The American System and the Scientific Revolution of the Late 19th and Early 20th Centuries

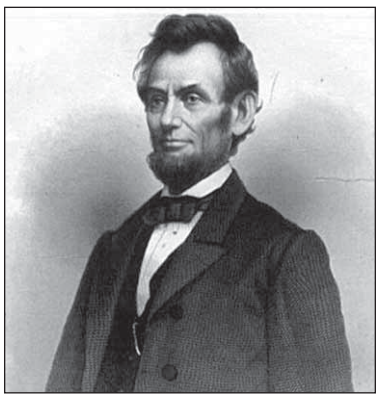
CEC Executive Member Gabrielle Peut prefaced her stirring 24 July conference presentation on the scientific work of Pierre and Marie Curie, with a strategic overview of the late 19th-century world. Here we present that first half of her speech, outlining the developments that inspired the great scientific breakthroughs of that time, and terrified the British Imperialists into a hateful and deadly counteroffensive.

These words were spoken on 11 February 1861: "I now leave, not knowing when, or whether ever, I may return, with a task before me much greater than that which rested upon [George] Washington. Without the assistance of that Divine Being, who ever attended him, I cannot succeed. With that assistance I cannot fail. Trusting in Him, who can go with me, and remain with you, and be everywhere for good, let us confidently hope that all will be yet well."

They were spoken by President-elect Abraham Lincoln as he departed from Springfield, Illinois to travel to Washington, DC for his inauguration as President of the United States. The American Union was on the brink of total destruction, and Abraham Lincoln knew it. The southern states had already seceded, beginning in January. Lincoln knew that full-scale Civil War was imminent; by April of that year, with the Confederate attack on Fort Sumter, the American Civil War was under way. Massive British aid flowed to the slave-based Confederacy, aiming to Balkanise and destroy that perfect union, the United States of America. Once again, America was face-to-face against humanity's mortal enemy, the British Empire.

It's extremely important to situate in our minds the political geometry of that time 150 years ago, and that eventual victory of the Civil War, under Lincoln's leadership, which in turn unleashed the greatest industrialisation in history, all across the world.

It is by grasping and understanding *this* United States of America, that you can fully appreciate that, without those heroic actions, we would not have the privilege today of setting out to relive in our minds the scientific upsurge of the late 19th century. The scientific discoveries in physical chemistry in the late 1800s were the greatest scientific explosion since the 15th-century Renaissance in Europe. They were a sort of mini-renaissance which was about to bloom, thanks only to this victory of the Americans against the British Empire. Louis Pasteur, Pierre and Marie Curie, Max Planck, Albert Einstein, and Vladimir Vernadsky established a new platform for the world's advancement, and that is what we must now master if we are to survive.



President Abraham Lincoln

The last spike is driven at Promontory Summit, Utah, USA, on 10 May 1869, linking the Central Pacific and Union Pacific Railroads to complete the first Transcontinental Railroad.

The Philadelphia Exhibition

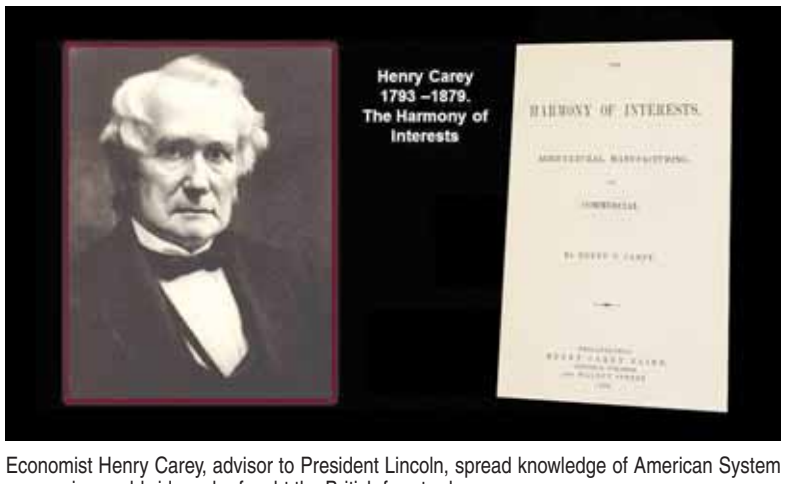
Lincoln was assassinated at the close of the war, but the industrial policy of the Union spread worldwide. In 1876, on the 100th anniversary of the American Declaration of Independence, an event took place that influenced the world tremendously: this was the Philadelphia Centennial Exhibition. It was a celebration both of the 100th anniversary of the War of Independence that defeated the British Empire, and of the more recent Union victory in the American Civil War. Scientists, political figures, and pioneers of industry from nations all over the world arrived to celebrate, study, and emulate the achievements of the United States, such as national banking, protective tariffs, and industrialisation through continental railway construction.

The sheer scale of the Exhibition was breathtaking. It was housed in 249 buildings constructed for the occasion, the largest of which, the Main Exhibition Building, was the tallest structure ever built in America and the largest in the world, enclosing 21 and a half acres. It housed three categories of international exhibits: Mining and Metallurgy; Manufacturing; and Education and Science. Thirty-seven nations officially participated in the Centennial, along with nineteen colonies of the British Empire, including New South Wales, Queensland, South Australia, Victoria, and New Zealand. One thousand nine hundred exhibits were displayed.

Those who attended the Philadelphia event returned to their home countries energised with ideas, on the basis of which those nations were then industrialised virtually overnight. With the aid of American advisors, many nations applied the methods of what became known as the American System of economics, as opposed to the British system of free trade and imperialism.

The leader of the worldwide push for the American System was an American economist, whom British free traders have attempted to black out of history: Henry C. Carey. More than any other single individual, he is the person who kept the American System alive. His background was rooted in republicanism, with his father Mathew Carey being an Irish republican revolutionary who was kicked out of Ireland for "defaming the British". Mathew Carey came to the United States and became a collaborator of Benjamin Franklin and an ardent supporter of Alexander Hamilton, the father of national banking in the United States, and of the American System generally.

The Philadelphia Centennial Exhibition in 1876 drew scientists and industrialists from around the world to its display of the advanced machinery of America's post-Civil War industrialisation.



Economist Henry Carey, advisor to President Lincoln, spread knowledge of American System economics worldwide as he fought the British free-traders.

The Harmony of Interests

Henry Carey captured this republican legacy in his book *The Harmony of Interests*, first published in 1851. It echoed the great reports of Hamilton, namely, the *Reports On Public Credit, On a National Bank*, and *On Manufactures*, dating from the early 1790s. Its full title was *The Harmony of Interests: Agricultural, Manufacturing, and Commercial.* Carey emphasised that the knowledge and skills of the labour force, and of the entire population, must always be advanced, and that that required raising their standard of living. By the time of the Civil War, Carey was the chief economic advisor to Lincoln. The application of American System principles in industry was crucial for securing the Civil War victory. The international promotion of those principles by Carey and his circles, after the war, transformed not only the United States, but many other nations as well, including Germany, Japan, Russia, and Australia.

But Carey also understood who the enemy was. Alongside the principles of industrial development, his reports contained a devastating attack on the imperial free trade system of Adam Smith, and, in particular, the views of Malthus, the two pillars of that British Imperial system. In *The Harmony of Interests*, Carey proclaimed that Malthusianism had been invented to *justify* the British System: "The impoverishing effects of the system were early obvious, and to the endeavour to account for the increasing difficulty of obtaining food where the whole action of the laws tended to increase the number of consumers of food, and to diminish the number of producers, was due the invention of the Malthusian theory of population, now half a century old."

Towards the end of the book, Carey wrote: "To substitute true Christianity for the detestable system known as the Malthusian, it is needed that we prove to the world that it is population that makes the food come from the rich soils, and food tends to increase more rapidly than population, thus vindicating the policy of God to man."

By 1865, the year of the war's end and Lincoln's assassination, Carey reflected on how the economic programs instituted during the war had brought an explosion of iron and steel production under a protectionist policy, and that "notwithstanding all our

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was only there for the sake of the development of the period that came later", observed Shields.

Call it a "platform upshift". The Universe exhausts the possibilities of an existing platform, in order to step up to the next level of organisation; similarly, man's discovery and exploitation of one level of technology and resources enables us to step up to a new, higher level.

Sky Shields: "If you look back at the biosphere, it does this. ... Nowhere in the biosphere do you see this stupid environmentalist 'delicate balance'. It's just not true; there is no delicate system there that stays in equilibrium. It's the opposite of that! … 99 per cent of all species that have ever existed are gone. The vast majority of every type of species, every type of organism that's lived on this planet, no longer exists, because it [the species] is relatively fixed compared to the process that it's inside of. The process moves on without it. … They're only to be used up, to reach the next level."

But, he continued, the emergence of mankind is the first appearance of a potentially immortal species, one that does not have to vanish in order for the Universe to develop to the next level. Rather, mankind himself must evolve to higher levels of energy flux density—through higher levels of science and technology—in coherence with the developing Universe, in particular by developing ever more powerful sources of energy.

As Shields summarised the matter, "The only thing we have to destroy are our bad ideas. We dump systems, the way the biosphere dumps animals. And we should; we move constantly to new energy resources. We never stop and try to find something sustainable, because nothing's sustainable. There is no such thing as anything sustainable, except for that process of progress. You keep moving, you keep developing, you keep changing, you keep increasing our population."

For instance, since it has been some 65 million years or so since the last extinction event, our position in the galaxy indicates we are due for another. Mankind could go extinct as the dinosaurs did, unless we develop processes of ever higher energy flux density, like fusion power (the process which powers the Sun), matter-antimatter reactions, and beyond, to allow us to deal with galactic and supra-galactic processes.

Mankind as a species must move out into and colonise areas of the Universe beyond our single, likely fragile planet. Three astronauts scheduled to fly on the next mission to the International Space Station were asked about such prospects during their 20 September 2011 press conference at the Johnson Space Centre in Texas. They responded in a scientific, and therefore thoroughly optimistic fashion, blowing the presently ruling Green ideology to smithereens.

NASA astronaut Don Pettit replied, "I'd like to say, that I'm a firm believer that one planet is not enough! If the dinosaurs had colonised other planets, if they had had a space program, they would still be here today! If mankind plans to live on the span of tens to twenties of millions of years, we're going to have to have our DNA on other planets."

Russian cosmonaut Oleg Kononenko added, "I think that the problem with resources will confront humanity sooner or later, and so humanity will have to look for other means of existence. So humanity will have to explore other galaxies, to survive."

European Space Agency astronaut André Kuipers elaborated, "I don't know who said it first, but it's like we're standing at the edge of the ocean with only our toes in the water, and we have this entire ocean to go explore". He concluded, "If you look back to our age from the far future, you'll see Yuri Gagarin, Armstrong, the first space station on Mars, mining the Moon, all of these things will be normal, all of these things will happen. Mankind will surely spread throughout the solar system."

The British Crown Created Green Fascism

vast expenditures, the productive power of the loyal States is greater at this moment than was that of the whole Union on the day on which, less than four years since, President Lincoln assumed the reins of government."

After he catalogued the vast expansion of iron and steel production as the indicator of this productive power, Carey warned, "When the present war shall have been closed there will be another to be fought, and that one will be with England. By many it is desired that it may be a war of cannon balls; but it is not now with such machinery that she chiefly seeks to fight us", but with free trade, with an "increase of men engaged in the creation of financial water-spouts, and of permanent maintenance of a premium on the precious metals"; in other words, a monetary system as opposed to a credit system. Carey called monetarist speculation "the windbag system".

As a crucial flank in their plans to "outdo England without fighting her", Carey and his associates organised the 1876 Centennial Exhibition in Philadelphia. Officially named by the U.S. Congress the *International Exhibition of Arts, Manufactures, and Products of the Soil and Mine*, the Centennial Exhibition presented the most dramatic show of science, technology and industry in history until that time.

The Transcontinental Railroad

The single most stunning American System accomplishment in this period was the command of railways. The Transcontinental Railroad, which Lincoln had initiated in 1862 while the nation was still in the throes of the Civil War, had been completed in 1869, the first of five transcontinental railways that would soon cross the country. Steam engines and railways dominated the Philadelphia Exhibition. The Reading Railroad and the Pennsylvania Railroad bordered the Exhibition grounds on two sides, and carried 7,500,000 passengers without incident in 22,917 trains comprised of 127,080 cars. At the centre of the 13-acre Machinery Hall was a single steam engine, the Corliss Duplex Engine, powering all the exhibits in that hall. Built expressly for the Centennial, this was the largest engine ever made. It weighed 700 tons and had been shipped from its site of manufacture in the state of Rhode Island on 65 railway cars. All the latest locomotive engines were on display, notably those of the Baldwin Locomotive Company of Philadelphia, which had revolutionised locomotive construction by manufacturing self-assembly kits, so that a locomotive could be shipped anywhere in the world and assembled on site. Baldwin engines eventually operated in Japan, Russia, Brazil, Mexico, and Australia, among other countries.

The *Times of London* wrote in alarm

Friedrich List, architect of Germany's unification, brought American System economics to Europe.

that, even though the Exhibition had been held on America's home territory, "the products of the industry of the United States surpassed our own oftener than can be explained by this circumstance—they revealed the application of more brains than we have at our command", and that "The American invents as the Greek sculptured and the Italian painted: it is genius." By the official count, 9,789,392 visitors from all over the U.S.A. and the world attended the exhibition.

Henry Carey, in his 1876 pamphlet titled *Commerce, Christianity and Civilisation Versus British Free Trade: Letters in Reply to the London Times,* presented his vision of the American System and a global development program. He nailed free trade for the anti-human, genocidal doctrine it was, in particular for the fact that it rested on a worldwide empire of dope-pushing: "Early in the free-trade crusade it was announced in Parliament that the smuggler was to be regarded as 'the greater reformer of the age'."

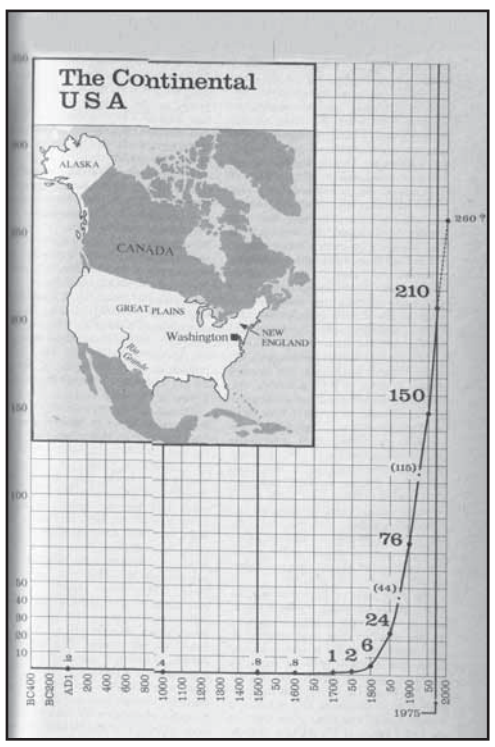
He attacked the British East India Company's opium smuggling into China as being based upon "bribery, fraud, perjury and violence", and charged that the British had bombed Canton "with great destruction of property and life", setting the stage for "a treaty by which the poor Chinese were required to … pay $21,000,000 for having been so long compelled to submit to the humiliation of being plundered by the 'great reformer'; and further, to cede Hong Kong, at the mouth of the Canton River, to the end that it might be used as a smuggling depot throughout the future." When the British Crown had renewed the East India Company's charter in 1833, wrote Carey, it was with the "express understanding … that opium-smuggling should not in any manner be interfered with."

Bam! This would have knocked the Brits' socks off.

American Influence in Germany

Most worrying to the British was the impact of American System economics upon Germany. Friedrich List, an economist who was a close associate of Mathew Carey and had worked on railway development in Pennsylvania, went back to Germany in the 1830s and created the famous *Zollverein*, or customs union, which began to bring Germany together as a nation-state.

Equally important for unifying the patchwork of small German principalities was List's launching of construction of a national railway grid. In the period after the formal unification of Germany in 1871, in addition to List's own activities, Henry Carey himself maintained extensive industrial and political contacts there during the government of the pro-American Chancellor Otto von Bismarck. Carey helped organise the protective tariff of 1879, reversing the long-standing commitment to free trade that had dominated in Prussia, which was now the largest of the unified German states.



America's post-Civil War population boom

American System ideas were implemented in industry by Emil Rathenau, who had attended the 1876 Philadelphia Centennial Exhibition. As a result of his efforts, the German electrical industry grew from a state of infancy when it had only 26,000 employees in 1895, to a position of controlling one-half of all international trade in electrical goods less than two decades later, by 1913.

In farming, only 20,000 harvesting machines were in use in Germany in 1882, but there were 300,000 of them by 1907, just 25 years later. Between 1870 and 1914, Germany, which had been a net exporter of population in the early 19th century, saw its population rise by almost 75 per cent, from 40 million to over 60 million. By 1909, Germany's merchant marine and navy posed a serious challenge to the world-ruling British navy. Beginning in 1889, German industrialists began to build a railway from Berlin down through the Balkans, across Turkey, and all the way to modern Kuwait.

Russia: Mendeleyev and Witte

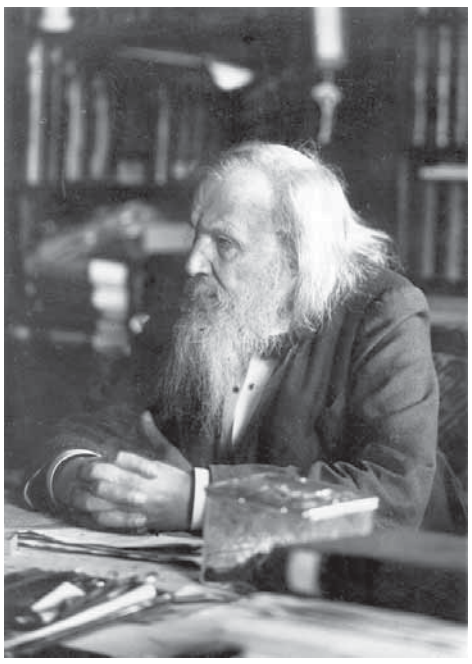
In Russia, the ideas of the protectionist American System were well known via extensive collaboration with the Americans, dating back to Russia's chairmanship of the League of Armed Neutrality, which protected third-country shipping and supply lines during the American Revolution. Hamilton's *Report on Manufactures* had been published in Russian in 1807, and the U.S. Army Corps of Engineers helped build the first Russian railways in the 1830s. Russia allied with Lincoln in the U.S. Civil War, sending Russian warships to the New York and San Francisco harbours against potential British attack. Besides the back-to-back emancipation of the serfs in Russia by Czar Alexander II and the slaves by Lincoln in the USA, there were numerous pro-American System explorers, industrialists, and diplomats from the Carey networks, in and out of Russia in the period from the 1850s up into the 1890s.

An extension of this collaboration was the fact that the brilliant chemist Dmitri Mendeleyev, originator of the Periodic Table, and major influence on Marie Curie, attended the 1876 Philadelphia Exhibition. He returned to Russia with enhanced intelligence on American agriculture, the fledgling oil industry, and transcontinental railway construction. Mendeleyev was the director of the Bureau of Weights and Standards, which was important for the Russian development of their iron industry, obviously crucial for building such a railway in Russia.

Finance Minister Count Sergei Witte drafted Russia's 1891 tariff law, with his ally Mendeleyev writing the introduction to the document—a scathing attack on British free trade. Witte, around this time, produced a Russian translation of List's *National System of Political Economy.* Russian industrial production grew rapidly under Witte's guidance. The 5,800-mile Trans-Siberian Railway from St. Petersburg on the Baltic Sea to Vladivostok on the Pacific was completed in 1903. Railways became the single largest industry in the country, employing 400,000 people in 1900. The population was also being transformed, as Witte wrote in one of his reports: "The railway is like a leaven, which creates a cultural fermentation among the population. Even if it passed through an absolutely wild people along its way, it would raise them in a short time to the level requisite for its operation."

Strategically, the establishment of unbroken rail networks from France all the way across Europe to Asia would open "a new path and new horizons not only for Russia but for world trade", wrote Witte. It would rank "as one of those world events that usher in new epochs in the history of nations and not infrequently bring about the radical upheaval of established economic relations between states". In other words, this Russian statesman was talking about the potential end of the British maritime empire. In particular, transcontinental rail would provide the opportunity for "more direct relations with the North American States", strengthening the longstanding "solidarity of political interests" between Russia and the U.S.

Russian Finance Minister Sergei Witte



Witte's ally Dmitri Mendeleyev (1834–1907), the chemist who developed the Periodic Table, was also an American System economist and the mastermind of Russia's industrialisation. He attended the Philadelphia Centennial Exhibition, focusing on railways, soil science, and the oil industry.

A Strategic Challenge to the Empire

As this was unfolding, a modern Japan was founded during the 1860s and 1870s, when a handful of Japanese intellectuals translated the works of Hamilton, Friedrich List, and Henry Carey into Japanese, to promote what they themselves called "the American System" in Japan. These Japanese patricians, born noblemen, but becoming ardent supporters of the American Constitution, formed an army to subdue the feudal Tokugawa warlords and restore central government to the young Emperor Meiji in 1868, an event known as the Meiji Restoration.

One of Henry Carey's closest friends and collaborators, U.S. State Department official Erasmus Peshine Smith, was stationed in Japan from 1871-77 as an advisor to the Japanese government's Foreign Ministry on issues of credit, tariffs, education, and bilateral treaty agreements with the western powers. The establishment of the National Bank in 1872 and the enactment of educational reforms to create a literate citizenry, imbued with scientific and technological optimism, were directly due to Smith.

With this platform now established in Russia, Japan and Germany, by the 1890s an historic opportunity for the nations of continental Europe to unite and work together emerged. France's Foreign Minister Gabriel Hanotaux collaborated with Finance Minister Witte of Russia to develop the internal connections of the European nations, moving towards a completed Eurasian Land-bridge.

The world was advancing in a way that could smash the power of the British Imperial forces. The British counteroffensive, led by the likes of the son of that dope-sniffing Queen Victoria, the future King Edward VII, struck against all those nations with assassinations, subversion, and fomentation of wars—and ultimately World War I.

Equally horrifying to British Imperial strategists was the work being done in the laboratories, in all fields of science, during the decades after Lincoln's Civil War victory. It was against this scientific renaissance that the Cambridge Apostles of the Darwin Project for Malthusian genocide were unleashed, to corrupt, pollute, and attempt to destroy the new scientific discoveries and technological advances, including the revolution in physical chemistry, taking place during these years.