

French Academy of Sciences as a full member. It is also known that Prince Henry offered him a post in the Prussian Army. In 1785, Carnot participated in an essay competition of the Prussian Academy of Sciences with a *Dissertation sur la théorie de l'infini mathématique* (Dissertation on the Theory of the Mathematical Infinite). Three years later, he wrote an essay on defense policy, in which he rejected every form of war of aggression. The meaning of war could only lie in the "defense of civilization." Everything else was a crime. As he elaborated, "just war" can only be defensive, which included, of course, all manner of offensive operations. This was the reason why he appealed for the maintenance and further development of the French system of fortifications, and it makes Carnot the last military theoretician

who had a comprehensive moral-philosophical foundation.

In 1797, Scharnhorst, who was then working at the General Staff of Hanover, mentioned Carnot's *Eloge* in his essay, *Development of the General Cause of Success of the French in the Revolutionary Wars*; Scharnhorst could only have obtained a copy of Carnot's work from Prince Henry. Another area in which Carnot showed that he was thinking far ahead of his times, was in his essay on the future military importance of aerostatic balloon warfare.

### The 'Organizer of Victory'

On April 20, 1792, Austria and Prussia declared war on the French Republic, in order to restore the power of Louis

## Carnot and his times

**1753:** Lazare Carnot is born in Burgundy (May 13).

**1773:** Carnot studies under Gaspard Monge at the military academy in Mézières, where he meets Benjamin Franklin.

**1783:** Carnot becomes a captain in the army.

**1789:** French Revolution begins. Storming of the Bastille in Paris (July 14).

**1791:** Flight and capture of King Louis XVI. Carnot is elected to the new Legislative Assembly (Oct. 1), in charge of education. He writes his first proposals on reform of the army.

**1792:** France declares war on coalition of Austria and Prussia. Storming of the Tuileries (Aug. 10); overthrow of the monarchy. Chaotic situation in the army, with losses on all fronts, massacres in Paris. Carnot slowly begins to impose his policies. Carnot elected to National Convention (September); goes to the Pyrenees to organize defense against a possible attack from Spain.

**1793:** Louis XVI is executed (Jan. 16). France declares war on Britain, the Netherlands, and Spain. Northern front is collapsing. Carnot is sent there, writes a famous report stressing the need to strike the enemy on the flanks. He turns the military situation around, winning some battles. Girondists are driven from power by Jacobins (July). France is ruled by Maximilien Robespierre and the Committee of Public Safety. Reign of Terror results in guillotining of 1,251 people by July 1794. British Navy intervenes in the Mediterranean. France responds with mass mobilization (*levée en masse*). Carnot reforms the army and brings its strength up to 1 million men (4% of the population). Carnot named member of the Committee of Public Safety (August). He reorganizes and takes all military

operations under his control.

**1793-94:** Carnot's reforms: 1) formation of a new, mass-based army; 2) organization of military forces to fight "total war"; 3) new political strategy: Obtain the neutrality of Prussia. Disrupt communications between Austria and England. Concentrate efforts on attacking the English, leading to an invasion of England.

**1794:** France occupies the Netherlands (until 1795). French victory at the battle of Fleurus (June), in the north, followed by retaking of all the northern ports, crucial to getting U.S. help for the French. Coup of 9-10 Thermidor, led by Paul Barras, ends the Reign of Terror and leads to the arrest of Robespierre. Danton and Robespierre are executed (July). The authority and military influence of Carnot are used to remove Robespierre, although Carnot will never accept the reactionary policies of the Thermidorians. French armies continue to regain territory after territory. Creation of the Ecole Polytechnique (September).

**1795:** Dutch fleet captured by France. Prussia, Spain make peace with France. Carnot leaves the Committee of Public Safety, in opposition to the policies of Barras. He returns to power on April 11, becoming a member of the Directory, which rules France with a five-man executive committee.

**1796:** Napoleon Bonaparte leads French army in conquest of most of Italy by 1797. Carnot elected president of the Directory (April 30).

**1797:** Coup d'état of 18 Fructidor by General Augereau (Sept. 4). Carnot is removed from the Directory, escapes first to Switzerland, then to Germany. The Directory, now a triumvirate under Barras, becomes dependent on Napoleon.

**1798:** French occupy Rome, invade Switzerland. Bonaparte leads expedition into Egypt (until 1799), takes Cairo. British fleet defeats French in the Battle of the Nile.

**1799-1800:** Bonaparte invades Syria. Coalition formed of Britain, Austria, Russia, Portugal, Naples, and

XVI. The actual reason for the war, as so often, was to prevent “American conditions” from emerging in Europe. On Sept. 6, Carnot was elected a member of the Convention for the district of Pas de Calais. The first major battle was the famous “bombardment of Valmy” on Sept. 20, 1792, which was indeed only a bombardment, in which two starving and exhausted armies took their distance from each other as fast as they could, after having shot off a bit of ammunition. From September to November 1792, Carnot was in the Pyrenees as a special emissary of the Convention. After his return, he presented proposals for the economic development of the otherwise backward mountain region (developing its textile industry) so that it could free itself from British domination.

Ottoman Empire against France. French driven out of Italy. Coup d'état of 18 Brumaire: Bonaparte returns to France, overthrows the Directory, and sets up a Consulate, which rules until 1804. Carnot returns, is named minister of war; but resigns in opposition, 1800.

**1802:** Treaty of Amiens between Britain and France. Bonaparte is created First Consul for life, over Carnot's opposition.

**1803:** War breaks out between Britain and France.

**1804:** Bonaparte crowns himself emperor. First Empire lasts until 1814. Third Coalition is formed by Britain, Russia, Austria, and Sweden against France.

**1805:** France defeats Austria at Battle of Ulm. British defeat Franco-Spanish fleet at Battle of Trafalgar. France defeats Austria and Russia at Battle of Austerlitz.

**1806:** Napoleon dissolves Holy Roman Empire. Prussia defeated by France at Jena and Auerstädt.

**1807:** Carnot withdraws from public life.

**1808:** France occupies Spain.

**1810:** France annexes Holland.

**1811:** French driven out of Portugal.

**1812:** Napoleon invades Russia; occupies Moscow, but is forced to retreat.

**1813:** Prussia begins War of Liberation from France. Coalition against France formed by Russia, Prussia, Britain, Austria, and Sweden. France defeated at Battle of Leipzig, Battle of Vittoria. Allied forces invade France.

**1814:** Coalition forces enter Paris in March. Carnot is appointed governor of Antwerp by Napoleon. Napoleon abdicates and is exiled to Elba. Louis XVIII becomes King of France. Treaty of Paris ends Napoleonic Wars. Congress of Vienna (to 1815).

**1815:** The Hundred Days: Napoleon returns to Paris. Carnot serves as Minister of the Interior. Battle of Waterloo: Napoleon defeated and exiled to St. Helena. Carnot is exiled from France (July).

**1823:** Carnot dies in Magdeburg.

Since the allies Austria and Prussia suffered a defeat that year at Jemmapes, Britain was forced to enter the war against France in February 1793, following some propaganda work of the chief of the British secret service, Edmund Burke. The British strategy was simple and brutal: France was to be attacked from the sea and by land simultaneously. The country was to be starved into submission by means of a blockade. Part of the operation included inciting revolts in the Vendée, Toulon, and Lyons. The commander of the French northern army, Dumouriez, deserted on April 2, 1793 and went over to the British. This led to a complete disintegration of the French Army.

In that period, Carnot was elected to the Committee of Public Safety, the highest institution in France, where he was responsible for military planning and the movements of the armies. The French Army had been severely weakened by the desertion of over 6,000 noble officers. Nepotism and political factionalization prevailed. Carnot's major task was to combine the remainder of the army units with the newly recruited, but untrained masses (“*levée en masse*”) to form a capable force, and to reestablish the authority of the officer corps. Moreover, the entire army structure had to be changed. Carnot reduced the number of the armies from ten to six, and then to five. He introduced brigades and divisions and attempted thereby to improve the mobility of the formations. Another of his tasks was to promote “young talents,” such as Lazare Hosch, who was promoted to the rank of general at the age of 24.

Carnot was well aware that the employment of the most modern science and technologies would be decisive for victory. He was the first to implement a scientific-technological “crash program.” Scientists such as Berthollet, Chaptal, Monge, Prier, Guyton, de Morreau, Vandermonde, Foucoy, and Hasenfratz were brought in. Monge, for example, wrote a handbook on the production of cannon, and set up an immense cannon factory in Paris. Vandermonde was responsible for the mass production of bayonettes, Chaptal worked on the production of gunpowder and saltpeter. It did not take long before there were 258 forges in Paris, which produced over 1,000 cannon barrels per day, and the powder-works in Grenelle produced, with a newly developed procedure, 30,000 pounds of gunpowder daily. A census of all industrial labor in Paris was carried out, and many workers were pulled out of private industry and assigned to state production facilities. A research unit for balloon warfare was set up in Chateau Petit Meudon.

Of course, the Ecole Polytechnique, which Carnot established, was of the utmost importance, and its first head was Gaspard Monge, Carnot's former teacher and friend.

In September 1793, the allies (Austria, Prussia, and Britain) had advanced to Mauberge, the last fortification before Paris. If this fortification fell, Paris would have been opened up to an attack by the allies. Fortunately, the allies made a mistake. In a typically British manner, the Duke of York left the army under the command of General von Coburg, in order