

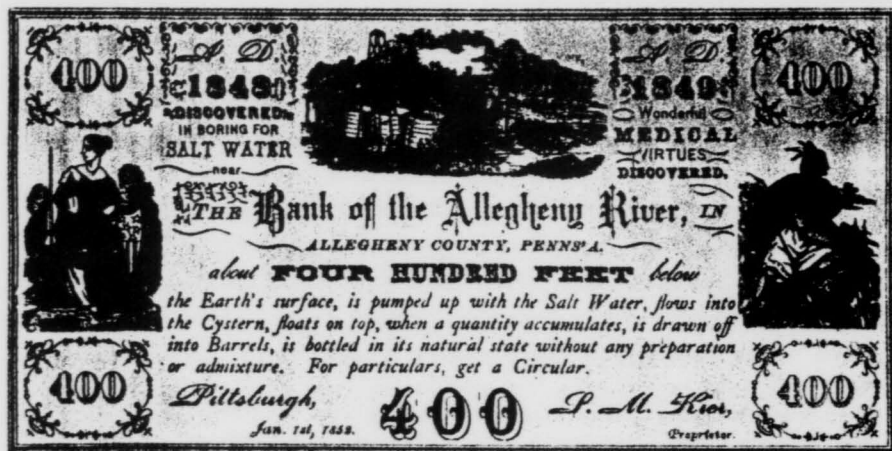
# “A Triumph of Individualism”: The Rule of Capture and the Ethic of Extraction in Pennsylvania’s Oil Boom

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*Apart from the hostile influence of man, the organic and the inorganic world are . . . bound together by such mutual relations and adaptations as secure, if not the absolute permanence and equilibrium of both, a long continuance of the established conditions of each at any given time and place, or at least, a very slow and gradual succession of changes in those conditions. But man is everywhere a disturbing agent. Wherever he plants his foot, the harmonies of nature are turned to discords. . . . Of all organic beings, man alone is to be regarded as essentially a destructive power.*

—George Perkins Marsh, *Man and Nature*, 1864

Courtesy Drake Well Museum



Kier's Advertisement and Circular, describing the wonderful curative properties of Kier's petroleum.

A vision of oil's potential value brought “Colonel” Edwin Drake to a remote section of northwestern Pennsylvania in 1858. But when the former train conductor struck the world's first well of petroleum in August, 1859, Drake could not even identify the green substance settling into the well head. His assistant, a blacksmith named Uncle Billy Smith, reportedly explained, “Mr. Drake, that's your fortune.”<sup>1</sup> Word of Drake's petroleum well quickly reached residents of the nearby town of Titusville. At varying rates, the towns-

people realized that this "discovery" could also serve as an opportunity. One by one they stole out to join the parade of onlookers streaming by the site of Drake's well. They would first go see it for themselves, and then determine how to proceed.

For one figure, however, this procession served as no less a business opportunity than Drake's well. This figure stealthfully moved in the opposite direction from the group. He mounted the fastest horse that he could locate and headed south along Oil Creek.<sup>2</sup> In a time of shifting priorities, many nineteenth-century onlookers—including the geographer and writer George Perkins Marsh—might, in fact, have compared this rider's imperative with that driving another rapidly moving mount through the countryside. Whereas Paul Revere rode through the Massachusetts countryside to inform colonists of the approaching military force, this figure bore the tidings of a different kind of invasion. In fact, the ink pen clutched in one hand placed the rider firmly within the invading force: the first wave of the invading capitalists that would overrun the Oil Creek valley during the next decade.

Jonathon Watson, the pen-wielding rider, represented the lumbering firm of Brewer, Watson Company, which had leased Drake his famous plot of land. While the rest of Titusville stood by Drake's well and pondered the future of the valley, Watson directly seized it. Armed with only the assumption that the oil must be accessible from the lowland areas along the stream, Watson contacted each of the 43 German and Scots-Irish farmers whose land bordered the creek along this valley. He had little difficulty in obtaining leases at bargain rates. If the people knew anything of Drake's undertaking, they had no idea of their own land's skyrocketing value. This man at their door offered them money not to buy their land, but just to *use* a portion of it—a portion most often along the river and of little agricultural value. By the middle of September, he had leased much of the most promising land along Oil Creek. Watson would become the region's premier oil producer—drilling more than 2,000 wells by 1871.<sup>3</sup>

In reality, Jonathon Watson simply practiced "good business" on this ride in which he chose not to tell residents how the value of their lands had suddenly changed. American capitalism rewards such resourcefulness. Many previous historians of oil have also singularly portrayed this business ethic in a positive light. Environmental history, though, affords the opportunity to look past economic successes in order to focus questions directly at the basic facts of the oil boom. Certainly, such inquiry can alter the information one pursues, leading the historian to ponder pollution rates and spill estimates. Yet environmental history can also simply adjust the way we perceive existing historical information. In the case of early oil, the well-known history divulges environmental ethics and ideas of land use that eventually become commonplace on the American landscape.

The strictures or regulations—sometimes called ethics—imposed by participants defined the oil industry as they do other industrial undertakings.<sup>4</sup> In the case of oil extraction, the lack of interest in limiting or regulating the search for crude oil became the defining ethic or value. Most important, the legal system offered little help to control development; in fact, the system of land law only furthered a *laissez-faire* approach to development and land-use. Transient labor, long-distance financial speculation, subleasing, land abandonment, and over-drilling began as details of the early industry's temporary carelessness, during its boom period. Eventually, however, such details were institutionalized within the rule of capture, the only law guiding oil speculation. The experience of early oil provides one succinct response to a basic question of industrial development: With neither legal assistance nor the formal and informal controls of land ownership, what happens to a place quickly dominated by a valuable commodity?

Ida Tarbell, the muckraking journalist and historian, believed she knew the answer to this question. Tarbell grew up in the oil regions during the 1860s boom and her observations offer a clue of what early oil tells the environmental historian:

It is certain . . . the development could never have gone on at anything like the speed that it did except under the American system of free opportunity. Men did not wait to ask if they might go into the Oil Region: they went. They did not ask how to put down a well: they quickly took the processes which other men had developed for other purposes and adapted them to their purpose. . . . What was true of production was true of refining, of transportation, of marketing. It was a triumph of individualism. Its evils were the evils that come from giving men of all grades of character freedom of action.

Taken as a whole, a truer exhibit of what must be expected of men working without other regulation than they voluntarily give themselves is not to be found in our industrial history.<sup>5</sup>

Tarbell depicts Oil Creek valley as overrun by temporary development and exploitation. Between 1860 and 1872 (when the Oil Creek valley was displaced as the world's largest oil producer), the boom transformed this eleven-mile river valley into an entirely new place known as *Petrolia*.<sup>6</sup> Unlike other extractive landscapes, petroleum's fluidity caused many participants to lose any social or cultural restraint to development. Due to the rule of capture, property demarcations could not hold the resource. Therefore, the commodity went up for grabs, held in common until the first lucky bit tapped the reservoir.

Contemporary writers, such as Garrett Hardin, an ecologist and pioneer of environmental studies, have extended Tarbell's sensibility to better under-

stand such a locale. Hardin places such development within an ecological framework he calls the "Tragedy of the Commons." Hardin presents the undeniable effects of human tendencies, specifically greed, on natural resources held in common, such as a fishery, community pasture, air, or oceans. Human nature, Hardin asserts, as a capitalist society rewards it, will press each occupant to use the resource as quickly as possible so that others do not first reap its benefit.

The underground reservoir of crude oil fell directly within this criteria of the common resource, because it could only be owned when it reached Earth's surface. With such fluidity as a defining characteristic, the commodity of crude oil was destined to create an exploitive boom. In Petrolia, land ownership or even mere lease rights entitled users to administer both the supply and the land in any fashion they chose. Indeed, Hardin seems to be referring to many of the practices of Petrolia when he writes:

The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them. Since this is true for everyone, we are locked into a system of "fouling our own nest," so long as we behave only as independent, rational, free-enterprisers.<sup>7</sup>

The early oil industry reified itself by encouraging speculators, wildcatters, and others to behave only as "independent, rational, free-enterprisers." The industry perpetuated itself by creating other oil regions, only to see each one pursue its own demise. Similar to drill bits and storage casks, this transient quality was also part of the design perfected by the triumph of individualism blowing through northwestern Pennsylvania in the 1860s.

### **Commodifying the Petroleum Resource**

The rapid commercialization of petroleum, or rock oil, constitutes a striking example of cultural commodification.<sup>8</sup> Its occurrence and location had been known for many years prior to Drake's successful drilling, yet its potential went unexplored. Settlers initially named the oil along Oil Creek for the Seneca people, who were the native inhabitants of this portion of North America at the time of European settlement. The Seneca were thought to have been the original human inhabitants of this place, and its product should therefore bear their name. This region, however, had long ago been at least a temporary home to the moundbuilding society that is believed to have lived centuries prior to the Seneca.

While this people left few written records, historians position them inhabiting North America during the Woodland period, which lasted from 700 to 1600. Archaeologists have pieced together a great deal of their story from excavated villages, particularly burial mounds throughout the nation, such as

that found in Cahokia, Illinois. The Hopewell site, located near present-day Pittsburgh, Pennsylvania, is the oldest of these North American villages yet found. From such points, this highly mobile people ventured widely from their original homelands in the Ohio Valley and along the Great Lakes in order to collect necessary resources. A small stream above Pittsburgh and Hopewell became a frequent stop as word spread of its freely pooling oil. This oil could be used for decoration, skin coloring and other ceremonial rites.<sup>9</sup> Clearly, the crude oil now served as a resource to be used but not as a commodity of trade and sale.

While mobility distinguishes these early Americans from later peoples, they were also industrious and highly regimented. Initial European explorers in the valley found long, narrow troughs that had been dug along Oil Creek just below its junction with Pine Creek. Roughly two thousand troughs were found scattered over this level plain, and others could be found at intervals throughout the Oil Creek valley. Each one spanned seven or eight feet in width and six to ten feet in depth, shaped as circles, oblongs, ovals, and squares. These troughs were cribbed with lumber, which had been preserved by the oil stored in them. Large trees growing out of the troughs suggested to early residents the troughs had not been used for many years, possibly even centuries.<sup>10</sup> No evidence remained in the vicinity of Titusville as late as 1847 to show from where the timbers for such cribbing might have come.

The Senecas volunteered no knowledge of the pits and did not use such technology in their own collection of oil.<sup>11</sup> Instead, they were indeed the first people of record to place a value on the thick, black film filling nearby pools and spreading congealed clouds over the creek's surface. The Seneca skimmed the oil from the water's surface, using a blanket as a sponge or dipping a container into the water. Once collected, the brownish crude served as an ointment or skin-coloring, but nearly always only for external use. Many early Europeans explorers noted the important role the substance played in Seneca culture. Such explorers also designated this odd stream as Oil Creek.

From its earliest notice—whether by aboriginal or immigrant peoples—the geological substance so near the earth's surface identified this locale. Oil Creek and the fluid pooling around it were first recorded as a detail of Lewis Evans' *Map of the Middle British Colonies in America* in 1775. Additionally, very close to the present site of Titusville and Oil City, the word "Petroleum" is printed, as it is on Peter Kalm's *Map of New England and the Middle Colonies* in 1772 and Thomas Pownall's *Map of the British Colonies in North America* in 1776. A Moravian missionary recorded the first-known written observation of oil in this region in 1768.<sup>12</sup> In this account, the missionary observed a number of different types of oil springs. He also noted that the Indians preferred those springs feeding directly into the creek. His writing describes their method of dipping the crude from the pits and then boiling out the remaining

water. While native users and these first observers acknowledged the resource, they had little reason to think of it as a commodity to be sold.

Passing American soldiers of the Revolutionary era often noted the remote area. In 1775 General William Irvine made a trek to the region specifically to explore along Oil Creek. He filed the following report:

. . . It has hitherto been taken for granted that the water of the Creek was impregnated with [the oil], as it was found in so many places, but I have found this to be an error, as I examined it carefully and found it issuing out of two places only . . . on opposite sides of the Creek. It rises in the bed of the Creek at very low water, in a dry season I am told it is found without any mixture of water, and is pure oil. . . .<sup>13</sup>

By modern thinking, a stream of pure oil should have begun a great land rush to the Oil Creek valley; however, the cultural process of remaking oil as commodity remained dormant. For a 1780 observer, a river of oil merely denoted the region as poor for agriculture and an unpleasant place to reside.

Such reports continued with General Benjamin Lincoln's observation of a 1783 incident when his soldiers stopped at the springs, "collected the oil, and bathed their joints with it." This, he continues, "gave them great relief, and freed them immediately from the rheumatic complaints with which many of them were affected." The troops drank freely of the water, which by and by, "operated as a gentle purge."<sup>14</sup> The region's oil soon gained a reputation for its medicinal capabilities. Accounts of this natural curiosity, based upon Lincoln's observations, were included in Jedediah Morse's *American Universal Geography* in 1789 under the heading "American Natural Curiosities," in the *Massachusetts Magazine* in 1791, and in Joseph Scott's *United States Gazetteer* in 1795.

Settlers in the region soon began to gather oil from springs on their property by constructing dams of loose stones above the water's surface, ten to fifteen feet in diameter, around the place where the oil bubbled. Dams created an eddy inside the wall that confined the floating oil, while the water flowed out freely between loose stones.<sup>15</sup> The oil accumulated for several days before being soaked up with a woolen cloth. Ten to twelve barrels of oil might be collected in a season, which was not enough to turn the undertaking into an industry. The Hamilton McClintock farm housed the most successful spring, harvesting twenty to thirty barrels.<sup>16</sup>

While not enough to start a boom, such a supply brought petroleum to the consumer for the first time. Nathaniel Carey, one of the first settlers along Oil Creek, brought the first barrels of oil to Pittsburgh in 1790.<sup>17</sup> During the 1790s, bottles containing the substance also found their way into other urban areas, where they were called "Seneca Oil" and offered as a miraculous cure for many ailments, particularly rheumatism.<sup>18</sup> The American consumer normally

ingested the Seneca oil much as he or she would castor oil. Locals and those traveling through the Venango County region were even known to sit in the pools of oil to soak their weary and aching joints. One other potential use had been explored early by the imaginative mind of Benjamin Franklin. Using whale oil and later petroleum in 1757, Franklin began experiments to calm rough waters by dumping the thick substance directly on to the ocean in harbors.<sup>19</sup>

Carey's efforts at distributing the oil were soon surpassed by a young canal boat operator who wished to commercialize the process. In the mid-1840s, Samuel Kier noticed the similarity between the oil prescribed to his ill wife and the annoying substance invading the salt wells on his family's property outside Pittsburgh. Crude oil became commodity as Kier immediately began collecting the waste substance. He opened a bottling and merchandising house in Pittsburgh in 1849. The mysterious cure-all, "Kier's Rock Oil," soon sold throughout the northeastern United States. Although he acquired the oil only by skimming, Kier's supply quickly exceeded demand because of the constant flow from the salt wells. With the excess, he began the first experiments to use the substance as an illuminant.<sup>20</sup>

Kier continued to make his former nuisance pay dividends throughout the 1850s. By 1850, Kier sold an illuminant called "carbon oil" for \$1.50 a gallon from a warehouse in Pittsburgh. Afraid of explosion and fire, residents living near Kier's refinery registered complaints with the authorities, who ordered Kier to move his operation from the city.<sup>21</sup> In 1857, A. C. Ferris, a New York businessman, ordered a supply of oil from Kier and began experimenting with its illumination potential. Using his connections from other business as well as aggressive advertising throughout the New York area, Ferris sold around 1,000 gallons of illuminating oil in 1858. He cultivated the markets that would allow petroleum byproducts swiftly to become the nation's most popular illuminant.

The stage was set for the dogged determination of one reluctant entrepreneur. Hired by the Seneca Rock Oil Company, Colonel Edwin Drake arrived in the oil regions in 1858. Using the model of drilling for water, Drake was to pursue the world's first well of the "nuisance" resource, petroleum rock oil. Many problems and a lack of local support contributed to Drake's difficulties. In 1859, his employer wired him enough money to close out the project—dubbed "Drake's Folly—and return home. In a flash of capitalist heroism, Drake refused and took out a local line of credit to continue. On August 27, Uncle Billy directed Drake to the fortune in his well head. Immediately, the resource had been altered. No longer a static resource of limited supply, petroleum had been pursued and found in relative abundance. The potential of a nearly limitless supply of crude oil led scientists to experiment with the substance's utility and businessmen to establish its market. The process of making a commodity was in full swing.

## Capturing the Oil Supply

Crude oil appears inconspicuous enough coming from the ground in a greenish, black ooze mixed with water—not the jet of blackness that many imagine. Organic wastes, such as plants and microscopic plankton floating in ancient seas, accumulate at the bottom of oceans and lakes. Over millions of years these layers of organic waste form levels of sediments rich in carbon and hydrogen. Natural degradation converts such residue into hydrocarbons (oil and natural gas) through pressure and underground heat. The droplets of oil migrate through levels of rock before becoming trapped in permeable rocks and sealed in reservoirs by shale rock on top and heavier salt water at the bottom.

Geological magic takes place in these reservoirs. The pressure builds as the matter further decomposes. Pressure created by the lighter gases in this reservoir over thousands of years allows the oil to flow up the well bore when the drill bit pierces the reservoir. This “fugacious” quality creates a flowing well: a well out of which a supply of oil flows. While the gusher possesses romantic associations of wealth, it occurs when the pressure is mismanaged. The gusher is wasteful, dangerous, and unnecessary from a practical point of view. This opinion would have been in the minority during the 1860s.

The fugacious quality of oil distinguishes it from other sedentary mineral resources such as coal and wood. The liquidity of the resource forces the application to it of ownership laws such as those pertaining to landowners' rights for water and free-roaming animals. Under normal conditions, these legal decisions were less fueled by philosophy than by the possibilities of economic development. Rivers or water wells were the only similar resource litigated during this era. Interestingly, the United States courts consistently supported river development in New England over the petitions of farmers whose land had been damaged by the mills' use of the river.<sup>22</sup>

First applied on this continent during the colonial period, the American property system, as Tarbell observed earlier, while effective in controlling settlement and agricultural development, failed miserably in organizing the extraction of oil. Based on John Locke's idea that land ownership should depend on individual enterprise and labor, the American system also grew out of Adam Smith's trust in the natural liberty of individuals to own and use land as they wish.<sup>23</sup> Locke writes that in the original state of English settlements, possession of land was directly related to one's labors for or upon it. Money, capital, allowed for the accumulation of wealth, and its value depended on need. As he writes,

What would a Man value Ten Thousand or a Hundred Thousand Acres of excellent Land, ready cultivated, and well stocked too with Cattle, in the middle of the in-land Parts of America, where he had no hopes of



Commerce with other Parts of the World, to draw Money to him by the Sale of the product?<sup>24</sup>

The system of land ownership in the U.S. sprung from land's attachment to a marketplace and the ability to accumulate wealth from the sale of property. Society's attempt to incorporate jurisdiction of diffusely occurring resources into the rubric pertaining to surface rights transformed a rational, tidy property system into the morass of the early oil industry.

As United States history is often characterized as "a triumph of individualism" and self-determination, Petrolia stands as a demonstration of what can result if these characteristics are allowed to proceed entirely unchecked. The best indicator of the irony of this "triumph" in Petrolia were the abandoned derricks that began littering the region shortly after speculation began in 1860. One observer described these as "decaying monuments of small fortunes ruined when . . . the first oil excitement arose, [and] labor attempted to emancipate itself from capital."<sup>25</sup> The wild speculation of a mass population, each being able to secure leases and sink wells at will, drove a tornado of development that had little connection to the labor involved in the industry.

Searching for oil brings the luck of the gambler to the controlled world of industry. Boomers found an industry ripe for speculation because the rule of capture placed no jurisdiction of property law on underground crude. Oil went to the first one to strike and seize the supply, bringing subterranean crude up to Earth's surface where land ownership applied. The rule of capture spurred boomers to stream to the valley. Soon every aspect of the industry and life associated with it became based on the immediacy generated by the rule of capture. Whereas the discovery of oil led farmers and others to develop a new industry and technology, the rule of capture catapulted the search for oil to the status of an industrial boom. The rule, in essence, cleared the way to have no rules restricting the industry's development.

The rule of capture possessed a history, though it had never been applied to such a level of resource exploitation. It was established in British mineral (but not oil) mining law near the end of the eighteenth century: the rights of the surface landowner were practically supreme. The legality of nineteenth-century United States speculation continued to be tied to the primacy of the surface owner, an idea deriving from the English case, *Acton v. Blundell*, decided in 1843.<sup>26</sup> The original suit arose when the flow of a percolating water well operating a cotton mill was depleted in 1837 by a coal pit sunk on neighboring ground. The owner of the well sued the pit owner and based his claim upon the established English law of surface streams. At this time, riparian law held that "each proprietor of the land has a right to the advantage of the stream flowing in its natural course over his land. . . ."<sup>27</sup> This right, as the ruling stipulated, must not be "inconsistent" with others living on and using

the same stream. In other words, there needed to be an overseeing authority, most likely a government or court, over any resource such as a stream. This entity would ensure that one party did not capture more of the resource's energy or ability than another. However, complications grew when one moved beneath Earth's surface.

In *Acton v. Blundell* the British court held that the surface stream doctrine did not apply to the flow of water as it was drawn from underground wells. The court's ruling stipulated that the action of the well indeed usurps the liquid from neighboring soil but does not do so "openly in the sight of the neighboring proprietor. . . ." Instead, it taps this neighboring flow in "the hidden veins of the earth . . .," and it would therefore be impossible for any proprietor to know "what portion of the water is taken from beneath his soil." The court concluded that until this rate of flow could be established, it must assume that a well usurps no water from neighboring lands; therefore, land owners have every right to capture as much water as possible by drilling down into their own property.<sup>28</sup>

The opinion also discussed the serious consequences that were bound to occur if the law of streams were allowed to take precedence in such a case. If first sinking a well into a specific stream gave the owner an indefeasible right to the water in that stream, a neighbor would be unable to make use of the spring on his own land. In conclusion, the court noted the importance of not placing limitations on mining when it declared:

[A] well may be sunk to supply a cottage, or a drinking-place for cattle; whilst the owner of the adjoining land may be prevented from winning metals and minerals of inestimable value. . . . there is no limit of space within which the claim of right to an underground spring can be confined: in the present case the nearest coal-pit is at the distance of half a mile from the well: it is obvious the law must equally apply if there is an interval of many miles.<sup>29</sup>

The court granted the "owner of the soil all that lies beneath his surface." This provided the owner with the freedom to use the resources (or hire someone to do so) at his pleasure.

The ruling in *Acton v. Blundell* didn't receive its first application to petroleum deposits in the Pennsylvania state courts until well after the Oil Creek valley's boom. The first recorded case to invoke the rule of capture occurred in 1875, and it specifically mentions that the legislature may wish to create a different law. "No doubt," the deciding judge wrote, "many thousands of dollars have been expended in oil and gas territory that would not have . . . if some rule had existed by which [the resource] could have been drilled."<sup>30</sup> But no rule did exist—except for the rule of capture.<sup>31</sup> In a strikingly apt simile, historian Stanley Clark refers to the rule of capture as "the law of the jungle."<sup>32</sup>

The 1860s boom went on without reconsideration of this law and the laissez-faire approach to development simply became accepted as the standard. Finally, in 1899, the Pennsylvania Supreme Court substantiated what had been practiced for forty years in the Oil Creek valley, ruling that

every landowner or his lessee may locate his wells wherever he pleases, regardless of the interests of others. He may distribute them over the whole farm, or locate them only on one part of it. He may crowd the adjoining farms so as to enable him to draw the oil and gas from them. What, then, can the neighbor do? Nothing; only go and do likewise.<sup>33</sup>

As Tarbell wrote earlier, the earliest speculators in Petrolia did not need to be told to “go and do likewise.” When speculators considered the fortune available, a human reaction drove them to quickly sink first one well, then another, and another. Much like playing the lottery, chances of a major strike were thought to increase with every well sunk. Hardin’s argument comes to the fore as these urges become the only control on oil’s early development.<sup>34</sup>

### Compelling Immediacy in the Oil Fields

With the rule of capture as its active component, the early industry swiftly escalated to boom. A small player like Drake faded to the background, while the wily businessmen such as Watson found the most promising economic opportunity in the nation. The need to seize the resource rapidly enhanced the level of the boom but was not its sole cause. Other details of early oil production (including technology, ownership practices, and marketing) also fed the industry to boom rather than to undergo stable, long-term growth.

The presence of oil dovetailed with the rule of capture to create a rush of people to the region in 1860. For instance, an October 6, 1859, article in the *Erie Weekly Gazette* observed that,

There seems to be no diminution to the supply, and the only difficulty appears to be, to get vessels to contain it until it can be sent to market. Think of 1200 gallons of oil drained from the earth’s caverns each twenty-four hours, at an expense of some six dollars, and visions of Pike’s Peak will no longer dazzle your vision!<sup>35</sup>

No need to look west to the mountains for opportunity, suggests this writer, progress and prosperity are right under your nose. The nation’s initial announcement of Drake’s well, reportedly written by a local entrepreneur, appeared in the *New York Tribune* on September 13. The same author filed another article to update “interested parties” on October 7. Imagine the reaction when potential investors and speculators read these words:

There seems to be no diminution of the supply however much the speed of the pump is increased. There is land for sale. . . . The nearest railroad point is Union, on the Sunbury and Erie Railroad, twenty-five miles from Erie, Penn., then by stage twenty miles to Titusville. We see many strange faces in our quiet village, and we are happy to see them; at least, I know the hotel keepers are, if I may judge from their pleasant countenances, or the kind attentions to their guests.<sup>36</sup>

No doubt this account—more advertisement than news article—was written with full awareness that many readers would be spurred to action by the knowledge that fortune seekers had already begun to arrive.

Of course, tremendous wealth was the most marketable detail of early oil. Some articles presented economic fortune as a simple news event of individuals' increasing worth; others added details that enhanced the feeling of immediacy. Thomas Chase and his wife traveled to Titusville on their honeymoon in 1859 and filed the following report in their local newspaper, the *Potter Journal*, upon their return.

As a result consequent upon this discovery, real estate and leases with privilege of boring till oil was found, were each held at great prices. . . . The tract of land on which the large spring has been opened by Mr. Drake, was once purchased by the father of the writer of this article for a cow, and previous to that had been sold at treasurer's sale for taxes. Now we believe \$100,000 would not buy one acre of it. Men until now barely able to get a poor living off poor land are made rich beyond their wildest dreaming.<sup>37</sup>

The increase in value of the valley's lands stunned the readers' sensibilities as it did the Chases. Most observers would assume that they should seize their fortune in Petrolia soon or risk prices rising further.

With the rule of capture in place, the primitive technology of the industry and the fashion in which wells occurred also enticed rapid development. Surface appearance, particularly that of seeping springs, was the most popular method for selecting properties on which to drill. However, after the first few days of speculation, very few such sites remained available. With physical geography no longer a useful determinant, the industry went metaphysical. The divining rod became the most acceptable method of well location. Using a forked twig from a witch hazel or peach tree, a diviner would tightly hold the wood as he passed around the property. A swift downward dip of the wood, often imperceptible to the naked eye, would show where one should locate a well.<sup>38</sup> A few successful divining experiences often permanently established a diviner's reputation in the business. Spiritualists and "oil smellers" also made a fine living in the oil fields by locating wells. A spiritualist or smeller often charged a lower rate, but were similarly dependent on reputation.

The site secured, speculators hired laborers to carry out the numbing work of drilling the well. The early equipment consisted of universally available items that could be made by any blacksmith. Each well—whether successful or not—carried a \$1,000 investment. While a considerable sum, most speculators parceled up startup fees between a variety of wells and only paid a portion of this investment for any single well. Part of this fee would hire the laborers to actually “kick down” the well.<sup>39</sup> These robust Irish or German men would press a wood beam downward and drive the drill bit into the earth to slowly chip away at the rock, sand, or soil. At this point, the typical well came in around 200 feet in depth. An experienced team of kickers could create two strokes per minute and sink the bit three to six inches per day.<sup>40</sup> Within a year, steam engines would assist with drilling and help to increase this slow rate of progress.

If this chipping process (often inaccurately referred to as drilling) revealed a flow of oil, the oilmen attached a pumping apparatus to the wellhead in order to maintain and increase the seep of oil. This derrick mechanism controlled the pump, operating on a vacuum principle, and forced the oil through the tubing and into the wellhead. The pressure created by one centrally-located steam engine often simultaneously powered a number of derricks. The oil came to the surface mixed with water and therefore needed to be fed into a separation tank from which the water could be drained when separation had been completed.

Striking and operating an oil well required no more than this relatively simple technology. Often drillers were blacksmiths, who offered employers the ability to construct or make adjustments in the necessary apparatus in the field. They created or adapted tools to confront each challenge of the early industry. With few known truths or set facts, the oil industry of the early 1860s presented men with a splendid opportunity for investment or labor. Despite the length of time that it could take to sink a single well, the influx of inexperienced individuals combined with the simple technology and natural occurrence of oil to feed speculators’ interest in readily sinking as many wells as possible. Each of these attributes, however, would also aid in the next great shift in the industry, a change that married economic boom even more intrinsically to the young petroleum industry.

Through the first two years of development, the strikes were known as pumpers—the derrick was largely responsible for extracting the supply. In April, 1861, the unbelievable phenomenon of the flowing well of oil became a reality—a well of oil that did not have to be pumped in which the oil actually exploded out of the earth. Henry Rouse, frustrated with the minimal production of his well at 150 feet, had set about to drill the well deeper. At a depth of 300 feet the drill struck a pocket of natural gas in addition to a pool of crude oil. The intense pressure of the gas sent the oil spouting 60 feet into the air at

a rate of 3,000 barrels per day (compared to Drake's well, which produced 8 to 10 gallons per day). The boom soon turned into disaster due to the workers' inability to cope with the never-before-seen phenomenon of a flowing well. A fire ignited, killing Rouse and eighteen others while burning out of control for three days. While a tragedy had occurred, many oilmen realized that the scale of the industry had been completely altered.

In May, 1861, the Fountain Well struck at 460 feet. The Empire Well then came in at Funkville and produced initially at a rate of 2,500 barrels per day before continuing after eight months at 1,200. These deep wells required mechanical drilling to replace "kicking down." The small, portable steam engines that powered drilling, revolutionized the industry during early 1860s.<sup>41</sup> In such examples, the names of wells (when not signifying the owner of the lease) suggested a "landmark in perpetuity." Of these first flowing wells, one observer wrote that the loss of oil had been great:

At first wells were bored with the hope but not with the certainty of oil, and the tank was usually a secondary consideration. When the first [flowing] wells were opened . . . there was little or no tankage ready to receive it, and the oil ran into the creek and flooded the land around the wells until it lay in small ponds. Pits were dug in the ground to receive it, and dams constructed to secure it, yet withal the loss was very great.<sup>42</sup>

Speculators felt the expense of constructing tanks at prospective well sites unnecessary until they were certain that the well would produce. However, during the interim, many dollars worth of crude would be lost. Many early oilmen based decisions on a cost-benefit analysis founded on the idea that crude was available nowhere else in the world. There existed no competition for Petrolia.

A steady series of deeper, flowing wells put many of the earliest pumper wells out of commission and attracted thousands more speculators to the region. This breakthrough functioned to define the landscape of Petrolia in two ways: the increased impact of outside speculators, and the hulking remains of abandoned, less-productive derricks. Even if it produced some oil, a well could now be judged not worth the expense if it did not produce at a certain rate. The flowing well, therefore, allowed oil production to cross another plane in the process of commodification: from discovered treasure, the natural resource swiftly became an industrial commodity. The entire landscape would be reconfigured to fit into the process of extracting oil from its geological home. The valley became more a process than a place.

The gushing wells furnished new fuel to the popular belief that enough wealth lay beneath the valley's surface to satiate the wildest dreams of many Americans, which then added further to the mythic grandeur of the industry.

The *Venango Speculator* discussed the effects of the massive increase in the oil supply from 1200 barrels a day in 1860, to over 5,000 in 1861, and then to astronomical proportions in 1862. "The great depression in the market prices of crude . . . has . . . been the means of introducing the product to all parts of the world and made it as much a necessity as any single article of human want."<sup>43</sup>

Flowing wells combined with over-drilling to convince some Americans that the region's supply would soon be drained—that the supply was finite. This belief spurred many formerly cautious Americans to rush for their opportunity in case the supply were to disappear. Such convictions often were directed by guidebooks for investors that exaggerated data in order to spur readers to quick action.<sup>44</sup> During the mid-1860s, journalists repeatedly traveled to the region to file a number of articles only to remain in order to collect the articles in popular books that guided readers' understanding of this place and its new industry. Unlike travel books, these guidebooks became a necessary educational tool when long-distance investment involved people throughout the world in the oil boom. Their descriptions could easily intensify the rush to the oil regions. For instance, one guidebook described the phenomenon of over-drilling in this fashion:

. . . the wells seem to have a more intimate connection, as though the supply of an entire locality was drawn from a reservoir having more or less continuity. Hence, all the flowing wells had their production interfered with, and in most cases stopped, from the sinking of other wells in their immediate vicinity.<sup>45</sup>

The flowing wells attracted new speculators to the region, but also drove those already there to increase efforts. One early guidebook reports that these "leviathans" worried operators of smaller pumping wells. "If it were possible to continue the new mode of supply, it was argued that the source would soon become exhausted." Overall, this observer reports, the flow has persisted and become a "permanent boon."<sup>46</sup> As the Reverend Mr. Eaton observed, "Every man on the creek was anxious to have a flowing well, although the product might [go dry] upon his hands. The dark green fluid represented wealth; it had made many rich, and large quantities were desirable in any event."<sup>47</sup>

Similarly, the field technologies themselves very quickly demonstrated the industry's boom development. While flowing wells had revolutionized drilling in the valley, the actual sinking of a well remained a time-consuming chore, which often failed to bear results. Whether a hole went straight or crooked, it still possessed the same likelihood of coming in a "duster." Probing blindly with a drill bit only one to two inches in width obviously made striking a well a risky proposition.

Most oilmen viewed finding an effective technology to bring crude out of the ground and to market as the greatest problem facing Petrolia's development. Thus, they directed technological innovation toward industrial production rather than efficiency. Such thinking attracted Colonel E. A. L. Roberts to the region in 1865, following his service in the Civil War. An expert in explosives, he brought a dozen torpedoes with him to Petrolia. These explosives were cast iron flasks, filled with gunpowder, and ignited by a weight that dropped along a suspension wire onto percussion caps in the flask.<sup>48</sup> In the midst of this highly flammable landscape, where smoking had been outlawed and lamps were only used indoors, a torpedo of nitroglycerin would be constructed, transported, and exploded beneath the earth's surface in proximity to another flammable mass in hopes of widening the area from which the well would draw.

On January 28, 1865, Roberts successfully discharged two of his eight-pound torpedoes into a well on Watson Flats, near Titusville. The explosion did not produce a jet of oil, but once the debris was cleared a well that had been slowly petering out now emitted a steady flow.<sup>49</sup> Roberts was granted a patent for using torpedoes to start water and petroleum wells<sup>50</sup> which gave him complete control of torpedoing in the region. He established a company in February with a fee rate of \$100 to \$200 per charge and a royalty of one-fifteenth of the increased flow of oil. Soon, many wells stood as examples of torpedoing's magical abilities to transform a dry hole into a producer. Early in 1866, for instance, Roberts torpedoed wells on the Tarr Farm that were pumping only three barrels a day, changing them into flowing wells producing 80 to 180 barrels each day.<sup>51</sup> In 1867, Roberts replaced the torpedo's gunpowder with nitroglycerin.

To onlookers, the results of torpedoes could not have been more impressive. The explosive's detonation would often cause a great jet of oil and debris to rise straight out of the hole and high into the sky. As historian Harold Williamson observes, however, "the introductory years of torpedoing exacted a heavy toll in lives, both in factories and in the field."<sup>52</sup> Regardless of the ancillary costs, torpedo technology became standard practice by 1870 and allowed the industry to produce enough oil to install it as a vital commodity within the expanding world of American industry. Similar to other innovative technologies, the torpedo expanded the industry's scope and potential production. It also forever altered the ethics of extraction and industrial development.

## The Culture of Boom

The air of urgency that the rule of capture blew through this valley did more than alter the young industry's technological processes. The pattern of ownership and risk also greatly shifted from that of the earliest days when the



boom revolved around individuals developing their own leases. By standardizing long-distance investment and lessening financial risk, the oil boom swiftly defined a new age in land ownership and use rights. Financial investment and land-use employed the lease as its major organizational tool.

Leases, of course, function as agreements between landowners and other parties who wish to use the property in some manner. The agreement secures remuneration for the landowner as well as some control over the way the site is administered. Most landowners received a royalty payment varying from one-eighth to one-half of the oil production. If the prospects seemed particularly favorable, the lessee also paid an immediate monetary bonus. With such financial possibilities, only a foolish landowner sold his or her land in the Oil Creek valley during the early 1860s. Land values repeatedly rose beyond anyone's imagination. It was impossible to foresee the next development in the economic boom. Instead, most owners leased their land to oil speculators and refused to sell until later in the 1860s.

Instead of rapid changes in land ownership, the significant transactions of this early era revolved around the trading, selling, and swindling of leases. Joint stock companies drove this economic period by purchasing leases from landowners. These leases would then become the main gambits in the process of "oil speculation." Companies bought and sold shares in leases at opportune times. Most important, the joint stock companies parcelled the leases into smaller shares, thereby dispersing the risk among many lessees and investors. Beginning in 1860, landowners and stock companies purchasing leases peddled them for an acre or less of ground. For such a lot, they would accept a money payment for the lease-right and also establish a rate of royalty interest. During the 1860s, Oil Creek valley was parcelled out much like a cake, but then swapped and sold many times before anyone took a bite. The frenzy of leasing surface rights and the practice of such land speculation reflected the frenetic commodification and ownership of land.

With the financial risk dispersed widely, so too went any commitment to permanent life in the region. The confused morass of lease trading and abandoned wells left land owners with almost no ability to monitor or control the actual activities carried out on their land. Oilmen were free to develop the valley as they wished, with little knowledge of what had gone on in this place previous to the oil industry. In addition, the specific decisions were left to businessmen, industrialists and laborers who would most likely move on with the industry when Petrolia's supply had run dry.

By the time land-users acquired a plot, the land had become distant from its cultural meaning or ecological significance. It had been transformed into a commodity—much like a box to be emptied, and its cargo unloaded. By 1870, even leases incorporated these principles by stipulating the number of wells to be drilled within a definite time limit and containing clauses of

forfeiture for failure to carry out the agreement. These conditions compelled a producer to drill wells even when the market price of oil did not warrant the expense in order to keep from forfeiting a lease or on the belief that oil's value would soon rise.

Leases also spelled out other ways in which companies conducted land use in a short-sighted manner. For instance, the length of leases varied from twenty to ninety-nine years, and some extended in perpetuity. A minimum drilling depth would be stipulated so that the lessee neither gave up too easily nor with too light a flow. Frequently, 200 feet stood as the minimum drilling depth, although in 1860 a full 500 feet occurred regularly. During 1860 and 1861, the royalty rate ranged between one-quarter to one-third of the oil produced. Usually, drillers delivered barrels of a site's crude directly to the landowner. Cash outlays were often stipulated, and could be paid before drilling or when production reached a certain level. Such arrangements, of course, functioned to entice landowners not only to lease their land to others but also to create as many parcels out of it as possible. Suddenly, economic motives made it highly desirable to have a variety of representatives from all over the nation acting as the stewards of one's property.

The trading also did not stop at the trading company's level. Subleasing accentuated almost all of the problems of the existing trade network. Subleasing involves the selling of fractional shares by lessees, thereby further distancing the user of land from its owner. The holder of a lease for ten acres could sublease all ten acres if he chose and never sink a well himself. Or he could develop the entire ten acres but accept investment support that he then rewarded with partial shares in his lease. Subleases made the oil industry the domain of speculative specialists, who acquired leases and subdivided them at huge profits to producers. To smaller speculators, subleasing afforded the means by which they could bolster resources and expand their drilling. Subleasing also helped to spread the risk if one had few resources. By 1860 a speculative infrastructure was in place that distinguished the oil industry from any other. People could be in the oil business and make a fortune at it without ever getting grease on their hands.

The trading in Petrolia did not remain a secret for long. The traders soon were backed by capital from all over the world. The long-distance investment of blind capital took Petrolia one additional step away from land owners controlling their land. The oil industry was the first extractive industry—in many ways the first land-use practice—to involve long distance financial speculation.<sup>53</sup> Advertisements for investors began to appear in the *New York Times* in the early 1860s. While the Civil War tempered the possibility for investment, the post-war years presented a flurry of economic activity in the valley. This type of investment provided speculators and companies with nearly unlimited resources with which to exploit oil supplies. The only true limit on

earnings was the amount of land and oil available in Oil Creek valley. The region became site to an industrial undertaking that had neither understanding nor appreciation for the local culture or ecology. In fact, most investors did not even know where the place really was.

With each traded leasehold right, the land incrementally lessened in its standing to do anything but produce oil; concurrently, the tract of land's value as property rose with its association to the product being taken from it. The landscape itself sunk deeper and deeper into the process of commodification that was infecting the entire Oil Creek valley.

### An Ethic of Transience

Writing in *The Republic of Technology*, Daniel Boorstin stresses that technological developments have rippling effects on other details of life, leaving little unchanged. He writes, "each grand change brings into being a whole new world. But we cannot forecast what will be the rules of any particular new world until after that new world has been discovered."<sup>54</sup> The discovery of methods to bring oil from the earth in great amounts made the Oil Creek valley one of these "new worlds" of which Boorstin writes. The roots of the valley's development, however, reach past technology to the cultural values of residents fueling development.

The oil that had once acted as a mere identifier for a region dependent on agriculture and the lumber and tanning industries suddenly became the vehicle for the region's rise to prominence and economic progress. What had once been valueless now was a commodity of enormous worth—locally, regionally, and nationally. In the early years of this industry the reaction of occupants and onlookers set the priorities that would govern the use of the valley's resources over the next decade. However, oil became less a matter of regional development than of national exploitation. By 1865, 543 companies based in funds from outside the oil regions were at work in Petrolia.<sup>55</sup> John D. Rockefeller, who perfected the organization of petroleum as an international commodity, referred to Petrolia as "a mining camp."<sup>56</sup>

As more factory than place, Petrolia functioned effectively to produce the entire world's petroleum during the 1860's. The priorities and values of the culture were organized around extraction and guided by the rule of capture. Fused into an ethic, this way of life and business defined a portable industry that could be applied to a variety of resources in most locales. Motion made up the essence of this ethic, with community, production, and trade becoming transient entities. Oilmen came to define permanence in terms of companies and personal fortunes, not in terms of localities and specific supplies. The oil would be drained. Once development had begun, the well pursued its own demise. Once the oil had been depleted, the pursuit of oil would move on and take with it the infrastructure and people of the industry.

This grand organization seems distant from the original actors in this story of commodification. Drake, of course, remained oblivious of such possibilities. He made no effort to secure landholdings or leases, nor to patent any of the processes he had employed. His employer, the Seneca Oil Company, dissolved in 1860, and its leases were taken up by the Pennsylvania Rock Oil Company. While the industry that he had started flourished throughout the 1860s, Drake was left with no personal landholdings, nor any revenue from wells. Ultimately, he was left destitute and near death in New York City. When oil barons heard of his situation, they successfully petitioned the Commonwealth of Pennsylvania to support him and his family at the princely rate of \$1,500 per month.

The pen-toting rider, Jonathon Watson, on the other hand, quickly realized what Drake's hard work could produce. One of the other successful early oilmen, George Bissell, described the scene of early speculation in a letter to his wife. In November, 1859, he writes:

We find here an excitement unparalleled. The whole population are crazy almost. Farms that could have been bought for a trifle 4 months ago, now readily command \$200 and \$300 an acre, and that too when not a drop of oil has ever been discovered on them. So much for the bare hope of their being by any possibility a substratum of oil. . . . No California Placer was ever one tenth part so valuable. When the other springs are opened the profit will be millions. I never saw such excitement. The whole western country are thronging here and fabulous prices are offered for lands in the vicinity where there is a prospect of getting oil.<sup>57</sup>

The idea of sky-rocketing land prices drove those only vaguely interested in investing to go to Petrolia sooner rather than later. Bissell himself was not far behind Watson's ride. Four days after the ride, Bissell began leasing or buying farms until he had expended \$200,000 by the end of autumn.<sup>58</sup> Other prospectors arrived within days from other parts of Pennsylvania, New York, Ohio, and New England.

These were only the precursors of a mad and maddening rush that lasted a dozen years. Investors sunk incredible sums into the real estate of this eleven-mile valley, and the values would rapidly be dwarfed again and again. The liquid nature of petroleum allowed it to fall between the cracks of American ownership law. The scene then became a dramatic illustration of the formal and informal controls that ownership can make possible, with the ensuing tragedy most effecting the region's common ecology and culture.

Whether speculators constructed a spread of derricks to fulfill their lease agreement or to drain a pool of oil before anyone else, their motives were the same. As Jonathon Watson's horse galloped along Oil Creek in 1859, the fate of this valley fell into distant hands. Outsiders would have more to say about

the use of this place over the next century than any locals. As the ruling justice observed in the Supreme Court's 1875 decision concerning the rule of capture:

The discovery of petroleum led to new forms of leasing lands. Its fugitive and wandering existence within the limits of a particular tract was uncertain, and assumed certainty only by actual development founded upon experiment. The surface required was often small compared with the results when attended with success, while these results led to great speculation, by means of leases covering the lands of a neighborhood like a swarm of locusts.<sup>59</sup>

The swarm of locust followed Watson's ride and left the "neighborhood" soiled as few other places. Yet the system functioned just as it was supposed to. The landscape of Petrolia demonstrated the tendencies of the American system of land ownership when a region is allowed to boom with no regulation—with no laws but the rule of capture.

## Notes

1. This article derives from Brian Black, *Petrolia: The Landscape of America's First Oil Boom* (Baltimore: Johns Hopkins University Press, 2000). For more information about photographs and the oil boom, see Brian Black, "Recasting the Unalterable Order of Nature: Photography and the First Oil Boom," *Pennsylvania History*, volume 64, no. 2 spring 1997, 275-299. The author wishes to express gratitude to Joel Tarr and his continued efforts on behalf of Pennsylvania's environmental history. Interview with Billy Smith, *Titusville Weekly Herald*, January 15, 1880. Of course, there is no way to verify this discourse. Smith was often reputed to aggrandize his own importance in the process; however, he undoubtedly had more familiarity with the possibilities of the well than did Drake.
2. J. D. Henry, *Early History* (London: Bradbury, Agnew & Company, 1914), 92, 95-98, 108, 109.
3. *Derick's Hand-Book*, I, 149.
4. For a discussion of environmental ethics, human values and technological use of the natural environment, see Ian Barbour, *Technology, Environment and Human Values* (Westport: Greenwood, 1980).
5. Ida Tarbell, "Introduction," Paul H. Giddens, *The Birth of the Oil Industry* 1938; Reprint edition (New York: Arno Press, 1972), xxxix.
6. In my work, I continue the tradition of popular writers of the 1860s to use an all encompassing term to include the boom landscape, life, and business practices. Writers used terms such as the Great Oildorado, Petroleum regions, and Petrolia.
7. Garrett Hardin, "The Tragedy of the Commons," *Science*, vol. 102, 1968.
8. The idea of commodification is part of theoretical models that derive from modern and post-modern cultural theories. The deconstruction of commodities has shown that a natural resource is assigned a value by the surrounding or using culture. If placed in a capitalist economy, this value can transfer this resource into a commodity, in which its use and management is orchestrated in a varying manner depending on its value and therefore its supply. In 1965 Maurice Godelier, the French anthropologist, wrote "there are thus no resources as such, but only possibilities of resources provided by nature in the context of a given society at a certain moment in its evolution." For discussion of this topic's relation to natural resources, see William Cronon, *Changes in the Land* (New York: Hill and Wang, 1983) and *Nature's Metropolis* (New York: Hill and Wang, 1992).
9. *History of Venango County, Pennsylvania*, 1879 (Franklin Penn.: Venango County Historical Society, 1976), 71-2.
10. S. J. M. Eaton, *Petroleum* (Philadelphia: J. P. Skelly and Co., 1866), 44-55.
11. Eaton, 44-55.
12. David Zeisberger, "The Diaries of Zeisberger Relating to the First Missions in the Ohio Basin," *Ohio Archaeological and Historical Publications*, XXI, 79.
13. General William Irvin, *Pennsylvania Archives*, First Series, XI, No. 25, 516.
14. *Memoirs of the American Academy of Arts and Sciences*, I (Boston, 1805), 375.
15. *Derrick's Hand-Book*, I, 8.
16. Thomas Gale, *The Wonder of the 19th Century: Rock Oil in Pennsylvania and Elsewhere* (Erie: Sloan and Griffeth, 1860), 15.
17. John Earle Reynolds, *In French Creek Valley* (Meadville, 1938), 72-73.
18. Paul Giddens, *Pennsylvania Petroleum, 1750-1872* (Harrisburg: Pennsylvania Historical and Museum Commission, 1947), 5-8.
19. Benjamin Franklin, *Autobiographical Writings*, ed. Carl Van Doren, I, (New York: Viking, 1945), 298-306. British scientists would use the same principle with petroleum in the port of Aberdeen in 1882, when they installed pipes to discharge crude directly into the ocean. [Benjamin Vincent, *Haydn's Dictionary of Dates* (New York: G. P. Putnam's Sons, 1889), 647].
20. Paul Giddens, *Early Days of Oil* (Gloucester, Mass.: Peter Smith, 1964), 3-6.
21. Edwin C. Bell, *History of Petroleum* (Titusville: "The Bugle" Print, 1900), 150; *Pittsburgh Dispatch*, Aug. 7, 1892.
22. See, for instance, John Stilgoe, *Common Landscapes of America* (New Haven: Yale University Press, 1982), or Theodore Steinberg, *Nature Incorporated* (New York: Cambridge University Press, 1991).
23. John Locke, *Second Treatises of Government*; (New York, 1963).
24. Locke, 343.
25. *Harper's*, 1865, vol. 50, p. 60.
26. Harold Williamson and Arnold Baum, *The American Petroleum Industry* (Evanston: Northwestern University Press, 1959), 759.

27. George A. Blanchard and Edward P. Weeks, *The Law of Mines, Minerals and Mining Rights*, 759-60.

28. *Ibid.*, 761.

29. *Ibid.*, 360-61.

30. *Brown v. Vandergrift*, 80 Pennsylvania 142 (1875).

31. The additional cases dealing with the rule of capture took many different approaches to the issues at hand. Some sought to treat oil and gas by the laws governing the collection of wild animals or solid minerals. In actuality, though, this approach to the rule differs little from that seen in *Acton v. Blundell*. Blakely M. Murphy, *Conservation of Oil and Gas: A Legal History* (NY: Arno Press, 1972), 427.

Not until the turn of the century would the rule of capture finally acquire specific legal meaning. Three state supreme court cases are generally cited as authority. In these cases the right to reduce to possession all the below ground minerals as well as the right to prevent drainage by drilling off-set wells received explicit judicial sanction.

However, the ambiguous nature of the rule was all oil speculators needed to initiate a new pattern of resource exploitation and land use. Indeed, these later rulings actually offered justification for the practices seen in the 1860s oil fields. An 1897 decision reads, "whatever gets into the well belongs to the owner of the well no matter where it comes from." *Kelly v. Ohio Oil Company*, 49 N.E. Report 401 (Dec., 1897).

32. J. Stanley Clark, *The Oil Century* (Norman: University of Oklahoma Press, 1959), 97.

33. *Westmoreland and Cambria Natural Gas Company v. Dewitt et al.*, 130 Penn State 235 (November, 1899).

34. In discussing a similar situation, the legal historian Arthur McEvoy writes of the rule of capture's impact on the California fisheries. In his model, many different users with a variety of technologies harvest the common property that they all share. Such a system of jurisdiction possesses no incentives to prohibit users from over-harvesting the resource. Although it was called growth, progress, prosperity, or expansion, the basic root of this desire is simple, human greed.

Economists refer to this indulgence of human nature as "the Fisherman's Problem," which stipulates that in a competitive economy, no market mechanism ordi-

narily exists to reward individual forbearance in the use of shared resources. The only possible outcome of such a boom is that eventually everyone goes broke—unless they pull out and move elsewhere. As McEvoy observes, "Collectively and inevitably—tragically to [Garrett] Hardin's mind—industry degrades and eventually destroys resources owned in common but used competitively." Arthur McEvoy, *The Fisherman's Problem* (New York: Cambridge University Press, 1986), 11.

35. Erie, PA, *Weekly Gazette*, October 6, 1859.

36. New York *Semi-Weekly Tribune*, October 7, 1859.

37. Coudersport, Pennsylvania, *Potter Journal*, October 13, 1859.

38. Williamson, 90-92.

39. In this practice, a 10 to 15 foot pole would be inclined an suspended overhead, and over the hole that had been dug by hand to six or ten feet. Rope stirrups were arranged in which two men each placed a foot. These men would then alternate kicking outward and downward, thereby also forcing the beam or pole downward.

40. Through soft shale or dirt, 5 to 6 feet could be kicked down in a day; through more difficult substances, 2 to 3 inches a day was common. Drilling 3 feet a day was usually considered to be a good average rate of progress. Usually, the center bit that was employed would become dull after drilling only 2 feet. It would then be replaced by a larger, blunter reamer. This process would require pulling the entire rig out of the ground—no matter what depth it had reached. This was also necessary to rid the hole of excess rock, water and dirt. In the overall construction of a rig, the auger stem followed these interchangeable bits and reamers.

The auger stem was a 20-foot-long-shaft that was heavy enough to carry the force of percussion drilling. "Jars," which were two looped irons, then were attached to the stem to give it a foot of play for each stroke. These jars took the strain off the other parts of the rig. A rope socket then joined the tool string to the kicking cable, which was a rope line that then came up to the surface and was attached to the kicking beam. This work could be heartbreaking, because holes often carved in or flooded. In such cases, the rigs and tools could be lost or broken, which greatly increased the expense of sinking the well.

Once the oil flow was established, the well

had to be tubed so that the supply could be managed and controlled. This process began with lowering lengths of two-or-three-inch copper piping down the hole in twelve foot sections. Laborers then lowered bags of flax seed to certain positions along the outside of the piping to hold it in place and finally a pumping apparatus (usually, a wooden sucker-rod with a rubber plunger attached to the end of it) directly into the tubing.

41. Cone, 126.

42. Eaton, 149.

43. *Venango Spectator*, November 5, 1862.

44. As a genre, these books relied on glamour or exaggeration to attract readers. Such overstatement, of course, consequently enhanced national interest in the region and contributed to the national "mythologizing" of Petrolia. Examples of such writing include: Gale and J. H. A. Bone, *Petroleum and Petroleum Wells*.

45. Cone, p. 156.

46. Cone, pp. 153-4.

47. Eaton, p. 142.

48. Deposition of Elijah Brady, Sept. 28, 1868, at patents office, New York City, quoted in Williamson, 151.

49. Letter of E. Mills to Roberts, Titusville, May 20, 1865.

50. The Patent Office decision was appealed to the U.S. Supreme Court which ruled in

Roberts favor in August, 1866. About twelve deaths are attributed directly to torpedoes. Williamson, 152.

51. *Scientific American*, XV (July 21, 1866), 54.

52. Explosions frequently occurred in the production of the torpedoes in one of the three factories based in the oil regions, most prominently in Titusville. The wagons that then transported the explosive devices to the site were additionally dangerous, particularly after the adoption of nitroglycerin. About twelve deaths are attributed directly to torpedoes. Williamson, 154.

53. The original American colonies are probably the nearest thing to these zones of resource extraction to take place in the U.S. For an explanation of the commodification of the landscape during the colonial period in the U.S., see Cronon, *Changes in the Land*.

54. Daniel Boorstin, *The Republic of Technology* (New York: Harper & Row, 1978), 24.

55. *Venango Country Spectator*, Feb. 22, 1865.

56. Allan Nevins, *Study in Power* (New York: Charles Scribner's Sons, 1940), vol. 1., 172.

57. George Bissell to wife, November 4 and 7, 1859.

58. Cone and Johns, 222-3.

59. *Brown v. Vandergrift*, 80 pnn St. 142 (November, 1875).