Spice Up Your World: Omaha and the Global Clove Trade

Matthew Whalen[1] & Kifton Opocensky[2]

[1]Departmenf of Biology ; [2]Department of Computer Science & Graphic Design

Introduction

As we sit down to dinner each night, there is a good chance our dishes are teeming with flavor from worlds and cultures far and wide. Spices that originate half a world away are now intimately associated with our food culture. Spices are not just an accessory tool, they are an essential part of the way we define, prepare, and enjoy our food.

Over the past 400 years, spices, and cloves in particular, have made a grad journey across the globe to end up in our dishes. Omaha was a vital connection for exotic goods that moved across the continental United States. The demand for spices led to industrialization of these crops with significant human and environmental implications. Our can of cloves links Omaha to centuries of global agricultural change and reminds us that in The Anthropocene we must be aware of how our actions affect the Earth System.

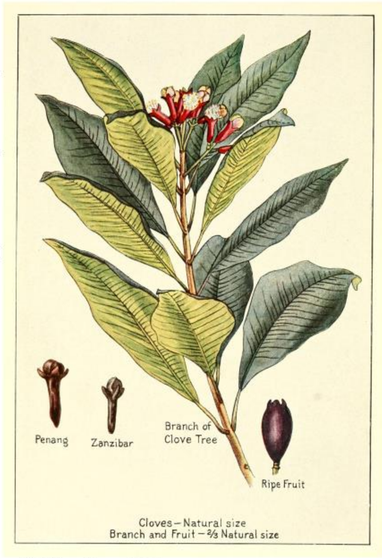

Fig 1. "Clove: Flower and Bud"

The Dutch and The Clove Trade: 1600-1800

Originally, China was the largest consumer of cloves, and until the 16th century Europe did not purchase clove directly from the Moluccas. Rather, they purchased from other countries that traded with the Moluccas (1). The Portuguese were the first Europeans to travel to the Moluccas around 1511. Fig 2 (right) depicts the most popular trading routes that developed over time between China and Europe around the Spice Islands. Pirates, lured by the potential wealth of cloves, forced China out of the trade. Portugal, the only nation with sufficient naval power to defend against pirate attacks, emerged as the dominant force in the clove trade. With their control growing, tensions rose with Indonesian countries, forcing the Portuguese to back off (2).

Fig. 2 Map of trade routes used in the 1600's (4)

The loosening of Portuguese control allowed the Dutch East India Company to begin taking control of Java in 1603 (3). There were many fights with the natives, the Portuguese and the Chinese, which ended up destroying a lot of trading routes, ports and hubs. Eventually, the Dutch succeeded in monopolizing the clove trade, and held that power for over 20 years. The company went bankrupt by 1720 and completely defunct by 1799 (3). After the Dutch lost control, there was a quick decentralization of the spice trade, allowing other nations to enter the trade, leading to the rapid movement of spices across the world, including the United States.

Paxton & Gallagher: The Omaha Connection

As cloves increased in demand across the world, mass production of cloves increased. Cloves were now transported across the world and across the United States, aided by the railway. Ties to the UP rail system added Omaha as another link in the Global trade and movement of flavor and culture.

The Paxton & Gallagher company (est. 1879) commanded possession of rail-lines in Omaha, and emerged as one of the premier jobbing wholesalers in the area. Their warehouses began importing large shipments of dried spices which they then ground and packaged on site. The company saw wild success with the launch of their independent food line, Butter-nut Foods, which they packaged and processed in their warehouse at 711 S. 10th Street (5).

Fig 3. Paxton & Gallagher Warehouse located adjacent to Rail-way at 711 S. 10th Street (11)

Fig 4. Female workers on the spice floor of the Paxton & Gallagher warehouse on S. 10th Street (11)

The warehouse (above) served as a multi-tiered spice mill, as each floor ground and roasted coffee, spices, and extracts. The smells lofted through the city, standing as a landmark to the residents as "as island of the blessed"(6). Spices soon became not just luxuries, but "essentials of cookery" (7) in the modern Omaha home. Newspapers encouraged housewives to increase their spice cabinets so they may learn to "Cook like the French". Soon, each home's cabinet was filled with stackable tins of spices. By the 1940s nearly every spice imaginable came pre-ground, ready to use, in a matching Paxton & Gallagher tin.

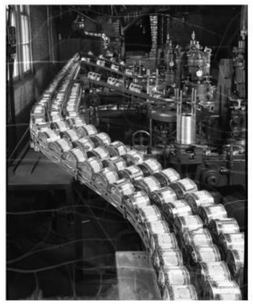

Fig. 5 P&G industrial canning line (11)

Fig. 6 Kitchen spice cabinet in a 1954 Omaha home (US Library of Congress Archives)

Cloves and the Anthropocene

Our metal clove can, devoid of any indication of the origin of its contents, represents a characteristic of the Anthropocene. It is an opaque tin that masks us from its history, our relationship with nature and with other cultures of people.
Spices can still be the great luxury to bind the world, to bring together all the unique flavors and cultures of our planet; they give us the opportunity to be transported to cultures and worlds away from our own kitchen. However, we must understand were these spices originate and the work and value that has brought them to us…

Do You Know Where Your Cloves Come From?

Cloves and the Environment

Until the 1700s, cloves grew exclusively in the Molucca islands where the Dutch commanded control over the plantation agriculture. The rise of industrial plantation agriculture brought about large declines in large mammals and rainforests of the archipelago. Early exports in the 1400s were picked from wild clove plants. However, as Europe's clove imports reached 30 tons per year, agriculture shifted to largescale production in the 1420s. European imports of cloves grew to 200 tons by 1600, resulting in 120 kha of forest clearing. By the 19th century, forest clearing increased to 475 kha for cloves alone in the Moluccas. These plantations constantly shifted across the landscape as soil became exhausted from intense clove agriculture (8).

Fig 7 Zanzibari man tending to drying cloves (From https://Flickr.com)

Fig 8. Area of forest cleared for agriculture in Madagascar (From https//Flickr.com)

As clove production in the Moluccas declined due to increasingly poor growing conditions, Zanzibar emerged as a viable competitor. As Zanzibar's slave export declined due to the Abolitionist movement, the slave labor was instead used for large scale clove production and by the late 19th century Zanzibar was the global leader in clove export. Since the early 1900s, introduction of "Sudden Death Disease", vectored by the red tree ant, has slowly crippled the growing capacity of the Zanzibar islands and greatly reduced the value of the Zanzibar clove trade which employs 70% of the rural population (9), resulting in largescale poverty throughout the country.

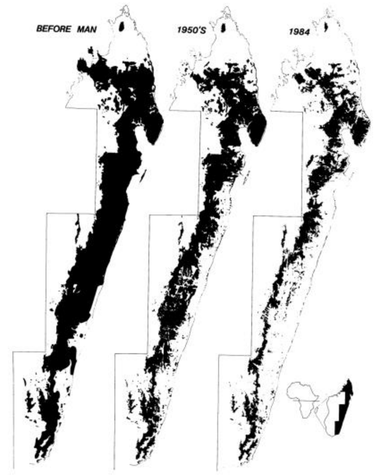

Fig. 1. Maps of deforestation history in eastern Madagascar derived from aerial photographs and satellite images. (a) The estimated original extent, (b) forest extent as of 1950, and (c) forest extent in 1985.

As Zanzibar's control over the clove trade waned, other countries emerged as new hotspots for clove production. Madagascar is currently the world leader of clove exports (10), consisting of 20% of their total earnings. Madagascar is home to a rich ecosystem, with unique flora and fauna. However, since the 1900s Madagascar has lost up to 50% of its rainforest, and even more has been disturbed through fragmentation and degradation.

Thus, clove cultivation has followed a consistent path of moving from location to location, leaving land and people decimated and exhausted in its path.

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11) Omaha Durham Museum Digital Archives

What's Cooking?

Courtney Correia – Environmental Science
Kayleen Bare – Psychology
Creighton University College of Arts and Sciences

C.A Swanson Company

Carl Swanson arrived in Omaha, Nebraska as a Swedish immigrant in 1896 to later purchase a small wholesale company that processed and sold eggs from local farmers. His sons took over during an era of dramatic change following the second world war. It was in this context that the Swanson brothers introduced the TV dinner to American culture. 5,000 dinners were sold during their first year of production, and exploded to 10 million the following year.

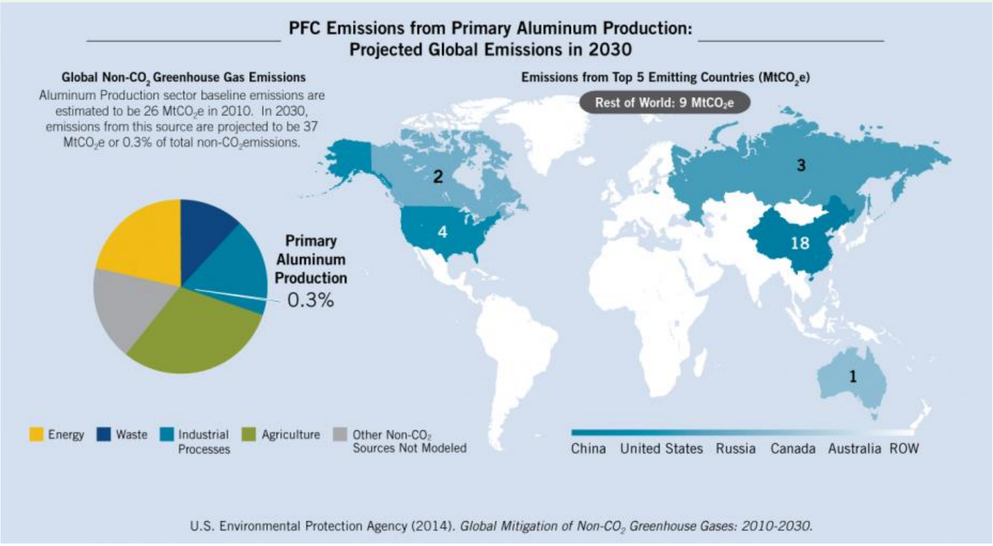
Carl A. Swanson (right) with O.S. Shaw (left)

Winner, Winner, Frozen Dinner

With men away at war women were much more involved in the workforce in their absence. When the Swanson brothers invented the TV dinner millions of women were still on the job. Because of this recent redefinition of domestic roles and status of women there was a new need for "convenience cooking". Working full days meant less time for cooking and cleaning at home. Swanson diners were easy, and required little time and labor. Simply removing the packaging and placing the dinner in the oven long enough to heat up was sufficient. No preparation, cooking, or dish cleaning was involved, which took much of the effort off of the working women. Because of this, Swanson TV dinner advertisements were largely targeted towards women, as evident in these 1950s ads.

"I'm late - but dinner won't be!"

The TV dinner changed the way Americans thought about food. In 1954, Swanson & Sons introduced the first prepackaged turkey dinner in Omaha, Nebraska. This revolutionary concept provided women an easy solution to balance working long hours and holding up their responsibility of cooking for their families. TV dinners were appealing because they required little effort to prepare and still provided a nutritious meal.

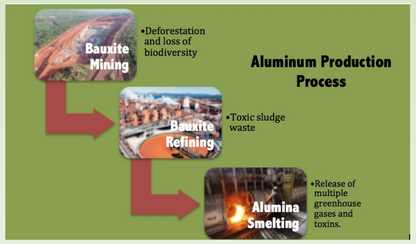


U.S. Environmental Protection Agency (2014). *Global Mitigation of Non-CO_2 Greenhouse Gases: 2010-2030.*

While aluminum trays provided an easy, mess-free meal, they were no friend to the environment. This map illustrates the projected emissions from aluminum production in 2030.

Anthropocene (factories, production, growth)

The most influential invention leading to the proposal of Swanson TV dinners was lightweight aluminum, which was used for the tray of these TV dinners. Aluminum's uses in World War II in military aviation let to an influx of aluminum production, world production tripled. World War II contributed its mass-production framework to create a new consumer intensive society, there was a surplus of leftover goods. New markets had to be created to purchase them (Bonneuil and Fressoz 2016). Gerry Thomas, a Swanson company executive, noticed these lightweight aluminum trays used to heat in-flight meals and proposed the idea to fill them with frozen turkey and side dishes as a easy way to serve dinner at home (Smith 2009, 171). Wilkinson Manufacturing, another Nebraska company, developed the initial aluminum foil Swanson Tv dinner tray (Morris 2005). Packaging of ready-made meals impacts global warming, fossil fuel depletion and human toxicity (Rivera, Orias, Azapagic 2014). The same environmentally detrimental aluminum production techniques are still used today and TV dinners continue to make use of aluminum in their packaging. According to the American Frozen Food Institute as stated by Gust, the frozen food industry is worth $22 billion, with the average American consuming 72 frozen meals each year (Gust 2011). In a report on the frozen food market, it is predicted that globally the market will grow with a 5.2% compound annual growth rate from 2017-2023 ("Frozen Food Market" 2017).



Environmental Impacts

The environmental consequences of this increasing production and demand for aluminum were significant. Aluminum is an active metal, the most common source of aluminum is bauxite ore. The three steps in aluminum production, mining and refining bauxite and smelting of aluminum, are all extremely energy intensive. It takes 15 kWh to produce just 2.2 pounds of aluminum, which is enough to power the average american household for half a day or more. Along with large energy use these processes use large amounts of water, and generate air, water, and soil pollution. (Norgate, Jahanshahi, and Rankin 2007). Bauxite is surface-mined in the tropics often causing deforestation and loss of biodiversity. The next step, refining bauxite produces a toxic sludge, red mud. The pH of this toxic sludge is high enough to kill plants, animals, and even burn airways if an individual breathes in near fresh sludge. Red mud eventually dries and becomes a toxic landfill. The final process of smelting releases multiple greenhouse gases and toxins (Donoghue, Frisch, and Olney 2014).

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Concerning Collectables: The Role of Consumer Plastic in the Anthropocene

Emily Newcomb, Craig Schmerbauch, and Duncan Riley : Creighton University

INTRODUCTION

The College World Series (CWS) has been a part of the cultural sphere of Omaha for decades. Since 1967, the CWS has recruited countless baseball fans to populate the streets of Omaha for two weeks every summer. As consumers fill the streets, countless products began to fill the streets to be taken home by patrons. One of these objects is a plastic souvenir cup from the 1988 CWS. This plastic cup is as ordinary as the contents of grandma's cupboard, and would likely have been created by an apparatus similar to the one featured in the appendix, which was patented in 1965. However, it is imperative to look beyond the surface, and imagine what this object truly represents: the global use of consumer plastic, both in Omaha and worldwide. Consumer plastics have had drastic effects on the environment on both a local and global scale; however, they have also positively contributed to progress toward a more sustainable society. Our object points to the fact that while plastics can embody negative effects of the Anthropocene, they can also exemplify the positive aspects of humanity's technological and scientific development.

OBJECT SPOTLIGHT

The physical properties of this 1998 CWS plastic cup (visualized below), are merely a fragment of a much greater story being told. Rather, this plastic cup represents a timeline: beginning with the production, transportation, consumption, and followed by disposal. Yet, this timeline becomes insufficient in illustrating a plastic cup's life-cycle unless the environmental interactions can be understood at each stage.

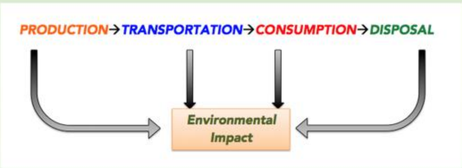


Figure created by Duncan Riley

Furthermore, observing this cup, think about this cup's life cycle knowing:

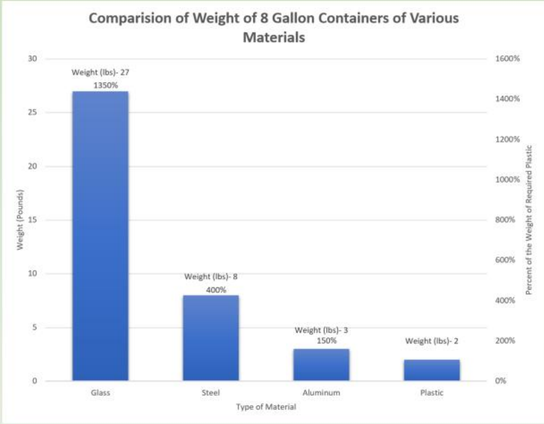
- Manufactured by Louisiana Plastics Inc.
  - St. Louis, Missouri- How far did it travel?
  - In 1998 or earlier- How was it produced? Efficiently?

Photograph of "Consumer Plastic" cup, a product if the 1988 NCAA College World Series hosted in Omaha, Nebraska. Object belongs to the Durham Museum of Omaha, Nebraska.

CONSUMER PLASTIC IN THE GLOBAL ANTHROPOCENE

Positive Aspects

Plastic does have many benefits to humanity and the environment. It has a high strength to weight ratio, allowing for less material to be used to create containers, lowing shipping costs, both in terms of money and energy and therefore environmental damage- other products tend to use 33% more energy after production, largely due to the heavier weight. There are many ways plastic can be reused once objects reach the end of their useful lives, through either recycling or conversion into crude oil (American Chemistry Council 2014).



Compares the weights of 8 gallon containers made of various materials, and shows the percent of weight increase relative to plastic (Denkstatt).

Negative Aspects

Plastic is integrated into nearly every aspect of American life. Plastic has been described as "one of the most ubiquitous and long lasting recent changes to the surface of our planet," (Fischer 2017). The volume of plastics usage has largely paralleled the explosive growth referred to by Anthropocene scholars as the Great Acceleration. Plastic was invented in 1907 and began to be commonly used in the 1940s, and its use has been increasing exponentially. The amount of plastic created in the first ten years of this century is greater than the amount produced in the prior century (Fischer 2017). Additionally, numbers skyrocketed between the 20th and 21st centuries. In 2007, 230 million tons of plastic were produced globally (Mossman 2008).

Plastic's effect upon the Anthropocene is unprecedented. While plastics theoretically have potential for reuse, the vast majority of plastics are created as single-use products, such as disposable water bottles. This has lead to incredible amounts of plastics in landfills and the oceans which will remain there unless otherwise removed by humans (Meikle 1997). Furthermore, chemicals added to plastics during their production have been found to be detrimental to organisms when absorbed, which often happens when they consume foods and beverages in plastic packaging or the plastic itself. Some of the commonly used chemicals within plastic manufacturing have great hazards including, but not limited to: toxicity, sensitization and corrosive damage to skin and eye, carcinogenicity, mutagenicity, and teratogenicity (Wilberg 1976).

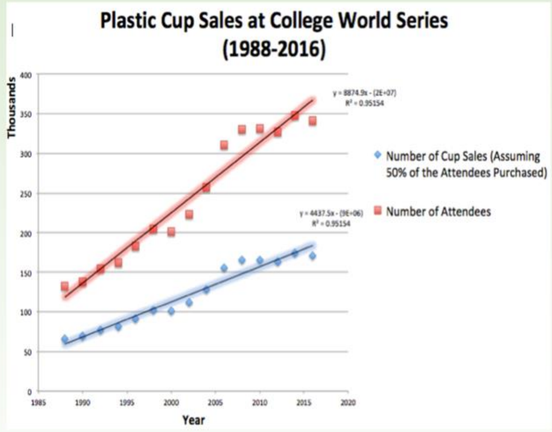
OMAHA CONNECTIONS TO THE ANTHROPOCENE

For most people, a common plastic cup from the 1988 College World Series may not tell any more about history than the teams that played that year. Yet, the historical value of these cups extends beyond its material composition, plastic.

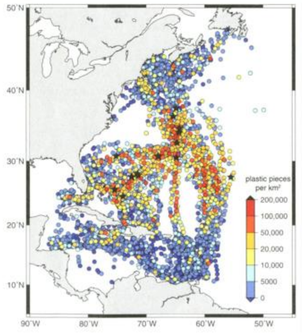
Americans and specifically those who live in Omaha, see and use plastics in almost every respect of their lives. Yet, we often overlook the time-line of its production, transportation, use, and disposal. Moreover, the full history of plastic in Omaha is best illustrated as an interconnected relationship between humans, objects, and nature.

Throughout its use in America, plastic has undergone many alterations in order to better benefit human use. However, it is imperative that we still understand that the benefits provided by plastic use, also comes with consequences. In fact, when buying and using plastic objects, it is essential to weigh out the environmental impacts and identify your role in protecting and preserving the environment.

The graph below depicts the number of people that attended the CWS every two years from 1988-2016. Assuming that the same percentage of people purchase cups every year (50%), this demonstrates the steady increase of plastic cup sales. Although the number of sales are highly speculative, this graph nonetheless emphasizes the increasing environmental impact of humans in Omaha. Assuming this trend is correct, that would say that ~150,000 more cups have been sold in 2016 than 2000, and merely demonstrates the importance of individual accountability in preserving our global environment.



Depicts the gradual increase of CWS attendees from 1988-2016. Under the assumption that cup sales remained similar each year, values were calculated to give a raw quantity for the amount of the plastic waste being produced each year by CWS (NCAA 2017).



Distribution of plastic marine debris collected in 6136 surface plankton net tows on annually repeated cruise tracks from 1986to 2008 in the western North Atlantic Ocean and Caribbean Sea. Symbols indicate the location of each net tow; color indicates the measured plastic concentration in pieces km"2. Black stars indicate tows with measured concentration greater than 200,000 pieces km"2.Symbols are layered from low to high concentrate (Law et. al, 2010).

CONCLUSION

Consumer plastic has left an immense footprint upon the foundation of the local and global environment. Man's most synthetic material has negatively impacted the environment through factory emissions, pollution of oceans, and longevity within landfills. This problem persists today, even with stronger recycling efforts in place. The overproduction of plastic, such as our College World Series collectible cup, is a byproduct of our consumerist society. Though there are many costs associated with the production, distribution, and waste of plastic, there have also been great societal benefits as well. The advancement of humanity's technological and scientific development has helped countless lives across the world. When used with intention, plastic may help reduce waste created and slow the progression of human induced pollution. Awareness is imperative in this potential change. Though society has progressed greatly since the mass production of plastic in post-war United States, there are great strides in environmental consciousness to be made.

Photograph from 2009 College World Series held at Rosenblatt Stadium. Credit to "Remember Rosenblatt", published on June 22, 2015.

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MAJORS

Emily Newcomb- Biology and History, *College of Arts and Science*
Craig Schmerbauch- Economics, *College of Arts and Science*
Duncan Riley- Biology, *College of Arts and Science*

Got Milk?: An Environmental History

Lindsey K. Mack (Biology) and Jennifer Obman (Health Administration & Policy)
Department of History, Creighton University, Omaha, NE

Robert's Milk Bottle:

Research Questions:

- How has the consumption and production of milk changed throughout the world's history?
- How has dairy farming contributed to the extensive anthropogenic changes to the global nitrogen cycle?

Thesis Statement:

The industrialization of dairy farming resulted in major changes in the nitrate concentration of public water sources. Improper disposal of nitrogenous wastes has had a negative effect on the environment and has contributed to the adverse realities of the Anthropocene.

Figure 1. Robert's Milk bottle, Omaha, 1940's. Source: Durham Museum Archives

- Milk has been a part of the human diet for centuries, though the way it has been consumed has evolved over time.
- Dairy farming practices followed the trend of the move towards intensive agriculture in the 20th century.
- J.R. Robert's Sanitary Dairy grew from a small operation outside of Lincoln, Nebraska, eventually including plants in Lincoln, Omaha, and Sioux City.
- The company was renamed Hiland Dairy, though the Omaha plant is still in use.
- Soon after glass bottles became the norm for milk containment, paper cartons were introduced. During World War II, this approach proved to be much more ideal, as paper cartons were easier to transport and less likely to break (Gwinn, 1950).

Milk Consumption & Production Through the Ages:

- Milk consumption has increased since its inception in the 15th century. Originally a luxury item, its popularity grew to become a household item.
- Concerns about the 'purity' of milk only arose after it was connected to the deaths of children and infants (Gwinn, 1950).
- Due to purity concerns, many people preferred to purchase dry and canned products, which experienced much more processing than the raw milk (Valenze, 2011).
- The use of pasteurization was a turning point for the production and consumption of milk, leading to a rapid increase in supply ("The Creamery and Milk Plant Monthly", 1922)
- It led to the transition to 'sanitary dairies', which were held to higher standards in terms of storage and cleanliness (Smith-Howard, 2014).
- Later concerns over milk's purity were focused on human-introduced contaminants, which led to a return to the purchase of dry-milk products. (Smith-Howard, 2014).

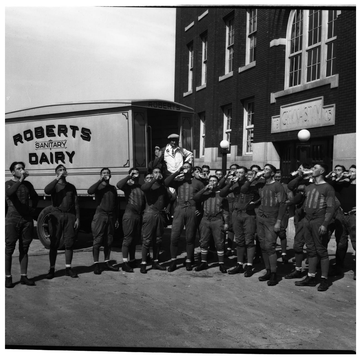

Figure 2. A group of Creighton University football players enjoy Robert's milk outside of the Old Gym. Source: Durham Museum Archive.

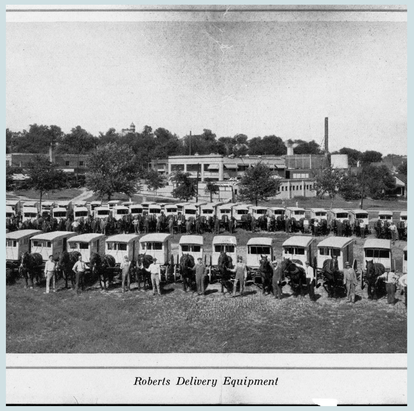

Figure 3. Horse-drawn delivery carriages from Robert's Dairy. Beginnings of Dairy Industrialization. Source: Durham Museum Archive.

Figure 4. Robert's Dairy production machinery. Beginnings of Dairy Industrialization. Source: Durham Museum Archive.

Nitrogen and the Environment:

- Nitrogen is required for the growth of plant matter and animal waste contains this vital nutrient to the life of plants, however, too much nitrogen can be harmful.
- The high capacity cattle barns used in dairy farming produce an immense amount of waste that is often not treated properly, leading to the formation of harmful runoff into public water sources.
- In the early to mid 1900s, the recommended method for floor waste treatment was via sand and trickling filters (Treblar & Harding, 1955).
- The 'treated' water was then allowed to combine with other water sources. However, this was soon found to be unacceptable. The nitrate concentration was still too high (Nichols, 1965).
- While animal waste is a natural source of nitrogen, the addition of anthropogenically produced nitrogen since the invention of the Haber-Bosch process has greatly increased the total amount of nitrogen present on the earth.
  - Because there is easier access to fertilizer that does not involve collecting manure from animals, farmers have decreased their use of this type of fertilizer, causing more of this waste to go untreated (Galloway & Cowling, 2002).

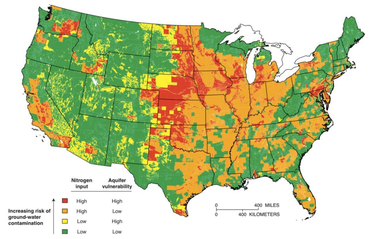

Figure 5. Areas at risk of nitrate contamination to shallow ground water. Source: https://water.usgs.gov/edu/nitrogen.html

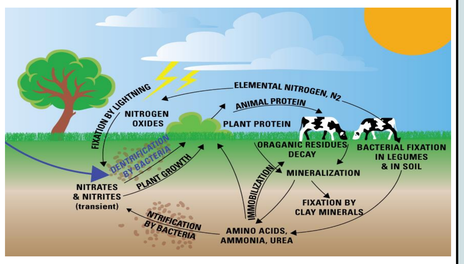

Figure 6. The nitrogen cycle. Source: http://geographybase.com/the-nitrogen-cycle

- While many facets of agriculture lead to increased nitrates within water sources, evidence suggests that dairy farms may be the greatest contributors to this kind of environmental degradation, due to the intensive grazing practices employed by these types of farms (Wilcock et al, 1999).
- Nitrogenous products in the water cause dead zones in aquatic environments and can be detrimental to the health of infants (Galloway and Cowling, 2002).
  - These dead zones can cause large-scale fish die-offs and cause the area to be uninhabitable by other water-dwelling creatures.
  - Nitrogen in the water that humans drink can cause Blue Baby Syndrome, in which babies are unable to take up as much oxygen in their blood, leading to developmental issues.

Looking to the Future:

- Animal waste and nitrate pollution as byproducts of milk production continues to grow and contaminate nature (Galloway and Cowling, 2002).
- However, there are farming models that have proven to decrease this pollution such as the "De marke" system, which has reduced nitrogen content by half (Aarts, Habekotte, and van Keulen, 2000).
- Environmental science continues to find ways to limit degradation caused by humans through advancements in technology and ways of thinking.

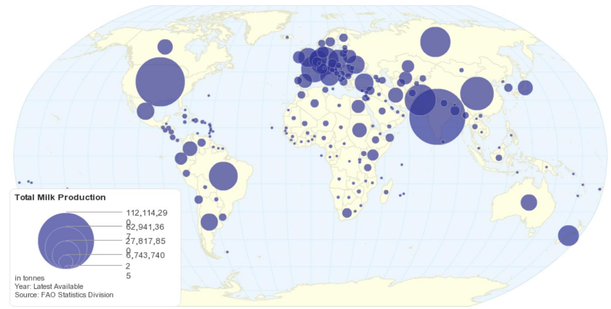

Figure 7. Total milk production in various locations around the world. Source: FAO Statistics Division

Figure 8. Robert's Milk Omaha, 1934. Source: Durham Museum Archive.

Figure 9. Hiland Dairy Omaha, 2018. Robert's Milk became a division of Hiland Dairy in 1981.

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Branding the Anthropocene

Michael Kokotajlo[1] & Bret Morrison[2]

Sustainability major[1], Psychology major[2]

Introduction

Figure 1. This is an image of the Iron cattle brand provided as the artifact of study. Figure 2. A steer is held in a branding rack. A rancher prepares him for the branding.

The iron brand represents the interconnection between Omaha and global history through the commodification of its grassland environment. The iron cattle brand was used to commodify cattle bodies. The use of the iron brand to identify and commodify cattle for market purposes highlights human influence within the Anthropocene- both in terms of laying claim to animal bodies as well the conversion of grassland ecosystems to support them. Both represent an Anthropogenic taming of the landscape .

A Classic Icon of the Old West

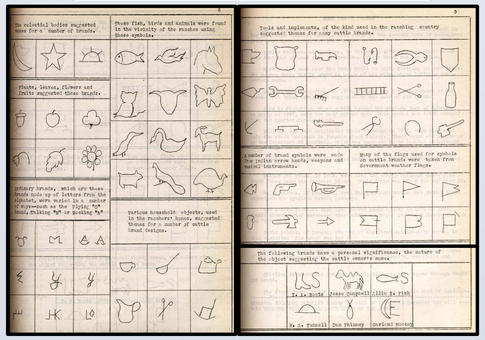

Figure 3. A catalogue of Nebraska Cattle Brands published in *Nebraska Folklore Pamphlet, Nov, 1938*

The goal of a brand was to be unique. They came in all shapes, sizes and combinations of characters. Rotation and serifs are one way of distinguishing brand letters but a common practice was the utilization of a type of ligature- the combining of two characters into one single character.

Figure 4. Picture from the National Park Service showing some men branding a calf.

Figure 5. Map illustrating the extermination of the American bison. Shows areas of die-off and of systematic extermination, range of herds up to 1889, and years of extermination in specific locations.

Cattle Take the Great Plains

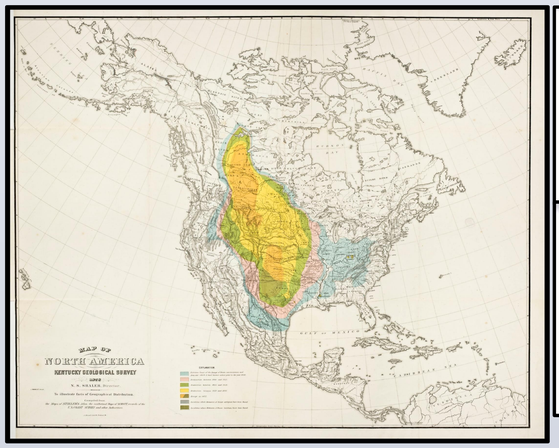

Figure 7. This map depicts the shrinking bison population, highlighting the effects of expansion at the nation's centennial. It became the model for William Temple Hornaday's well-known map of 1887.

Before cattle dominated the open ranges of the Great Plains, there was another type of ruminant roaming. This was the American Bison. "At the beginning of the nineteenth century, the plains had been home to bison population numbering upward of twenty, thirty, or even forty million animals". (Cronon, 1991). These animals controlled, shaped and modified their landscapes. Grasslands were comprised of shorter and more resilient species of grasses that could withstand the heavy grazing of these animals. They lived scattered throughout the plains moving between burned and unburned prairie, migrating north and south with the seasons. It was in the mid to late nineteenth century that the bison became victims of extermination.

From Bison to Cattle

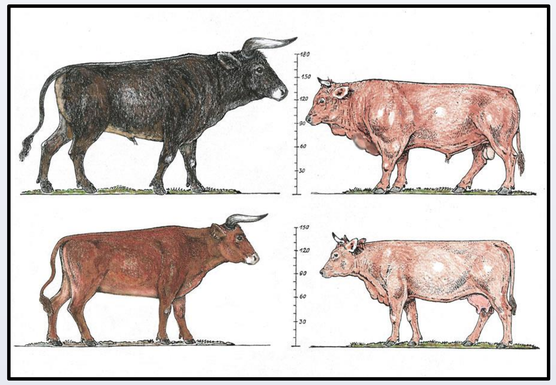

Figure 6. Comparison of bull and cow of the aurochs (left) and modern cattle (right).

- The eradication of bison and their replacement by cattle led to profound cultural, economic, and social changes. They also represented global environmental changes as grasslands around the world were domesticated for meat production .
- Bison and cattle share a common ancestor in the auroch. Many times larger and more aggressive than cattle, aurochs were the largest wild animals humans ever domesticated. Those many years of domestication have led to the auroch's extinction. (Francis 2015)

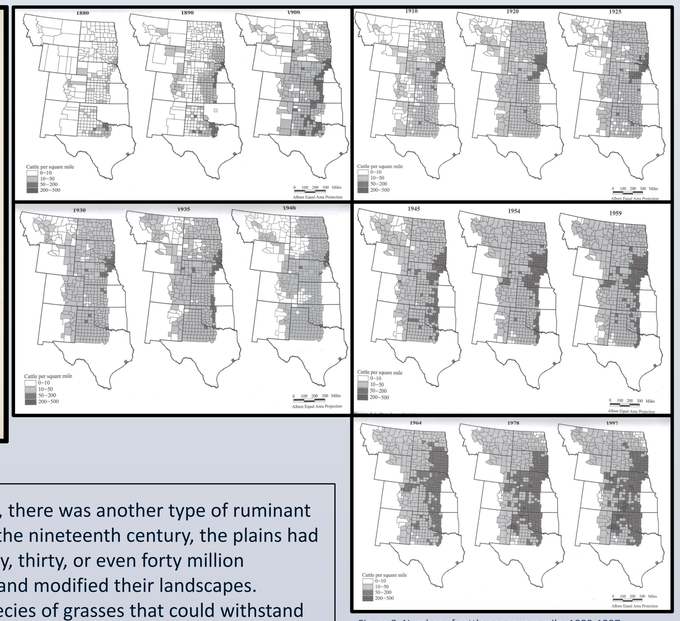

Figure 8. Number of cattle per square mile, 1880-1997

Cattle in Omaha

- During the 1890s, Nebraska saw a large population growth of 134 percent that influenced Nebraska into becoming a major producer of grain and cattle. (Larsen 1982) There was a large opportunity to grow the stockyard industry.
- The success of any start-up stockyard relied on the approval and cooperation of the Union Pacific Railroad. The railroad company was not interested in working with any stockyards, and they imposed large tolls on sipping livestock.
- Despite this, tycoon William Paxton was able to gain control of numerous small stockyards and combine them to create a stockyard "Syndicate."
- When Union Pacific fell on hard financial difficulties in early 1880s, it was the stockyard "Syndicate" in Omaha that bailed the company out. The resulting Union Stock Yards Company of Omaha (Limited) bought land from the railroad in South Omaha, establishing its hold in Omaha.
- Over the next ten years, through the efforts of major stockholder John McShane, the Union Stock Yards Company of Omaha (Limited) was able to help Omaha become a part of the Midwestern meat packing empire. The growth of South Omaha enterprise, especially in the packing industry, made it the "backbone of Omaha" as written by historian Alfred Sorenson. (Yost, 1966)

Cattle of the Anthropocene

- The commodification of cattle raises a question: Is human ownership of another organism a key indicator of the Anthropocene?
- The commodification of cattle is the commodification of the environment. It is at this point that humans use nature not just as a means to survive but as profit and growth, which is a key theme of the Anthropocene. It is in this way that the branding iron, which represents the commodification of cattle, symbolizes the Anthropocene.
- Jason Moore argues that the Anthropocene began when people introduced a qualitative shift in the way we view land from control of land as means of generating surplus resources to control of land as means to increase productivity. (Moore 2015)

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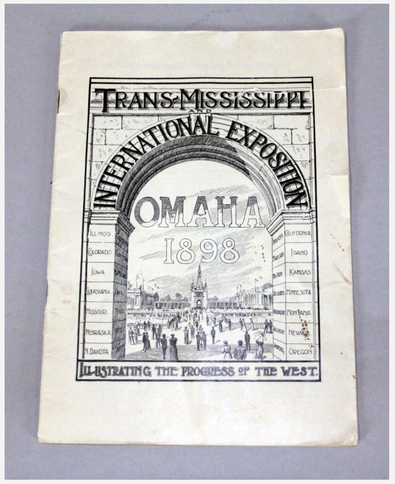
We would like to acknowledge the Durham Museum for sponsoring the opening of this exhibit, providing us with the Iron Cattle Brand as our artifact of study.

We would also like to acknowledge Emma Sundberg for providing us with the high resolution photos from the Durham Museum's Photo Archive.

Selling the West: The Trans-Mississippi Exposition

Maddie Fung | Biology & Matthew Mordeson | Computer Science

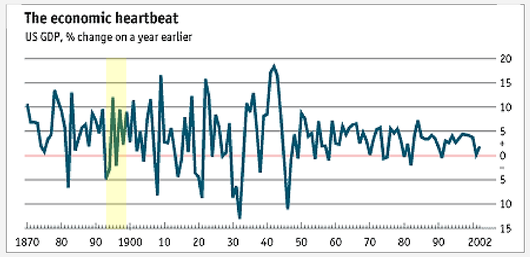
Pamphlet Artifact



This pamphlet was distributed from June – October 1898 at the Trans-Mississippi and International Exposition in Omaha. Its 32 pages described the buildings and exhibits, served as a navigation guide and provided information about other local Omaha attractions and amenities.

Capitalism & Boom-and-Bust Economics

Boom-and-bust financial cycles were fundamental and reoccurring phenomenon of capitalist economies in the nineteenth and twentieth centuries. Successful "booms" always preceded inevitable "busts."



Capitalism strongly influenced the inception of the Trans-Mississippi Exposition. The entire nation was still recovering from the Panic of 1893, and its agricultural failures disproportionately impacted Western states more than the rest of the country. The exposition was an opportunity for financial gain in order to revitalize the local economy.

The Trans-Mississippi Exposition was a metaphor for the boom-and-bust nature of capitalism in the developing west. Several aspects of the exposition illustrated these cyclic patterns of success and decline caused by exploiting natural resources, both through the exposition's physical construction and its fluctuating economic outcomes.

"The White City"

The Trans-Mississippi and International Exposition was one of several world's fairs held in the "Golden Age of World's Fairs" during the late 1800s. The Omaha Exposition featured exhibits from a variety of western states and their respective industries. Special exhibits featured the latest technological advancements in agriculture, electricity and several other industries.

The buildings and landscaping projected an image of success and stability, though it did not accurately represent the untamed, rugged Western land. The buildings' architecture reflected Renaissance style with Greek and Roman influences, and a two-thousand foot constructed lagoon hosted Venetian gondola rides for transportation. All these structures were inherently temporary, built to only withstand the five-month duration of the fair, then planned to be demolished. The fairgrounds were an illusion for lasting success.

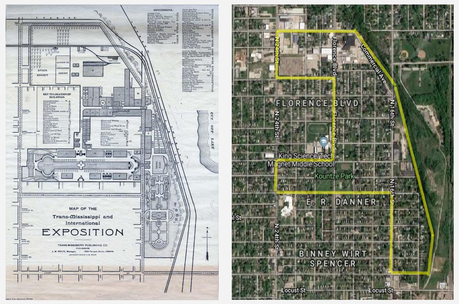
Resource Frontiers

The Trans-Mississippi Exposition advertised the untamed Western land as an opportunity for unlimited financial success. Nature was seen to exist independently from captial, therefore natural resources were simply commodities waiting for new settlers to exploit. This commodification of nature originated from the idea that humans are separate from nature, where capitalism furthered this division leading to global consequences (Moore, 2017). Practices that promote profit maximization can be logical from capitalist perspectives, yet illogical in ecological contexts (Wishart, 2012). The fair promoted the improvement of Western territories, by converting nature into resources into wealth, and by changing unclaimed wilderness into an economically flourishing Western Civilization.

Exposition Outcomes

The fair successfully hosted over 2.6 million visitors over the exposition's brief five-month duration (Haynes, 1910). However, the fairgrounds existed for less than two years, and the buildings were then demolished and their plaster remnants discarded into the emptied lagoon (Kelly, 1980). Similarly, the economic prosperity gained from the influx of visitors subsided as the fair closed and they all returned to their homes elsewhere. The extremely temporary lifespan between construction and demolition, and similarly the exposition's investment and payoff, portrays the culmination of all societal, economic and environmental perspectives influencing the Trans-Mississippi Exposition.

North Omaha: Then & Now



The Exhibition grounds were in North Omaha. The Grand Court and the lagoon occupied the land where Kountze Park currently exists (Landmarks, 1984).

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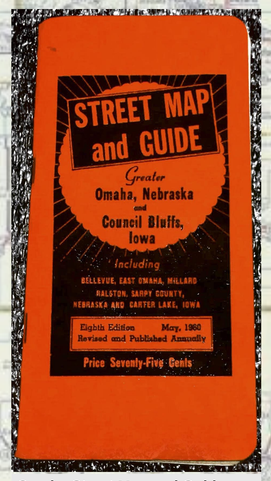
A Trip to the Past: A Guide to Roads in the Anthropocene

Alisha Baginski, History Major and Jessica Zawistowski , Biology Major | Creighton University

Introduction

In a post-World War II era, car culture expanded with the new military and economic expansions in American society. Paved roads and highways are examples of how this postwar culture influenced anthropogenic changes. The Omaha Street Map and Guide is representative of Omaha's part in the increase in land use for roads and highways during the Great Acceleration of the Anthropocene.



Omaha Street Map and Guide.
1960. Durham Museum Permanent Collection.

Workers constructing Interstate-80 in 1960.
From the Robert Paskach Collection, from The Durham Museum, Omaha, Nebraska. Copyright held by The Omaha World-Herald, Omaha, NE.

Historical Object

Omaha's relationship with car culture is evident in the massive road and highway infrastructure in the city. Published in 1960, this guide includes an inventory of car-friendly businesses and a map of Omaha's expanding road network. The car was central to life in the postwar Omaha, seen through the growth of the suburbs, and thus paved infrastructure, throughout the 1950s and 1960s.

A Story of Roads in the Anthropocene

The majority of the modern highway was constructed after President Dwight Eisenhower signed the Federal-Aid Highway Act of 1956. Originally for military movements, the highway system rapidly became a consumer commodity. Road construction in Nebraska was a major political topic throughout the 1960s. By the end of 1967, Nebraska had 103,000 miles of public roads.[1]

The Street Map and Guide provides a unique insight into the developing city of Omaha. With a history of transforming landscape and increasing the reach of human activities, roads can offer an important narrative when describing the Anthropocene.

Land Use Change

The increased construction of roads in Nebraska is part of a global anthropogenic phenomenon that has seen a rapid increase in impervious surfaces. Impervious surfaces can be used as a proxy for human activity's effects on the Earth. China, India, and the United States all have over 80,000 km^2 of impervious surfaces.[2]

This leads to an increase of pollutants in water runoff. Compounds, such as nitrogen oxide from car exhaust and hydrocarbons, cannot break down into the pavement. These toxic compounds contaminate rain runoff that negatively effects local ecosystems surrounding the paved area.[3]

Aerial view of I-80 construction in 1958.
From the John S. Savage Collection, from The Durham Museum, Omaha, Nebraska. Copyright held by The Omaha World-Herald.

Construction of I-80 in April 1960.
From the Durham Museum, Robert Paskach Collection, from The Omaha, Nebraska. Copyright held by The Omaha World-Herald.

Urban Sprawl

Roads play an important part in urban sprawl. As cities become more dense, roads offer a solution to growing populations. However, as roads are created in new areas, they often bring about more business and neighborhoods, leading to another increase in population. Thus, construction of roads contribute to a positive feedback loop of urban sprawl.[4]

Conclusion

With its extensive map and addresses, the Omaha Street Map and Guide shows how roads were a crucial part of Omaha life in the 1960's. The construction of roads and highways has many applications to the Anthropocene: they help to globalize the planet through ease of transportation and enable people to better access and exploit the land. Furthermore, roads can significantly affect surrounding and pre-existing ecosystems.

Interstate construction outside of Omaha in April 1960.
From the Durham Museum, Robert Paskach Collection, from The Omaha, Nebraska. Copyright held by The Omaha World-Herald.

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Acknowledgement

We would like to thank the Durham Museum for allowing us to access the Omaha Street Map and Guide as well as their collection of historical photos of Omaha.

WHEN ENTERING ANOTHER STATE OBTAIN MAP OF THAT STATE FROM ANY SHELL DEALER

Creighton UNIVERSITY
College of Arts and Sciences

THE PARADOX OF THE MONKEY WRENCH

Brad Macdonald - Exercise Science and Pre-Health Professions & Hasan Lari - Biology

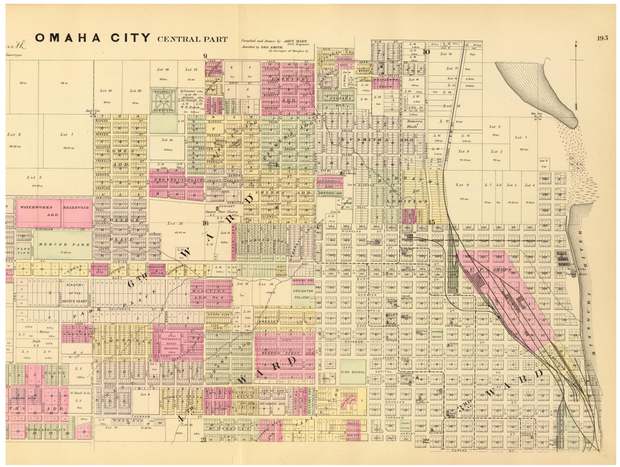
THE DURHAM MUSEUM

INTRODUCTION

The monkey wrench is a symbol of the innovation of humans and consequently, our impact on the environment. However, there is a separate history in which it is a symbol for radical environmentalism as well, in a different time and a variety of places. This is the paradox of the monkey wrench: a tool created for use in industry and the taming of the natural world by mankind, which has become a rallying image for those who radically oppose the very same industrial advancement.

OMAHA IN THE SECOND INDUSTRIAL REVOLUTION

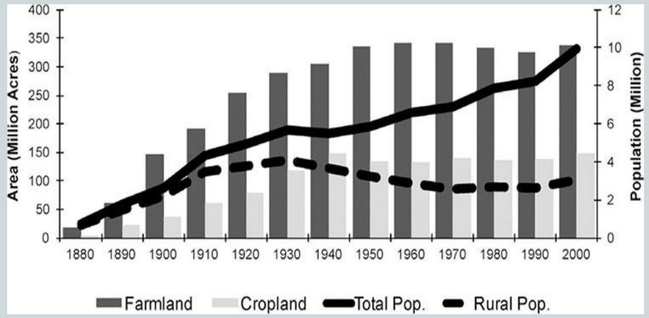
After the railroad construction began, an influx of employment opportunities saw Omaha grow and far surpass its neighbor cities and become a gateway to the Western portion of the United States. In an 1867 book, published by the Union Pacific Railroad Company itself, the economic opportunities afforded by the construction of the railroad are outlined. Natural resources such as untapped land for farming, mining, hunting and harvesting lumber were held as the most lucrative of opportunities (The Union Pacific Railroad Company 1867).



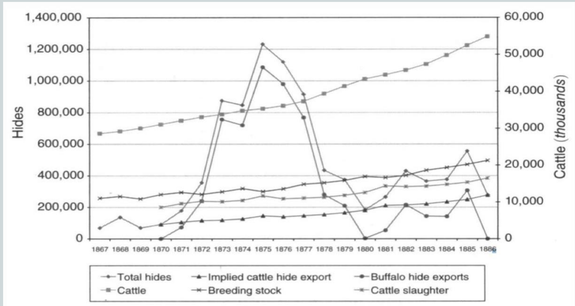
A map of the city of Omaha created by George M. Smith (1885) Union Pacific machine shops occupy a section in the bottom right of the map.

TAMING THE LANDSCAPE

Large-scale agriculture took its toll on the local and global environments in the last nineteenth and early twentieth centuries. (Gutmann 2018). A graph depicting the usage of land in the Great Plains and population growth which contributed to environmental change is shown below. The railroad allowed for transnational and international trade of hides and furs of animals. The hunting of bison to virtual extinction is an example of the devastating damage that the increased accessibility to the Great Plains had on its environment and a graph depicting this trend is below (Taylor 2011).

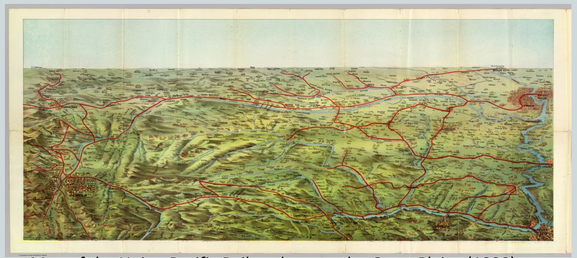


Measures of Population Growth and Land Usage in the Great Plains (1880-2000)



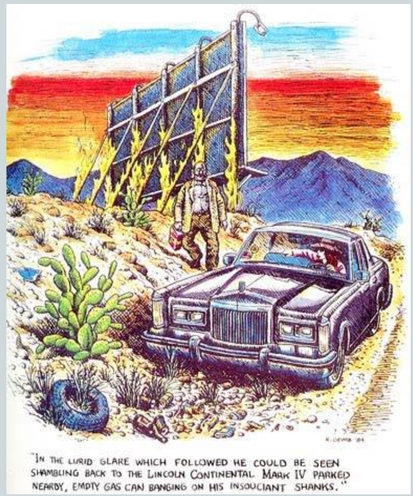
Bison Hide Exports and Cattle Population in the Great Plains (1867-1886)

Twentieth Century Monkey Wrench from Omaha, Nebraska

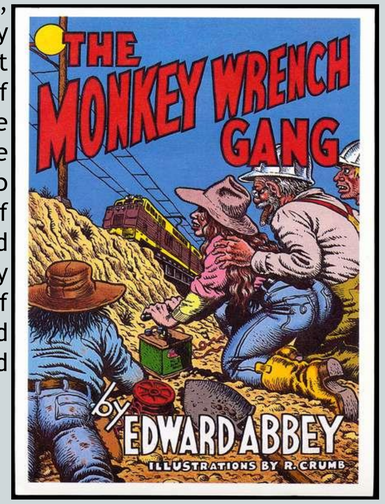


Map of the Union Pacific Railroad across the Great Plains (1890)

MONKEYWRENCHING



In his novel *The Monkey Wrench Gang*, Edward Abbey tells the fictional story of a group of activists who commit acts of sabotage in the name of environmentalism, and coining the term "monkeywrenching" in the process (Abbey 1975). Robert Crumb illustrated the book and examples of his work are shown to the right and the left. The ideology of Abbey eventually led to the development of a climate of resistance toward environmental destruction by the end of the twentieth century.



RESISTANCE IN OMAHA IN THE TWENTIETH CENTURY

The actions of groups such as Earth First! and ELF coupled with a new ideology of environmentalism had a massive impact on the United States. In Omaha, these effects can be seen in the creation of the Quality Environment Council. At Creighton University, students demonstrated an environmentalist ideology in articles from *The Creightonian*. This is evident in the political cartoons published in the paper in the 1970s.

Political Cartoons from *The Creightonian* (1970s)

CONCLUSION

The monkey wrench, through its contributions to industry primarily through the railroad was an agent for the advancement of human endeavors to tame the landscape during the second industrial revolution. In contrast, it become a symbol for those who radically oppose the advancement of industry in the United States following the works of Edward Abbey and the establishments of radical groups such as Earth First! and ELF in the late twentieth century.

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The Yoke That Broke the Plains

Creighton University
College of Arts and Sciences

Abbey Rieber, Jen Luttrell, Nicole Shintani

Biology Major History Major Environment Science Major

The Durham Museum

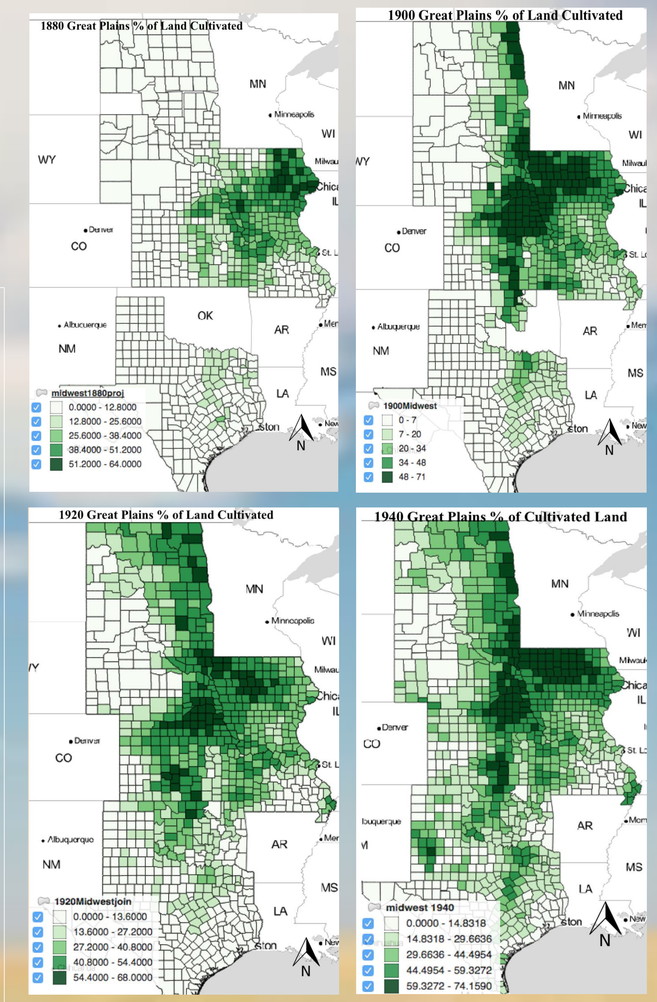
Neck Yoke in the Durham Museum collection

Yokes are tools through which animals are used to do work such as pulling a wagon or a farm plow. They have been used since antiquity in various cultures across the globe. Three different types of yokes are commonly used with oxen. The head yoke which is typically fitted to the horns of the ox, the withers yoke which is most commonly used on bovine with distinct humped backs and is fitted around their shoulders. The last type of yoke is the neck yoke, shown above. This yoke is displayed at the Durham Museum and was probably used for farming in the Omaha area. This would attach to two oxen providing more power than just one alone could. We are speculating that this yoke in particular was made around 1870 – 1900. In these years many farmers were still using yoked oxen in the Great Planes region. Advertisements in the Omaha World Herald from the late 1800's were often looking for young boys to work with yoked oxen to plow fields. This was made from a hard wood such as elm, hickory, or maple as these are typical for making sturdy, long lasting yokes. These neck yokes were the most popularly used and culturally important of the yokes to settlers in America, and allowed farmers to harness the muscle power of oxen to overturn soil to prepare their fields especially in the Great Planes.

Head Yoke

Withers yoke

Oxen were typically chosen over other farm animals for several reasons. “He [the ox] not only pulled the plow, harrowed the fields, threshed the grain, and perhaps hauled some of it to the market -- all the while providing the manure for the next year’s crop” (Moore 1961). Aside from their versatility, another major reason they were chosen for farm use was simply that they were cheaper than other animals like horses. This along with yokes being relatively inexpensive allowed for even poor farmers to start raising oxen and start farming their land. Even today, some small farmers opt to use oxen over purchasing a tractor because they are much cheaper and more cost effective over long term.



These maps show the change in the percent of cultivated (plowed) land on the Great Plains from 1880 to 1940. They are important in showing how the use of yoked oxen changed the environment of the Midwest.

Busting the sod on the Midwest plains was critical for advancing pioneers. Because it was such hard soil, breaking it was only possible through the power provided by the yoked oxen. It allowed for tough grasslands to become fertile cropland. “Breaking prairie sod required a plow weighing 30 to 50 kg, typically powered by six to eight oxen” (Rhoads 2015). With the introduction of yoke to the area, people were finally able to make use of the land for farming. As the map depict, much of the Midwest was cultivated and being used extensively in the 1900s. Along with this increase in cultivated land came an increased population size and commoditization of the land. As time goes on, more and more of the Midwest was cultivated. With this cultivation came the destruction of the ecosystem that was present at the time. This destruction is what connects the plow to the Anthropocene by telling a story about how new human made innovations can lead to impacts across entire contents and even the globe. In the prairies once all the grasslands were removed new plants, like trees, were able to take their place. These altered habitats and allowed for new species to move into the area as well as others were forced to leave or to die off. Sod busting did more than allow new species into the area, "sod busting, wind and drought combined to strip away friable soils" (Landa 2010). With these factors draining soil of its nutrients, more land was needed to be plowed in order for farmers to maintain the amount harvested. This cycle led to the Dust Bowl in the 1930's, which was a period of severe dust storms that greatly damaged the ecology and the ability for agriculture of the American prairie. "A widely respected authority on world food problems, George Borgstrom, has ranked the creation of the Dust Bowl as one of the three worst ecological blunders in history" (Worster 2004). During the drought of the 1930s, soil no longer anchored by the roots of prairie grass turned to dust. This dust was then blown away, sometimes into huge, blackening clouds, by prevailing winds. While teams of yoked oxen weren't the only cause of the dust bowl, the sod busting they did facilitated the erosion. The erosion following the loss of grasslands and was a major factor in causing the dust bowl.

A mural located at the Durham Museum depicting yoked oxen in a field pulling a plow.

"Throughout the Great Plains, farmers experienced phases... A pioneer era of expansion and reduction... in the twentieth century as farmers reached the natural limits of their environment. A transition era saw many farmers plow a bit too much marginal land, realize their error, and restore some of it to pasture" (Cunfer 2005). The over plowed land is still recovering today. With fewer but larger farms on the plains the land has been able to recover some of its lost prairie. Globally, “through harvesting, deforestation, and conversion of grasslands and wetlands, humans have reduced the stock of global terrestrial plant mass by as much as 45% in the last 2000 years” (Goudie 2018). Humans have started to realize the negative impacts they have made on the planet, which are so vast that some even think that humans have started a new era: the Anthropocene.

Photo from Durham Museum archives depicting oxen transporting farming materials.

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A Vacuum's impact

Omaha in the Anthropocene
Johnna Bierman: Elementary Education
Mason Rasmussen: Biology

ABSTRACT

- Before the dawn of electricity, daily housework required hours of manual labor. This meant doing your laundry by hand and cleaning your carpet without a vacuum. Once homes became wired for electricity electronic appliances were invented to help with this issue. This poster will explore our the connections between the consumer revolution that occurred after the second world war and the Anthropocene focusing on postwar energy consumption.

BACKGROUND ON THE VACUUM

•Our particular vacuum is a Kenmore Kenkart vacuum (shown right). It was manufactured in the 1950s by the Kenmore company for the Sears Roebuck Company. It was likely manufactured in Chicago and shipped to the Omaha Sears and Roebuck Co. location on Farnam street (shown below) where it would later be sold (Howard, 2017). The object was utilized for daily domestic chores for the duration of its usefulness until being given to the Durham.

Sears, Roebuck and Company. October 17, 1929. Bostwick-Frohardt Collection, The Durham Museum, Omaha Photo Archive.

OMAHA CONNECTION

- This object is primarily connected to Omaha through the Sears Roebuck company. The first Omaha location of the Sears Roebuck and Co. opened on August 23, 1928 on Farnam street.

SPECIAL SECTION SEARS, ROEBUCK & CO. ANNOUNCEMENTS

Morning World-Herald.

OMAHA, NEBRASKA, WEDNESDAY, AUGUST 22, 1928.

SPECIAL SECTION SEARS, ROEBUCK & CO. ANNOUNCEMENTS

C SECTION—TEN PAGES.

SEARS, ROEBUCK STORE OPENS TOMORROW

RICHARD SEARS, STATION AGENT AT 20, LAUNCHED FIRST BUSINESS VENTURE

Few Know That He Once Retired from Merchandising and Planned to Enter Banking Business in Iowa.

HIS LIFE A ROMANCE

PROUD OF THE NEW "DAYLIGHT" STORE

RETAIL STORES MAKE SALES OVER COUNTER

Manager Says That Is Hardest Thing to Make People Understand.

40-YEAR BACKGROUND

Here Is the Omaha Home of Sears, Roebuck & Co.

New Omaha home of Sears, Roebuck & Co., at Farnam street and Turner boulevard, which opens tomorrow.

OFFICIALS ON GROUND SAY EVERYTHING READY FOR PRESENTATION TO PUBLIC

PRESIDENT WOOD CONGRATULATES LOCAL MANAGER

Company Heads Tell Delight at Entering Omaha Business Field.

DOORS OPEN AT 9 A. M.

LOCAL FACTORIES WILL SUPPLY MUCH GOODS

"Sears Roebuck Store Opens Tomorrow." *Morning World-Herald*(Omaha), August 22, 1928, Special sec. Accessed March 22, 2018.

- The Sears Roebuck Co. Had extensive growth after the end of WWII. This was primarily due to the large consumer boom that occurred following the war with a 240% rise in in home appliance and furnishing sales (Nickles, 2002). It was within this post war context of the 50's that our Kenmore vacuum had its impact.

FUELING POSTWAR CONSUMERISM

- Starting in the late 1940s and early 1950s there was an increasing demand for electricity, a trend which would exponentially increase into the 21st century. This demand was filled by increasing the burning of coal in order to increase electric power production.
- The United States had mass means of production remaining after World War II, and in order to sustain this production new markets and consequently new consumers were created. Vacuums alone are not responsible for this increase in demand for electricity, but the vacuum and consumer products and appliances popularized during this period of postwar consumerism are at least in part responsible for this increase in demand of electricity.

Coal in Electricity Generation		
South Africa 93%	Poland 87%	PR China 79%
Australia 78%	Kazakhstan 75%	India 68%
Israel 58%	Czech Rep 51%	Morocco 51%
Greece 54%	USA 45%	Germany 41%

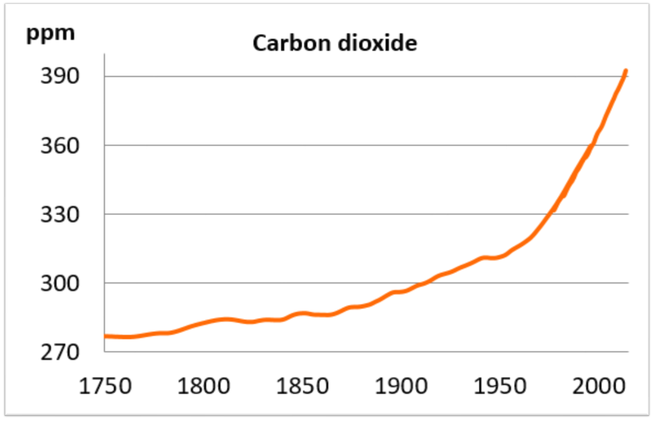
"Coal in Electricity Generation." *International Energy Agency*, 2012. https://www.iea.org/topics/coal/.o

ENERGY TRANSITIONS

- In 1950 coal was surpassed by oil as the major source of energy, however, coal has remained the largest source of electricity generation in the United States. As demands for electricity began to increase for the average American consumer during this period of postwar consumerism so did the burning of coal in order to meet this demand for electricity.

CORRELATIONS

- The increasing release of CO2 into the atmosphere from the burning of coal and other fossil fuels is strongly linked to the rising CO2 levels in the atmosphere, measured in parts per million (ppm). The trend of rising CO2 concentrations in the atmosphere has been shown to start at roughly the same time as the industrial revolution and has continued to increase just as the burning of fossil fuels has continued to increase. It is possible to obtain data about the amount of CO2 present in the atmosphere throughout history by analyzing air samples trapped in ice cores, an accumulation of this data is over the past centuries is graphed below.



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The Wheel has Come Full Circle

Rebecca Hare (Mathematics & Secondary Education) and Emma Baker (Biology)
Creighton University Department of History

Introduction: Rubber in Brazil

For most of the 18th and 19th centuries Brazil supplied almost all of the world's demand for rubber (Grandin). Originally the trees (*Havea brasiliensis* and *Castilloa ulei)* grew wild in small patches of two to three trees spread throughout the jungle (Stanfield). To extract the latex from the *Castilloa* trees required the tappers to create deep cuts which resulted in the death of the tree (Stanfield). By 1874 there was a decline in rubber exports due to the destruction of the trees (Clay). Thus the first stage of environment transformation due to the rubber industry was well under way.

Figure 1: Sap seeping out from a rubber tree. Source:http://thinkscience.in/?p=1041

Figure 2: Southeast Asia rubber plantation. Source:https://www.pinterest.com/pin/454019206166996161/

Charles Goodyear & Vulcanization

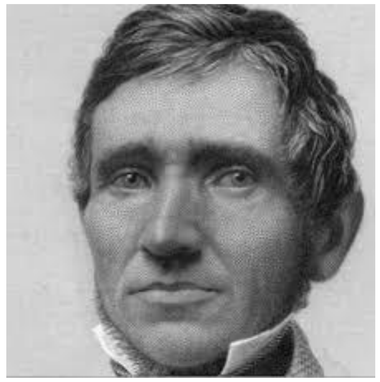

Figure 3: Charles Goodyear, the inventor of vulcanization. Source: https://www.linkedin.com/pulse/end-result-worth-weight-cost-susan-haring

When natural rubber is exposed to extreme temperatures, it melts in the hot summer and cracks in the cold winter (Clay). Thus, the rubber industry explored new ways to manufacture rubber. Through a process of trial, error, and serendipity, Charles Goodyear succeeded in "vulcanizing" rubber in 1839 (Clay). Goodyear combined sulfur and rubber at a very high temperature (Somma). This process, which is still used today, created rubber that actually began to harder at high temperatures (Somma).

Omaha and the Rubber Industry

Figure 4: This picture shows the Nebraska Tire and Rubber Company Logo found in the Durham Museum Collection.

Research Questions:

- How does rubber play a role in the larger narrative of the Anthropocene?
- How does rubber connect Omaha to this global narrative?

Thesis Statement: The logo of the Nebraska Tire and Rubber Company, our artifact, shows how the transportation and rubber industry evolved together and the effects that this coevolution had on environments thousands of miles away.

Figure 5: The Omaha Overland Tire Factory, pictured here represents a common tire factory in the 1920s. Source: http://durhammuseum.contentdm.oclc.org/cdm/singleitem/collection/p15426coll1/id/4532/rec/6

During the 1880s bicycling increased in popularity and opened up space for a new market, tire manufacturing. By 1907 companies were starting to produce tires for automobiles instead of bicycles with 33% of their sales being for the larger more expensive car tires (French). The 1900s saw a rise in the demand for rubber and many places profited. One such company was the Nebraska Tire and Rubber Company whose certificate above shows the importance of rubber not only in the United States, but specifically the impact of rubber in Omaha. With the nationwide automobile spark, Omaha was the leading city with the highest ratio of population to automobile ownership in 1923 (Harding). "Three tire manufacturers in Omaha are making approximately 1,500 tires and on average 1,000 a day each. The Nebraska Rubber and Tire company attributed to 550 of the 1,500 tires and 500 of the 1,000 tubes produced each day" (India Rubber & Tire Review).

Rubber today: Deforestation in SE Asia

In 1876, Henry Wickham committed an act of bio-piracy that would change the world forever when he smuggled rubber seeds out of the Amazon (Stanfield). New plantations were created, in countries such as Thailand, Indonesia Malaysia, India, Vietnam, and Sri Lanka, and forests were clear cut to make room for the new monocrop (Clay). Due to this South East Asia has suffered from immense landscape change due to high demand for the latex. Since 1961 rubber production has increased by a factor of 1500% in South East Asia (Fox). Its range is being expanded from where it was originally planted to keep up with demand. Typically this was done through the use of slash and burn tactics to clear forests needed for the new plantations (Fox). The new areas are less suitable for rubber plantations and usually require some form of terracing to grow properly leading to higher rates of soil erosion (Fox). As the demand for new tires continues to increase areas in South East Asia will continue to be transformed and degraded.

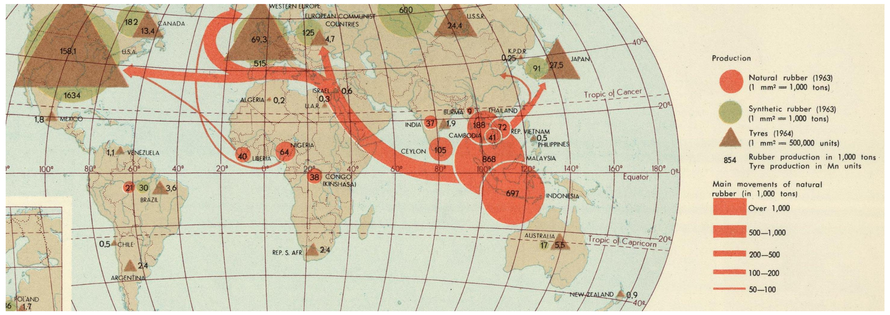

Figure 6: This map shows the global natural and synthetic rubber production and also shows the major movement of natural rubber from Southeast Asia. Source: https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~205401~3002403:Industry--continued---Pergamon-Worl?sort=Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No

Rubber and WWII

Figure 7: WWII campaign to help advertise the need to save rubber. Source: https://originalvintagemovieposters.com/ww2-propaganda-poster-save-rubber-willis-jeep-linen-backed/

"The American rubber industry became the largest and the most technologically advanced in the world. By the late 1930s, the United States was using half the world's supply of natural rubber, and most of it originated in Southeast Asia" (United States Rubber Program). In 1941, with the attack on Pearl Harbor, the United States' rubber plantations in Southeast Asia were also seized by the Japanese (United States Rubber Program). Franklin Roosevelt responded to the rubber shortage through three specific actions. First, Roosevelt asked Americans to be mindful of their rubber consumption and to collect extra rubber to be recycled (United States Rubber Program). U.S. citizens with specific plant knowledge were sent to nearly all corners of the earth to find other resources that could be used to producd rubber (United States Rubber Program). Lastly, Roosevelt called for a production of a new synthetic rubber.

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Meat the Anthropocene: Environmental and Historical Impacts of the Omaha Beef Industry

Joe Longhini, Jimmy Huiskamp

Biology and Finance Majors

Creighton University
College of Arts and Sciences

The Durham Museum

Introduction

The anthropogenic artifact that represents Omaha's history in the Anthropocene is a Dold sliced beef container. This object represents a piece of Omaha's history as center of the livestock industry. Livestock has an inherent impact on the planet because of their enteric fermentation (digestive release of methane) leading to accumulation of greenhouse gases. We will examine the history behind Omaha's stockyards, and the environmental impact that this represents for the growing human population.

Figure I. Dold meatpacking box

Midwestern Growth

The industry of meat packing went through large amounts of change before Omaha became a crucial player. In the mid-1800s, before the creation of massive stockyards and slaughterhouses, the meat industry was simply made up of merchants who were, "engaging in a part-time and seasonal occupation" (Walsh, 1982). Farmers would seek out these merchants looking for help in the disposal of excess commodities that they generated (Walsh, 1982). Specialization and access to capital allowed merchants to grow their scale of operations and take advantage of economies of scale. Meat distribution became an extremely capital-intensive occupation and only those that had large amounts of cash were able to survive.

Figure II. Swift refrigerated boxcar (Chicago Tribune)

While size and capacity increases of meat packing plants helped the meat industry grow, the pace of change accelerated following two key developments after the civil war: refrigeration and improved railroad connections. Ice packing allowed meat packers to operate throughout the summer months in facilities that were designed to keep the product from spoiling (Cronon, 1997). However, not everyone instantly welcomed this change as the idea of eating meat weeks after it has been cut appeared unhealthy (Cronon, 1997). Improved railroad infrastructure was arguably even more important than chilled packing, as it allowed for massive shipments to be made from livestock hubs in the south, such as Texas (Amstutz, 2008). Herders from Texas transported cattle North as they discovered cattle grazed well the North's terrain. From 1960 to 1980, the number of cattle in Nebraska increased from 37,000 to 1.1 million (Amstutz, 2008).

Omaha's Expansion

Figure III. Omaha Stockyards, 1954

Figure IV. Union Stock Yards Co. map

1876 was a key date in Omaha's meat packing industry. John A. Smiley created the Union Stock Yards Company of Omaha, which is not to be confused with the aforementioned Union Stockyard and Transit Company (Larsen, 2007). The company set up its facilities in South Omaha near a juncture owned by Union Pacific that connected Iowa to Nebraska. The meat packing company faced great struggles in attempting to construct deals with Union Pacific as the railroad company was reluctant to decrease the tolls it was charging for the use of its facilities (Larsen, 2007). In the early 1880s, however, the real estate investor, William Paxton, struck a deal to help grow Omaha's meatpacking business (Larsen, 2007). William Paxton was developing a similar stockyard setup in Council Bluffs, Iowa, which served as a, "transfer point where animals were unloaded and watered en route to Chicago" (Larsen, 2007). William Paxon leveraged the land of his newly formed syndicate, Omaha Land Company, which he acquired to negotiate more favorable shipping terms with Union Pacific and purchase more land to establish additional stockyards (Larsen, 2007). These actions by Paxon and his business partners led to the success of Omaha and the failure of Council Bluffs in the livestock business as people began to look at South Omaha as the most sensible place for stockyards to be located. (Larsen, 2007)

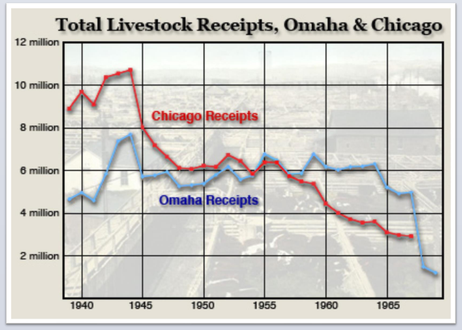


Figure V. Omaha's passage of Chicago in livestock receipts

As Omaha grew, it increasingly challenged the preeminence of other, larger cities in meat packing.. In the year 1890, Omaha ranked third in the nation in terms of meat packing cities, behind Kansas City and Chicago. It took approximately 65 years for Omaha to pass its peers in this category. In the year 1955, Omaha surpassed Chicago in terms of livestock receipts by 6.6% (Fine, 1956). Tremendous ground was made in the 15 years before that date, as Omaha only made up 51% of Chicago's gross receipts in 1940 (Fine, 1956). Although this growth was fantastic for Omaha's economy, but the environmental consequences of these change were equally significant.

Atmospheric Implications

To begin to understand the environmental and global impacts towards which the Omaha Stockyards have contributed, we must understand the role of cattle and other livestock within the context of the atmosphere. In the 21st century, demand for meat and protein have seen a significant rise to meet a growing population (Figure VI).

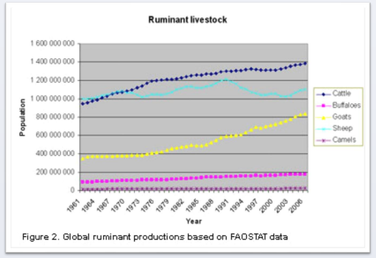


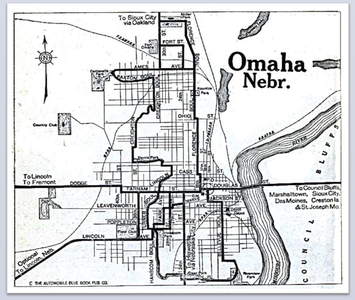
Figure VI. Growth of ruminant numbers over time (FAO 2018)

Cattle and other livestock emit methane due to enteric fermentation (creation of methane due to bacteria in the digestive tract), which disperses in the atmosphere and acts as a greenhouse gas. Greenhouse gases reflect solar energy back onto the earth, trapping radiation energy within the atmosphere, leading to changes in global climate that we see today.

Livestock are currently the leading contributor of anthropogenic methane emissions.

Breakdown of Methane Emissions

6,805 kilotons (kt) of methane were released across the globe from enteric fermentation in 2016 (EPA 2018).



In one of the Omaha Stockyard's peak years, livestock emitted 278.7 kt of methane amongst 7.7 million processed heads of livestock (Ganzell 2018).

Over a lifetime, one cow will produce 120.7kg of methane due to enteric fermentation (FAO 2010). By taking the percentage weight that the Dold Sliced Beef container held, it is calculated that **every box of sliced beef is responsible for 1.69kg of methane released into the atmosphere.**

Future Solutions

Multiple solutions have merit to curb the massive amounts of methane released each year, most of which involve bottom up approaches from hands-on consumers. For example, researchers have utilized different methods of protein production to replace livestock cultivation as the primary source of dietary protein. Plant proteins and mycoprotein (fungi) have begun to gain a percentage in the market, and have seen growth in overall consumption. Artificial cultured meat has also been developed, and while not available on a mass-consumer scale yet, the method shows promise for sustainably sourced red meat protein. Insect farms are also gaining traction to mass produce cheaper through means such as cricket protein, which while currently more expensive, have potential to become far cheaper and sustainably sourced (Vogel 2010). All the presented methods offer economically viable and far more environmentally friendly options to classic livestock cultivation.

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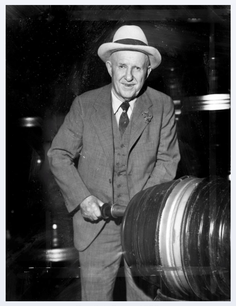
Near and Beer to Our Hearts: Storz Brewing Company, Aluminum, and the Anthropocene

Eric Ho *(Biology)*, **Patrick Rin** *(Biology)*

Creighton University, College of Arts & Sciences

Omaha Beer now in Storz

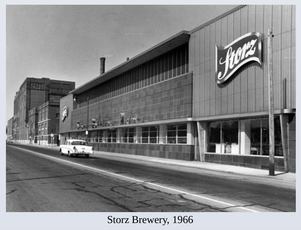


Gottlieb Storz, 1933

In 1876, **Gottlieb Storz**, a German native, founded **Storz Brewery** in Omaha and took over the brewing industry. Before the company took flight, the breweries in Omaha used only 90,000 bushels of barley to produce 45,000 barrels of beer each year[7]. Eventually, the Storz Brewery empire turned it all around – starting with a six-story factory that produced over 150,000 barrels per year.

They received the highest award for draft beer at the Transmississippi Exposition in 1898. To combat the hardships of the **Prohibition**, Storz supplemented their production of beer with root beer, ginger ale, soft drinks, and ice[7].

Storz Brewery, 1920



Storz Brewery, 1966

After the Prohibition, Storz Brewery expanded became the largest brewing company – producing 43 million gallons of beer in 1963, one-third of all the beer sold in Nebraska[7]. Even after doors closed, the nostalgia remained in the Omaha Community[12].

World War Brew

World War II brought aluminum into the spotlight with its commodity chains[2]. Earlier, aluminum was widely used in the World War I as a common component of aircrafts since it was a "lightweight, flexible, and durable material" [3] that had considerable advantages.

During the war, no beer cans were produced for domestic sales but over 18 million aluminum cans were sent to soldiers overseas[4].

By the end of World War II, there was an excess amount of cans that were bought by various breweries in the 1950.

Without WWII's overproduction of aluminum cans, it is safe to say that beer would not be in cans.

Storz WWII ad

Beer, Aluminum, and the Anthropocene

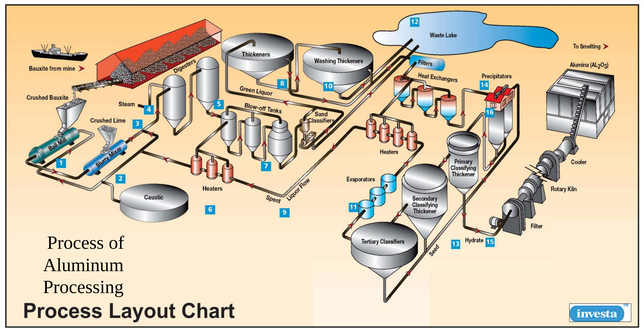
The shift from bottles to aluminum cans highlights the anthropogenic causes that impact the environment. Originally, beer was brewed in casks and served at saloons. As technology advanced, beer was packaged into bottles, and ultimately cans. Brewing beer causes environmental changes since the process itself requires mass trades of raw materials that results in fossil fuel usage and use of land for crop growth. When Pittsburg Brewing and Schlitz introduced the "tab top" beer can into the domestic market in 1962, the sale of canned beer skyrocketed (2). Prior to the war Aluminum was expensive, but during the war when there was a surplus of aluminum from the war they had to sell the excess to another market. The ease and cost of aluminum cans appealed to many breweries and was soon adopted as their main form of packaging in the 1950's

Storz Triumph ad

Environmental Repercussions of Aluminum cans:

- Drinking Water Pollution
- Deforestation
- Loss of Biodiversity
- Excessive Energy Usage
- Massive Consumption of Fossil Fuels for Import and Export
- Soil Erosion

Image 5:



Bauxite Mine

Pass me a Cold one!: Beer Culture and the Anthropocene

Storzette, one of the attempts that the beer market tried to target women. Storz found that the market for women beer was generally untouched and tried their hand at advertising with their signature beer Storzette. The beer was advertised to be calorie controlled, and more slimming than standard beer and was packaged in 8-oz cans and sold in "Princess Paks"6) In the end Storzette bombed, the idea of Storzette was overly progressive for its time, and prior to 1950's this idea was not a popular one since women empowerment was on the forefront of women's minds during the war.

Storzette Beer

In the pre-prohibition era, beer was a highly social object. Storz beers were popularized in Saloons and sold in kegs that were taken around the streets by horse drawn carriages[5]. They carried the same original German flavor that represented the roots of Gottlieb Storz.

Storz returned to the shelves after the Prohibition and WWII and brought with it a nostalgia that reminded people of a simpler time but now in the comfort of their own homes in the form of canned beers.

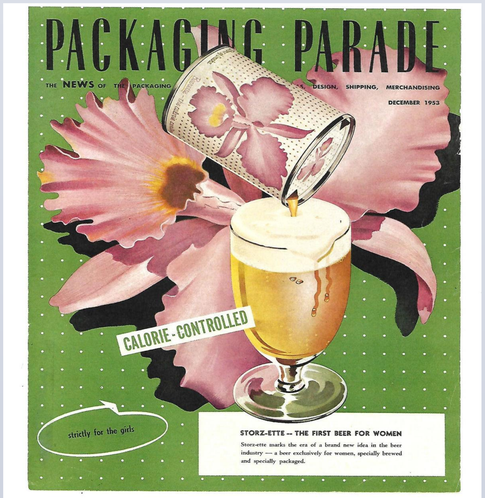


Image 10) Storzette Ad.

From Bottles to Cans

Bottles have been the main container for beer for centuries. Early on, they were made of clay. Now, they are either stored in colored or clear glass bottles. Storz distributed beer in brown bottles, which is the beneficial because it is best at screening out harmful ultraviolet rays that could cause spoilage[13].

Storz Beer Bottle

Storz Beer Can

In **1909**, a Montana brewery suggested that beer be put into cans. After the prohibition, there was increasing demand for inventing functional beer cans to solve problems including weak internal coating and reactions of beer touching metal[6]. Kruger Cream Ale were the first brand to sell beer commercially. Moving away from steel, **aluminum cans** became a reality in the late 1950's and the most common method of canning beer.

Conclusion

The aluminum beer can connects beer to the Great acceleration. Prior to WWII, aluminum supply was short and way overpriced. Post WWII, aluminum production was externalized and overproduced -- leading to a surplus. With this excess, cans became a cheaper alternative for breweries in the US. Without this aluminum surplus, there probably would not of been the invention of beer cans. The U.S. externalized the environmental cost of aluminum can production resulting in the negligence of the environmental damage that aluminum cans actually produced. With the mining, importation, and overproduction of aluminum, the overall environmental impact was less noticed to the domestic population. This small can might not seem like much but in the end this small can changed ecosystems and connects beer to the Anthropocene

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Image 1) Storz Brewing Co, *Lets Get It Over Quick, 1930.*
Image 5) Paskach, Robert. *Storz Planning to Be First with Transparent Package*. 1967. Omaha World Herald.
Image 6) Storz Brewing Co, *Storz Now in Cans!, 1943*
Image 7) Investa, *Aluminum Process Layout Chart*. 2012
Image 8) GreatMining,
Image 9) Grace, Erin: *Storzette Can, 2017* Omaha World Herald
Image 10), Grace, Erin, *Storzette Ad, 2017,* Omaha World Herald

Petroleum Politics Driving the Anthropocene

Ben Ryan[1], Tyler Figueira[2]

Creighton University: Department of Chemistry[1], Department of Biology[2]

Introduction

It can be easy to assume that energy choices and energy transition are rational decisions that privilege efficiency. Our object, the Shell Gas Pump, symbolizes oil, and demonstrates how the adoption of gasoline both locally and globally was largely driven by political agendas. Politics is thus one of the largest drivers of the Anthropocene.

Figure 1: Mona Motor Oil Company office, East Omaha, 1930

Global Politics

Although the story of automobile ascendency often begins in 1920 with the development of the assembly line, the story of how policy shaped its success begins earlier. Already at the start of 1900's, Congress was creating policy to help promote automobiles.

- Policy such as the shift toward urbanization and family nuclear homes supported automobiles. In a move against communism, President Herbert Hoover pushed for nuclear homes as it encouraged families to own their homes.[1]
- Promising forms of energy such as solar or wind were ready for utilization in homes, but government policy shot down these sources in favor of oil.[2]
- General Electric, threatened developers to not offer other forms of energy. This saved General Electric money while the costs that GE would have incurred were shifted onto homeowners.
- Large subsidiaries pushed and the government allowed them to stunt the expansion of various forms of energy.

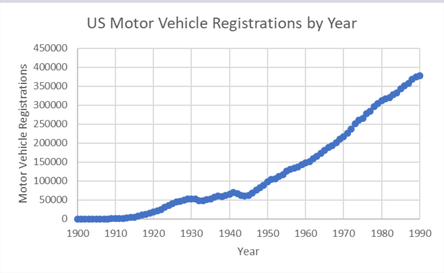

Figure 2: National policy created an enormous increase of automobiles in America.[3]

The History within Omaha

- Gasoline within Nebraska use would have increased at the same rate that the adoption of the automobile went. The adoption of the automobile within Nebraska mirrored that of the national rate.
- Politics at a local level had an effect on the adoption of petroleum within Omaha, controlling the prices, and helping to keep the industry within the city.
- Omaha's local politics helped to drive competition in the petroleum industry, allowing the economics of the city to continue to flourish.

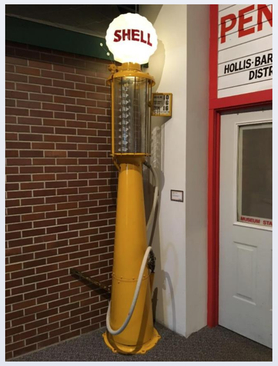

Figure 3: Shell Gas Pump

- The political motivation to keep Petroleum within the city, to help build the city of Omaha, was a huge factor to consider. And while there isn't as much about Omaha politicians deciding to bring oil in, this event in itself is enough to show the influence politics have on energy consumption on a local level.

Figure 4: Automobiles in the outside of the city

Why Does it Matter?

Figure 5: Automobiles within the city of Omaha

Policy can influence the future of the environment. In the same way as policy in the past favored oil over other technologies, policy today can favor cleaner and more efficient forms of energy.

About 1/3 of all carbon emissions from the United States come from the transportation sector. Gas taxes and other efforts such as California's Drive Clean Initiative could lead to a greener future by dampening the effect of car emissions.

How Can I help?

Furthermore, there seems to be a common misconception that the use of renewable energy sources is somehow harmful to the economy. This is simply not the case especially when looking at the state of California as a case study. California has the most amount of renewable energy within the country. Additionally, California also has the highest GDP out of any state in the country. This shows that the local economy will thrive when renewable energy is emphasized. Just as economics was a driver for the politicians with the adoption of petroleum, renewable energy adoption could have a big economic payoff within the state of Nebraska. Steps to explore renewable energy at a more local level are already being taken. The Omaha Public Power District offers a program to invest in research to provide more green energy opportunities.[5] All of these small positive changes add up and can lead to big impacts!

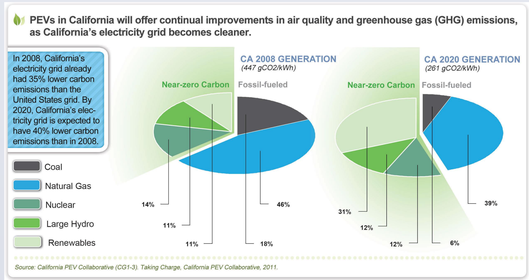

Figure 6: California Drive Clean Initiative[4]

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Acknowledgments

We would like to give a special thank you to Dave Ellison from Speedway Motors Museum of American Speed, for his expertise on the background of our gas pump.

Bear in Mind: Omaha in the Anthropocene

Madi Galas (Biology) and Emily Looby (History and Political Science)
Global Environmental History Creighton University

Introduction

Early modern Europeans viewed animal furs as a source of profit. The vast, seemingly untouched interior of North America and European demand for furs encouraged unsustainable hunting practices. The North American fur trade marked the beginning of North America's connection to the globe. Trade linked untouched native communities with wealthy Europeans. Both groups relied on the other to service a demand. The trade came to prominence in the sixteenth century as part of Dutch, French, and English colonial expeditions. These imperial powers established trade posts along river valleys and allied themselves with local native communities to provide furs. By the eighteenth century, fur trade and trapping transformed North America into a global power. Transcontinental connections, depletion of the environment, and western expansion all serve as central aspects to the North American fur trade. The legacy of the trade continues to shape human relations with animals and clothing today. The fur trade reflects humanity's prioritization of profit and fulfilling a demand over ethical, sustainable relations with nature. The trade clearly represents the dominance of economics in dictating humanity's relationship with the environment.

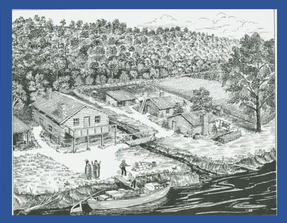
Heinrich Berghaus map of distribution of the fur trade

The Beginning: Reshaping Human Relations with Nature

Fur and leather supplies originated as staple goods. Communities sought animal hides to protect themselves from the environment and enemies. The North American fur trade originated when European fur supplies declined and prices sharply increased. Beaver, native to Southern Europe, was nearly extinct. Even rabbit was rare and expensive. To combat this problem and address demand, Europeans looked overseas to North America. On expeditions up the Hudson River and Saint Lawrence River, they discovered large caches of furbearing animals. They enlisted Native Americans to hunt and trap the animals in exchange for manufactured goods. Natives sought iron tools, wool blankets, and weapons. Eventually, communities became reliant on European goods as they proved to more efficient. European demand, for beaver specifically, drove demand. Demand for beaver hats continued "undiminished for three hundred years" (Richard, 3). This sustained demand led to a host of environmental changes. The relationship between humans and nature changed. River valleys and ecosystems alike became viewed as opportunities to turn a profit and assert dominance. As the fur trade migrated westward, beaver populations plummeted.

Late Arrival: Omaha's Role in the Fur Trade

Bellevue Agency



Cabanné's Post

In the nineteenth century, trappers took advantage of Omaha's popularity as a river and train transportation hub by placing their fur trade posts along the Missouri River. The fur trade here was well-known in North Omaha for nearly fifty years before it became a city. Fort Lisa, begun by Manuel Lisa for the Missouri Fur Trading Company, was the first to be built in 1812 and was a major social, political, and commercial. Next, Pierre Cabanné stepped in on behalf of the American Fur Company and created a fur trade post directly on the river. These early trade posts were also well known for their commitment to nearby tribes such as the Otoe.

The posts were eventually closed and moved southwest to Bellevue but companies continued to utilize the river area, its resources, and the desire of the consumer to produce the most popular goods. The shift included a change in the types of furs desired from buffalos and raccoons to mink and fox.

The National Fur and Tanning Company

Located in Omaha on South 13th Street, The National Fur & Tanning Company opened its doors to members of every class and its products, like the bear coat, contributed to the financial and social status in the city. They operated primarily at the beginning of the twentieth century. The company manufactured two supplies of fur. They purchased furs and hides from across the country, specifically Alaska and Northern Canada. And, in the 1920s, cow hides were cheap, so area farmers sent their hides to be tanned and manufactured into coats. They made decent coats when properly treated. However, farmers and stock men did not always contribute the highest quality hides and skins. Because of this, farmers were unsatisfied with the final product. Eventually, they discouraged it.

Fur represented status. Fur coats denoted the wearer's class depending on the type of animal and size of the garment. Upper-class men and women commonly wore mink, fox, beaver, and bear. Lower-class buyers brought in their own cattle or horse hides or they wore cheaper, dyed furs, like rabbit. This commodification of animals expanded as a trend and the company took hold of this by advertising outside of Nebraska to other Midwestern states such as Colorado and Oklahoma.

National Fur & Tanning Company advertisement and original location

Dislocation and Depletion

The fur trade led to dislocation and depletion of predominantly beaver from North America. The effects of human demand for animal furs and attempt to meet them were evident as early as the eighteenth century. Initial evidence of the beginnings of declination was marked by movement westward. Expanding the frontier signaled the need to look elsewhere for supplies of fur. During the eighteenth century, trade posts, such as Fort Albany and the York Factory, saw nearby beaver populations drop by approximately 100,000. By the nineteenth century, new technology arose that allowed felts to be quickly and efficiently produced. In turn, this led to an even faster depletion of the species and permanent production was dependent upon the number of available animals. The increasing demand for beaver pelts was ultimately due to population growth, a greater export market, and fashion shifts to other fur products.

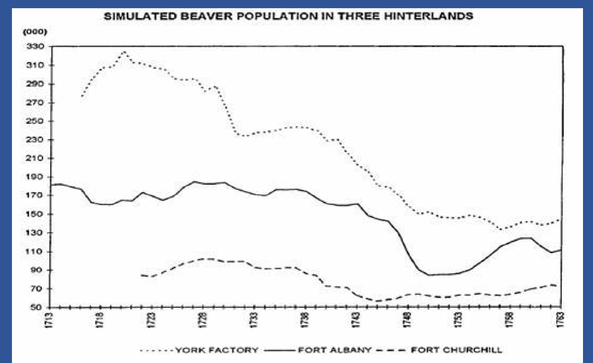


FIGURE 2 Simulated beaver populations in three hinterlands
NOTES: The populations at maximum sustained yield are Fort Albany – 172,000; York Factory – 231,000; Fort Churchill – 70,000.
SOURCE: Carlos and Lewis (1993, 279–83)

The Twenty-First Century Fur Trade

Because of depletion and transparent manufacturing processes, fur has morphed into a symbol of environmental dislocation, but continues to be consumed. Production and demand never experienced a severe taper. Demand continued throughout the twentieth century. However, demand evolved. The fur frontier was no longer located in North America, but switched to areas like the Amazon Rainforest and Nova Scotia. Both regions possessed large supplies of exotic animals not found in the consumer's region. These regions were overhunted. Fur farming was adopted to combat this. Already endangered animals became threatened by the trade. Eventually, a ban was placed on hunting and trading of endangered species. Efforts to improve relations between humans and animals were achieved through legislation and reforms in the industry. Fur farmers were required to change their killing, housing, and feeding techniques in favor of more humane ones. These reforms improved the quality of fur. The complete eradication of the fur trade is unlikely. People still wear furs in countries where fur production has been outlawed. Reforms have been utilized to meet activists and fur farmers in the middle.

The most serious anti-fur activism took place in the 1990s. Designer boycotts and protests were common. Today, organizations that protest the fur industry remain, but it appears demand has resurged. There are still stigmas associated with wearing fur. However, designers have changed the way they market fur to consumers. It is now about "individual choice" and refashioning fur as just another luxurious fabric. Designers no longer fear backlash. They know people will purchase it.

Black Bear Fur Coat

The fur coat was manufactured by the National Fur and Tanning Company (NFTC), which was located in Omaha, Nebraska. Although the exact date of origin is unclear. It likely falls between 1915-1950. Based on newspaper advertisements, the company operated primarily during the first half of the twentieth century. The coat was constructed from multiple black bear hides. The sleeves, collar, and body of were likely made separately and sewn together. The origins of the material were unclear. Since black bears are not native to Nebraska, the company likely purchased the hide from Canada or Alaska. In addition to outsourcing fur supplies, the company allowed farmers to bring in surplus hides to be tanned and manufactured into coats and robes for their use. However, these hides were not suitable to processing and often produced unsatisfactory garments. The coat certainly did not go through this process. It was constructed for the wealthy. Black bears were viewed as "the largest, most dangerous, and most respected of prey animals" (Richard, 9). They were rare. Therefore, only people with wealth had access to them.

The company was unique in its range of clientele. They advertised to both wealthy and low-income audiences. Advertisement could be found in farmer newspapers and ones directed at businessmen. Farmers sought the same services as the wealthy. Overall, the coat represents a change in the relationship between humans and nature. Animals continued to be viewed as an opportunity to turn a profit even after the effects of the beaver fur trade became glaringly apparent.

The coat from the Durham

NFTC advertisement

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Eveready Battery: Powering the Great Acceleration and Environmental Deterioration

Joseph Diaz and Mikaela Harvey (Biology)

Creighton University

Creighton UNIVERSITY College of Arts and Sciences

THE DURHAM MUSEUM

Key Points

- The evolution of the dry cell battery
- The expansion of the railway and the Industrial Revolution
- Environmental degradation and progress

Rise of the Eveready

Photograph of Eveready "Battery" obtained from the Durham Archives. Object belongs to the Durham Museum in Omaha, NE.

The Eveready telephone battery, produced for the first time in 1921, was a major contributor to the Great Acceleration of 1950, as well as the development of Omaha.

Manufactured as some of the first "dry cell" batteries, the Eveready provided long-lasting power to telephones. This was essential as this particular battery was first used to power the telephones located on trains. As technology progressed, the battery evolved from "wet cell" to these "dry cell" types. Wet cell batteries required a Zinc core to be immersed in a large pot of Ammonium Chloride liquid. This battery required upright orientation to function properly and broke frequently. With the development of the dry cell battery, an upright orientation was not required, causing the battery to be more versatile and break less. The materials which composed the dry cell battery also caused it to be much longer lasting (ACS, 2005).

Technology for batteries was developed to facilitate rapid communication over vast distances through the telegraph. While the telegraph was still influential in the 1950s, the Great Acceleration gave rise to newer, faster means of communication.

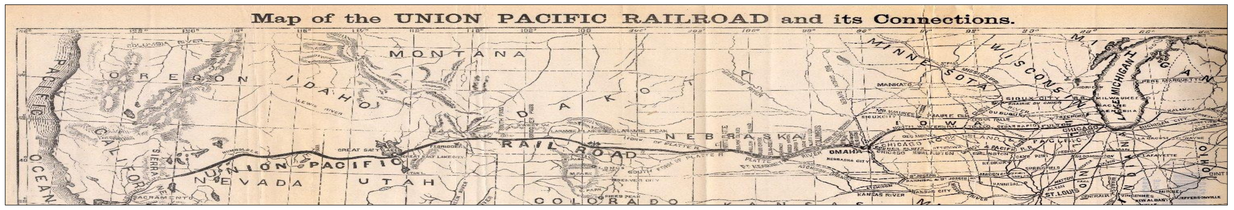
Union Pacific train, with telephone pole behind, which utilized the Eveready battery for train telecommunications. Obtained from the Durham Archives.

The Battery in the Second Industrial Revolution

The completion of the Transcontinental Railroad sparked a turning point in advancement between eastern and western communication. Joining the coasts, Omaha became a major center of commerce and railway activity. With this new commerce, the Eveready battery made its appearance in Omaha. Though there was a telegraph line developed to run alongside the length of the Transcontinental Railroad, the telegraph was not fast enough communication for the trains. This led to the development of train telephones.

Union Pacific employee communicating via telephone with trains. Image obtained from the Durham Archives.

One of the earliest telephones, this allowed for rapid communication between the Conductor of the train and the Trainmaster or crew at any of the train stations. Highly effective, the demand for the Eveready dry cell battery only grew, causing an increased production rate and thus, more intensive mining. As communications grew with the help of the Eveready, the environmental impact grew as well.



Map depicting the Transcontinental Railroad, connecting the East Coast to the West Coast in Omaha, circa 1868. Image credit to DPLA, original image sourced from Cornell University.

The Battery in the Great Acceleration

The Eveready battery before you primarily functions due Manganese and Zinc interactions via the following reaction: $8MnO_2 + 4Zn + ZnCl2 + 8H2O \rightarrow 8MnOOH + ZnCl_2 + 4ZnO + 5H2O$ (ACS, 2005). To obtain the necessary materials for this battery, an enormous amount of earth was physically moved, along with the displacement of other products. Modern day estimates of Zinc ore reserves is about 200 million metric tons (Statista, 2017), whereas Manganese is around 380 million metric tons (Geotimes, 2005).

There is a large amount of destruction to the crust and surrounding environment that comes from Zinc and Manganese mining. Separation from impurities such as rock, dirt and iron causes Zinc and Manganese mining efforts to displace a lot more dirt than other elements. To combat this, Lithium started to be used in batteries in the 1970s and not only worked more efficiently, but it was also "mined" in a minimally invasive way. Instead of displacing millions of tons of dirt, rock, and metal, Lithium is simply scooped up after the sun evaporates the water it resides in. (Merchant, 2017) The shift from Zinc-Manganese batteries to Lithium ones results in a much more sustainable and effective practice leading to a less polluted earth for all.

Manganese mine in South Africa, showing the magnitude of destruction involved in the process. Obtained from "The Nerve", a South African magazine.

A Lithium mine in Argentina that illustrates the minimally invasive methods used. Sourced from AIS Resources Ltd.

The Battery Today

The battery is a tool that helped to bring about the Great Acceleration as well as a more connected Omaha. The effects of the battery are both positive and negative and today, we see its impact now more than ever. Today, the company that made this battery in the early 20th century has been bought and rebranded as Energizer. The well-known bunny that is "still going" represents the continuation and advancement of the battery industry. Increased sustainability, better mining practices, and improved laws all mark an improved and better piece of technology today. There will always be room for improvement and we hope that you will join us in the creation of a cleaner tomorrow.

The mascot of Energizer, along with their slogan "Still Going". Obtained from the official Energizer Twitter account.

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Arrowheads vs. The Megafauna

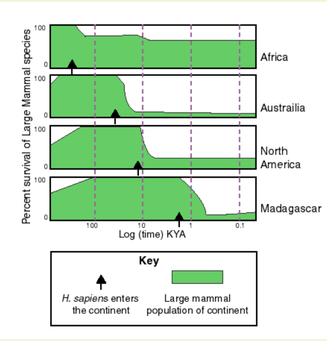
Omaha and the Anthropocene

Mitch Torkelson (Biology) | Henry Zink (Sustainability)

The Overkill Hypothesis

Paul Martin argues that animals had no previous experience with humans, and introducing them allowed them to become super-predators for megafauna. This caused rippling effects through ecosystems such as trophic cascades.

1. Extinctions were sudden, within the span of a few thousand years
2. Extinctions consistently followed directly after the introduction of humans.
3. The biggest losses were to large terrestrial mammals. Almost none were marine species. This showed hunting preference by humans
4. Megafauna only survived in Africa, which is the location where humans and megafauna coevolved.
5. The extinctions were not caused by displacement of animals from their niches by competing exotic species, since the ecological niches remained unfilled after the extinctions.
6. There are massive hunting sites filled with animal remains from hunting, although they are rare. Martin likens the invasion of humans to the "blitzkrieg" emphasizing the speed and ferocity.
7. Many of the extinct species had survived previous climatic changes.



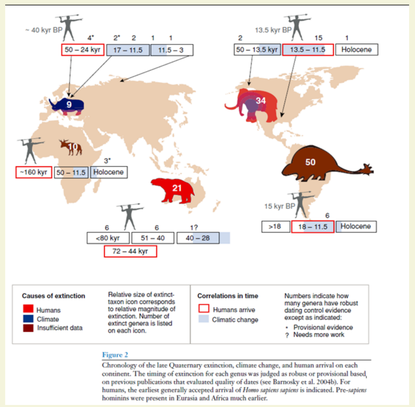


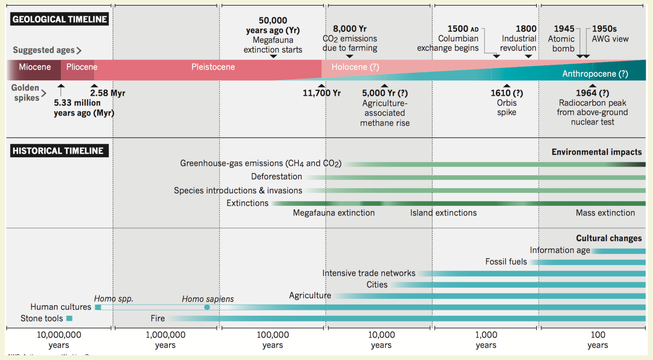
Figure 2
Chronology of the late Quaternary extinction, climate change, and human arrival on each continent. The timing of extinction for each genus was judged as robust or provisional based on previous publications that evaluated quality of dates (see Barnosky et al. 2004b). For humans, the earliest generally accepted arrival of *Homo sapiens sapiens* is indicated. Pre-*sapiens* hominins were present in Eurasia and Africa much earlier.

Martin's hypothesis has caught the attention of some skeptics who disagree for a few particular reasons:

1. There are too few kill sites. If humans had truly been a part of a blitzkrieg there would be more mammalian remains
2. Megafauna extinctions were happening around the world, many of which took place without humans.
3. Most archeological experts of the Pleistocene reject his hypothesis for being too much of an inference and not enough evidence.

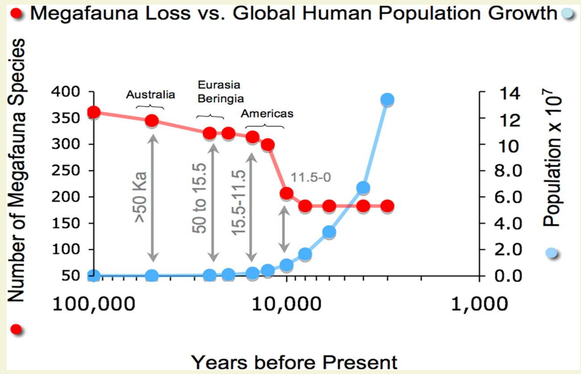
Abstract

Arrowheads used by Paleo-Indians link to Lithic tools and hunting strategies as well as the Megafauna Extinction. Man's drive toward mastery of nature throughout this extinction has charged debates of its significance to the Anthropocene. Could it be the first golden spike? Paul Martin argues so in his Overkill Hypothesis, faces heavy pushback by environmentalists. Our goal is to give a clear overview of each side of the debate.



Megafauna Extinction

Archeological records tell us that Asia natives crossed over the Bering land bridge that connected Canada to Russia 11,000 years ago. These people became known as the Paleo-Indians. Upon their arrival to North America, massive extinctions of land animals over 100 lbs. began to occur, including the wooly mammoth and saber-toothed tiger. Ultimately, 34 mammalian species would go extinct during this time.



Environmental Hypothesis

A particularly strong alternative hypothesis credits the ecological effects of climate change for having caused mass megafauna extinctions.

1. Habitat Loss: areas with adequate conditions for megafauna to live disappeared or fragmented.
2. Mosaic-Nutrient: reduced growing season and plant diversity reduced carrying capacities for megafauna.
3. Co-evolutionary disequilibrium: extremely rapid glacial-interglacial transition reorganized floras, disrupting ecosystems of coevolved systems.
4. Self-organized instability: extinctions resulted in small perturbations that were amplified into a catastrophe by multicomponent ecosystems.

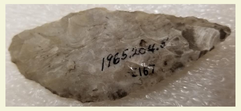
The Arrowheads

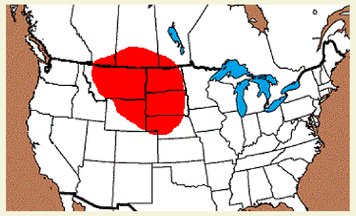
Cut Bank Jaw-Notched

Easily identifiable by its small U-shaped side notches and straight edges. Made of flint ridge stone. This arrowhead is used for weaponry such as arrows and spears.

Cody Knife

Easily identifiable by its weak shoulders and asymmetrical diagonal appearance. Made of Clovis stone. Possible uses include arrows, spears, or cooking.





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