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# David Livingstone

**2008/9 Schools Wikipedia Selection. Related subjects: British History 1750-1900; Geographers and explorers**

**David Livingstone** ( 19 March 1813 – 1 May 1873) was a British Congregationalist pioneer medical missionary with the London Missionary Society and explorer in central Africa. He was the first European to see Mosi-oa-Tunya (Victoria Falls), to which he gave the English name in honour of his monarch, Queen Victoria. He is the subject of the meeting with H. M. Stanley, which gave rise to the popular quotation, *"Dr Livingstone, I presume?"*

Perhaps one of the most popular national heroes of the late-nineteenth century in Victorian Britain, Livingstone had a mythic status, which operated on a number of interconnected levels: that of Protestant missionary martyr, that of working-class "rags to riches" inspirational story, that of scientific investigator and explorer, that of imperial reformer, anti-slavery crusader and advocate of commercial empire.

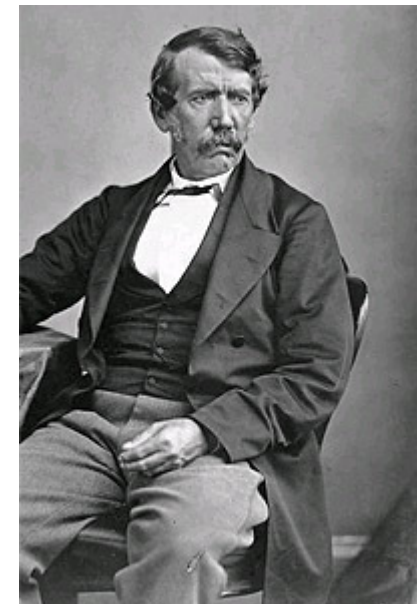
His fame as an explorer helped drive forward the obsession with discovering the sources of the Nile River that formed the culmination of the classic period of European geographical discovery and colonial penetration of the African continent. At the same time his missionary travels, "disappearance" and death in Africa, and subsequent glorification as posthumous national hero in 1874 led to the founding of several major central African Christian missionary initiatives carried forward in the era of the European "Scramble for Africa."

## Early life

David Livingstone was born on March 19, 1813 in the mill town of Blantyre, Lanarkshire, Scotland, into a Protestant family believed to be descended from the highland Livingstones, a clan that had been previously known as the Clan MacLea. Born to Neil Livingstone (1788-1856) and his wife Agnes (1782-1865), David, along with many of the Livingstones, was employed in the cotton mill of H. Monteith - David and brother John working 12-hour days as "piecers," tying broken cotton threads on the spinning machines.

David Livingstone's father Neil was very religious, a Sunday School teacher and teetotaller who handed out Christian tracts on his travels as a door to door tea salesman, and who read books on theology, travel and missionary enterprises. This rubbed off on the young David, who became an avid reader, but he also

### David Livingstone



|                   |   |
|-------------------|---|
| <b>Born</b>       | 19 March 1813<br>Blantyre, United Kingdom           |
| <b>Died</b>       | 4 May 1873 (aged 60)<br>near Lake Bangweulu, Zambia |
| <b>Occupation</b> | Missionary and explorer                             |



loved scouring the countryside for animal, plant and geological specimens in local limestone quarries. Neil Livingstone had a fear of science books as undermining Christianity and attempted to force him to read nothing but theology, but David's deep interest in nature and science led him to investigate the relationship between religion and science. When in 1832 he read *Philosophy of a Future State* by the science teacher, amateur astronomer and church minister Dr Thomas Dick, he found the rationale he needed to reconcile faith and science, and apart from the Bible this book was perhaps his greatest philosophical influence.

Other significant influences in his early life were Thomas Burke, a Blantyre evangelist and David Hogg, his Sunday School teacher. At age nineteen David and his father left the Church of Scotland for a local Congregational church, influenced by preachers like Ralph Wardlaw who denied predestinarian limitations on salvation. Influenced by American revivalistic teachings, Livingstone's reading of the missionary Karl Gützlaff's "Appeal to the Churches of Britain and America on behalf of China" enabled him to persuade his father that medical study could advance religious ends.

Livingstone's experience from age ten to twenty-six in H. Montieth's Blantyre cotton mill, first as a piecer, later as a spinner was also important. Necessary to support his impoverished family, this work was monotonous but gave him persistence, endurance, and a natural empathy with all who labour, as expressed by lines he used to hum from the egalitarian Rabbe Burns song: "When man to man, the world o'er / Shall brothers be for a' that" ..

### **His studies**

Livingstone attended Blantyre village school along with the few other mill children with the endurance to do so, but a family with a strong, ongoing commitment to study also reinforced his education. After reading Gutzlaff's appeal for medical missionaries for China in 1834, he began saving money and in 1836 entered Anderson's College in Glasgow, founded to bring science and technology to ordinary folk, and attended Greek and theology lectures at the University of Glasgow. In addition, he attended divinity lectures by Wardlaw, a leader at this time of vigorous anti-slavery campaigning in the city. Shortly after he applied to join the London Missionary Society (LMS) and was accepted subject to missionary training. He continued his medical studies in London while training there and in Essex to be a minister under the supervision of the LMS. Despite his impressive personality, he was a poor preacher and would have been rejected by the LMS had not the Director given him a second chance to pass the course.

Livingstone hoped to go to China as a missionary, but the First Opium War broke out in September 1839 and the LMS suggested the West Indies instead. In 1840, while continuing his medical studies in London, Livingstone met LMS missionary Robert Moffat, on leave from Kuruman, a missionary outpost in South Africa, north of the Orange River. Excited by Moffat's vision of expanding missionary work northwards, and influenced by abolitionist T.F. Buxton's arguments that the African slave trade might be destroyed through the influence of "legitimate trade" and the spread of Christianity; Livingstone focused his ambitions on Southern Africa. He was deeply influenced by Moffat's judgement that he was the right person to go to the vast plains to the north of Bechuanaland, where he had glimpsed "the smoke of a thousand villages, where no missionary had ever been".

## **Missionary work in southern Africa**

Livingstone was assigned to Kuruman by the LMS and sailed in December 1840, arrived at Moffat's mission, now part of South Africa, in July 1841. Upon arrival, Livingstone was disappointed at the unexpectedly small size of the village and an indigenous Christian population, after Moffat's twenty years of work,

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of only about forty communicants and a congregation of 350. Reasoning that conversions would be more likely if the missionaries were themselves indigenous converts, Livingstone rapidly attached himself to the plans of missionary Rogers Edwards to found a mission farther north in territory increasingly disturbed by traders, hunters, and Afrikaner settlers. Setting up the new mission at Mabotswa among the Kgatla people in 1844, he was mauled by a lion which might have killed him if it had not been distracted by the African teacher Mebalwe, who was also badly injured. Both recovered but Livingstone's arm was partially disabled and caused him pain for the rest of his life.

Robert Moffat arrived in Kuruman with his family in December 1843, and shortly afterward Livingstone married Moffat's eldest daughter Mary on January 2, 1845. She was also Scottish but had lived in Africa since she was four. After falling out with Edwards he moved to an out-station at Chonuane among the Kwena under chief Sechele, and finally moved with the Kwena to Kolobeng in 1847 under pressure of drought. Mary travelled with Livingstone for a brief time at his insistence, despite her pregnancy and the protests of the Moffats. She gave birth to a daughter, Agnes, in May 1847, and at Kolobeng began an infant's school while Livingstone worked on a philological analysis of the Setswana language, in which he had become fluent. The first and only Christian convert of Livingstone's career was made in Kolobeng when Sechele was baptized after renouncing all but his senior wife, although he was later denied communion after he took back one of his previous wives. Livingstone always emphasized the importance of understanding local custom and belief as well as the necessity of encouraging Africans to proselytize, however he always had acute difficulties finding converts he considered suited for training to be missionaries. Livingstone grew increasingly frustrated with settled missionary strategies and more willing to imagine more unconventional missionary methods. As Livingstone began to plan for new missionary initiatives, he recognized the difficulties presented by his growing family, and in 1849 he sent his family (now including daughter Agnes and sons Robert and Thomas) back to Kuruman as he planned further inland travels. Later Mary and David's family returned to England, but came to Africa again on the Zambezi Expedition.

## Exploration of southern and central Africa

After the Kolobeng mission had to be closed due to drought, he explored the African interior to the north, in the period 1852–56, and was the first European to see the Mosi-oa-Tunya ("the smoke that thunders") waterfall (which he renamed Victoria Falls after his monarch, Queen Victoria).

Livingstone was one of the first Westerners to make a transcontinental journey across Africa, Luanda on the Atlantic to Quelimane on the Indian Ocean near the mouth of the Zambezi, in 1854-56. Despite attempts especially by the Portuguese, the great peninsula of central and southern Africa had not been crossed by Europeans at that latitude owing to their susceptibility to malaria, dysentery and sleeping sickness which was prevalent in the interior and which also prevented use of draught animals (oxen and horses), as well as to the opposition of powerful chiefs and tribes, such as the Lozi, and the Lunda of Mwata Kazembe.

The qualities and approaches which gave Livingstone an advantage as an explorer were that he usually travelled lightly, and he had an ability to reassure chiefs that he was not a threat. Other expeditions had dozens of soldiers armed with rifles and scores of porters carrying supplies, and were seen as military incursions or were mistaken for slave-raiding parties. Livingstone on the other hand travelled on most of his journeys with a few servants and porters, bartering for supplies along the way, with a couple of guns for protection. He preached a Christian message but did not force it on unwilling ears; he understood the ways of local chiefs and successfully negotiated passage through their territory, and was often hospitably received and aided, even by Mwata Kazembe.



Livingstone was a proponent of trade and Christian missions to be established in central Africa. His motto, inscribed in the base of the statue to him at Victoria Falls, was "Christianity, Commerce and Civilisation." At this time he believed the key to achieving these goals was the navigation of the Zambezi River as a Christian commercial highway into the interior. He returned to Britain to try to garner support for his ideas, and to publish a book on his travels which brought him fame as one of the leading explorers of the age.

Believing he had a spiritual calling for exploration rather than mission work, and encouraged by the response in Britain to his discoveries and support for future expeditions, in 1857 he resigned from the London Missionary Society.

## Zambezi expedition

The British government agreed to fund Livingstone's idea and he returned to Africa as head of the Zambezi Expedition to examine the natural resources of southeastern Africa and open up the River Zambezi. Unfortunately it turned out to be completely unnavigable past the Cabora Bassa rapids, a series of cataracts and rapids that Livingstone had failed to explore on his earlier travels.

The expedition lasted from March 1858 until the middle of 1864. Livingstone was an inexperienced leader and had trouble managing a large-scale project. The artist Thomas Baines was dismissed from the expedition on charges (which he vigorously denied) of theft. Livingstone's wife Mary died on 29 April 1863 of malaria, but Livingstone continued to explore, eventually returning home in 1864 after the government ordered the recall of the Expedition. The Zambezi Expedition was castigated as a failure in many newspapers of the time, and Livingstone experienced great difficulty in raising funds further to explore Africa. Nevertheless, the scientists appointed to work under Livingstone, John Kirk, Charles Meller, and Richard Thornton did contribute large collections of botanic, ecological, geological and ethnographic material to scientific institutions in the UK.

## Geographical discoveries

Although Livingstone was wrong about the Nile, he discovered for western science numerous geographical features, such Lake Ngami, Lake Malawi, and Lake Bangweulu in addition to Victoria Falls mentioned above. He filled in details of Lake Tanganyika, Lake Mweru and the course of many rivers, especially the upper Zambezi, and his observations enabled large regions to be mapped which previously had been blank. Even so, the furthest north he reached, the north end of Lake Tanganyika, was still south of the Equator and he did not penetrate the rainforest of the River Congo any further downstream than Ntangwe near Misisi.

Livingstone was awarded the gold medal of the Royal Geographical Society of London and was made a fellow of the society, with which he had a strong association for the rest of his life.

## Livingstone and slavery

*"And if my disclosures regarding the terrible Ujijian slavery should lead to the suppression of the East Coast slave trade, I shall regard that as a greater matter by far than the discovery of all the Nile sources together"* - Livingstone in a letter to the editor of the New York Herald.



Livingstone's letters, books and journals did stir up public support for the abolition of slavery. However he became humiliatingly dependent for assistance on the very slave-traders whom he wanted to put out of business. Because he was a poor leader of his peers, he ended up on his last expedition as an individualist explorer with servants and porters but no expert support around him. At the same time he did not use the brutal methods of maverick explorers such as Stanley to keep his retinue of porters in line and his supplies secure. For these reasons from 1867 onwards he accepted help and hospitality from Mohamad Bogharib and Mohamad bin Saleh (also known as Mpamari), traders who kept and traded in slaves, as he recounts in his journals. They in turn benefited from Livingstone's influence with local people, which facilitated Mpamari's release from bondage to Mwata Kazembe.

Livingstone was also furious to discover some of the replacement porters sent at his request from Ujiji were slaves.

## **Illness, pain and death**



Henry Morton Stanley meets David Livingstone



David Livingstone memorial at Victoria Falls, the first statue on the Zimbabwean side.



Livingstone completely lost contact with the outside world for six years and was ill for most of the last four years of his life. Only one of his 44 letter dispatches made it to Zanzibar. Henry Morton Stanley, who had been sent to find him by the *New York Herald* newspaper in 1869, found Livingstone in the town of Ujiji on the shores of Lake Tanganyika on November 10, 1871, greeting him with the now famous words "Dr Livingstone, I presume?" These famous words may be a fabrication, as Stanley has torn out the pages of this encounter in his diary. Even Livingstone's account of this encounter doesn't mention these words. However, the phrase appears in a *New York Herald* editorial dated 10 August 1872 and the Encyclopaedia Britannica and the Oxford Dictionary of National Biography both quote it without questioning its validity.

A possibly apocryphal story is included in *Presidential Elections* by Paul F. Boller, Jr. (1985). The story goes that Stanley told Livingstone what had occurred in Europe and America during his expedition; among other things he said that the 1872 U. S. presidential election campaign had begun and the Democratic Party had nominated Horace Greeley. Livingstone stopped Stanley there; he said, "You have told me curious things and wonderful, but there is a limit--when you tell me the Democrats have nominated Greeley for President I am hanged if I will believe it."

Some in Burundi claim the famous meeting took place 12 km south of Bujumbura at the spot marked by the Livingstone-Stanley Monument, Mugere, but that marks a visit they made 15 days after their first meeting - see linked article for references - on their joint exploration of the north end of Lake Tanganyika, which ended when Stanley left in March the next year.

Despite Stanley's urgings, Livingstone was determined not to leave Africa until his mission was complete. His illness made him confused and he had judgment difficulties at the end of his life. He explored the Lualaba and failing to find connections to the Nile, returned to Lake Bangweulu and its swamps to explore possible rivers flowing out northwards.

David Livingstone died in that area in Chief Chitambo's village at Ilala southeast of Lake Bangweulu in Zambia, on May 1, 1873 from malaria and internal bleeding caused by dysentery. He took his final breaths while kneeling in prayer at his bedside. (His journal indicates that the date of his death would have been May 1, but his attendants noted the date as May 4, which they carved on a tree and later reported; this is the date on his grave.) Livingstone's heart was buried under a Mvula tree near the spot where he died, now the site of the Livingstone Memorial. His body together with his journal was carried over a thousand miles by his loyal attendants Chuma and Susi, and was returned to Britain for burial in Westminster Abbey.

## Livingstone's legacy

By the late 1860s Livingstone's reputation in Europe had suffered owing to the failure of the missions he set up, and of the Zambezi Expedition; and his ideas about the source of the Nile were not supported. His expeditions were hardly models of order and organisation.

His reputation was rehabilitated by Stanley and his newspaper, and by the loyalty of Livingstone's servants whose long journey with his body inspired wonder. The publication of his last journal revealed stubborn determination in the face of suffering.



A new statue of David Livingstone on the Zambian side of Victoria Falls





He had made geographical discoveries for European knowledge. He inspired abolitionists of the slave trade, explorers and missionaries. He opened up Central Africa to missionaries who initiated the education and health care for Africans, and trade by the African Lakes Company. He was held in some esteem by many African chiefs and local people and his name facilitated relations between them and the British.

Partly as a result, within fifty years of his death, colonial rule was established in Africa and white settlement was encouraged to extend further into the interior.

On the other hand, within a further fifty years after that, two other aspects of his legacy paradoxically helped end the colonial era in Africa without excessive bloodshed. Livingstone was part of an evangelical and nonconformist movement in Britain which during the 19th century changed the national mindset from the notion of a divine right to rule 'lesser races', to ethical ideas in foreign policy which, with other factors, contributed to the end the British Empire. Secondly, Africans educated in mission schools founded by people inspired by Livingstone were at the forefront of national independence movements in central, eastern and southern Africa.

## Family life

While Livingstone had a great impact on British Imperialism, he did so at a tremendous cost to his family. In his absences, his children grew up fatherless, and his wife Mary (daughter of Mary and Robert Moffat) eventually died of malaria trying to follow him in Africa. He had six children: Robert reportedly died in the US Civil War. See ; Agnes, Thomas, Elizabeth (who died two months after her birth), William (nicknamed Zouga for the river along which he was born) and Anna Mary. His one regret in later life was that he did not spend enough time with his children.

## Archives

The archives of David Livingstone are maintained by the Archives of the University of Glasgow (GUAS).

## Places named in his honour and other memorials

### In Africa

- The Livingstone Memorial in Ilala, Zambia marks where he died.
- The city of Livingstone, Zambia which includes a memorial in front of the Livingstone Museum and a new statue erected in 2005.
- The *Rhodes-Livingstone Institute* in Livingstone and Lusaka, Zambia, 1940s to 1970s, was a pioneering research institution in urban anthropology.
- David Livingstone Teachers Training College, Livingstone, Zambia
- The David Livingstone Memorial statue at Victoria Falls, Zimbabwe, erected in 1954 on the western bank of the falls.
- A new statue of David Livingstone was erected in November 2005 on the Zambian side of Victoria Falls.
- A plaque was unveiled in November 2005 at Livingstone Island on the lip of Victoria Falls marking where Livingstone stood to get his first view of the falls.



- The town of Livingstonia, Malawi.
- The city of Blantyre, Malawi is named for his birthplace in Lanarkshire, Scotland, and includes a memorial.
- The *David Livingstone Scholarships* for students at the University of Malawi, funded through Strathclyde University, Scotland.
- The Kipengere Range in south-west Tanzania at the north-eastern end of Lake Malawi is also called the Livingstone Mountains
- Livingstone Falls on the River Congo, named by Stanley.
- The Livingstone Inland Mission, a Baptist mission to the Congo Free State 1877-1884, located in what is now Kinshasa.
- A memorial in Ujiji commemorates his meeting with Stanley.
- The Livingstone-Stanley Monument, Mugere, Burundi marks a spot that Livingstone and Stanley visited on their exploration of Lake Tanganyika, mistaken by some as the first meeting place of the two explorers.
- There is a memorial to Livingstone at the ruins of the Kolobeng Mission, 40 km west of Gaborone, Botswana.
- The church tower of the Catholic Holy Ghost Mission in Bagamoyo, Tanzania is called Livingstone Tower because his body was laid down there for one night before it was shipped to London.
- Livingstone House in Stone Town, Zanzibar, provided by the Sultan for Livingstone's use, January to March 1866, to prepare his last expedition; the house was purchased by the Zanzibar government in 1947.
- Plaque commemorating his departure from Mikindani on his final expedition on the wall of the house that has been built over the house he reputedly stayed in.

### In Scotland

- A statue stands near the base of the Scott Monument in the Princes Street Gardens, Edinburgh, Scotland.
- The David Livingstone Centre in Blantyre, Scotland is a museum in his honour.
- David Livingstone Memorial Primary School in his birthplace, Blantyre, Lanarkshire, Scotland.
- David Livingstone Memorial Church of the Church of Scotland, in Blantyre, Lanarkshire, Scotland.
- A bust of David Livingstone is among those of famous Scotsmen in the William Wallace Memorial near Stirling, Scotland.
- Strathclyde University, Glasgow (successor to Anderson's University), commemorates him in the *David Livingstone Institute for International Development Studies*, the *David Livingstone Centre for Sustainability*, and *Livingstone Tower*.
- The *David Livingstone (Anderson College) Memorial Prize in Physiology* commemorates him at the University of Glasgow.

### In England

- His grave is marked in Westminster Abbey, London.
- The Royal Geographic Society has a statue of Livingstone in the hall of their London headquarters.
- The London Missionary Society named their headquarters *Livingstone House*, in Carteret St, London SW1.
- David Livingstone Primary School, Thornton Heath, London
- Livingstone Primary School, New Barnet, London
- Livingstone Primary School, Mossley, Tameside



## In Canada

- The Livingstone Range of mountains in southern Alberta
- David Livingstone Elementary School, Vancouver
- David Livingstone Community School, Winnipeg
- Bronze bust in Halifax, Nova Scotia.

## In USA

- Livingstone College, Salisbury, North Carolina
- Livingstone Adventist Academy, Salem, Oregon

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# Henry Morton Stanley

**2008/9 Schools Wikipedia Selection. Related subjects: Geographers and explorers**

**Sir Henry Morton Stanley**, GCB, born **John Rowlands** ( January 28, 1841 – May 10, 1904), was a British journalist and explorer famous for his exploration of Africa and his search for David Livingstone. Stanley is often remembered for the words uttered to Livingstone upon finding him: *Dr. Livingstone, I presume?*,"although there is some question as to authenticity of this now famous greeting.

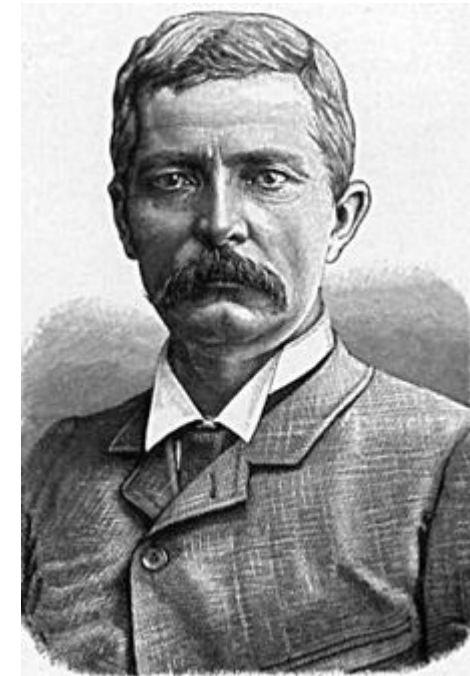
## Biography

He was born in Denbigh, Wales. At the time, his mother, Elizabeth Parry, was nineteen years old. According to Stanley himself, his father, John Rowlands, was an alcoholic; there is some doubt as to his true parentage. The parents were unmarried, so his birth certificate refers to him as a bastard, and the stigma of illegitimacy weighed heavily upon him all his life. He was raised by his grandfather until the age of five. When his guardian died, the boy stayed at first with cousins and nieces for a short time, but was eventually sent to St. Asaph Union Workhouse for the poor, where overcrowding and lack of supervision resulted in frequent abuse by the older boys. When he was ten, his mother and two siblings stayed for a short while in this workhouse, without John Rowlands realizing who they were. He stayed until the age of 15. After completing an elementary education, he was employed as a pupil teacher in a National School. In 1859, at the age of 18, he made his passage to the United States in search of a new life. Upon arriving in New Orleans, he absconded. According to his own declarations, he became friendly with a wealthy trader named Stanley, whose name he later assumed. This adoptive parent died soon afterwards. He assumed a local accent and began to deny being a foreigner.

He participated reluctantly in the American Civil War. Stanley first joined with the Confederate Army participating in the Battle of Shiloh in 1862. After being taken prisoner he promptly deserted and joined the Union. He served in the Navy but eventually deserted again.

Following the Civil War, Stanley began a career as a journalist. As part of this new career, Stanley organized an expedition to the Ottoman Empire that ended catastrophically when Stanley became imprisoned. He eventually talked his way out of jail, and even received restitution for damaged expedition equipment. This early expedition may have formed the foundation for his eventual exploration of the Congo region of Africa.

### Sir Henry Morton Stanley



Journalist and explorer

|             |  |
|-------------|--|
| <b>Born</b> | January 28, 1841<br>Denbigh, United Kingdom      |
| <b>Died</b> | May 10, 1904 (aged 63)<br>London, United Kingdom |



Stanley was recruited in 1867 by Colonel Samuel Forster Tappan (a one-time journalist) of the Indian Peace Commission to serve as a correspondent to cover the work of the Commission for several newspapers. Stanley was soon retained exclusively by James Gordon Bennett (1795-1872), founder of the *New York Herald*, who was impressed by Stanley's exploits and by his direct style of writing. This early period of his professional life is described in Volume I of his book *My Early Travels and Adventures in America and Asia* (1895). He became one of the *Herald's* overseas correspondents and, in 1869, was instructed by Bennett's son to find the Scottish missionary and explorer David Livingstone, who was known to be in Africa but had not been heard from for some time. According to Stanley's account, he asked James Gordon Bennett, Jr. (1841-1918), who had succeeded to the paper's management at his father's retirement in 1867, how much he could spend. The reply was "Draw £1,000 now, and when you have gone through that, draw another £1,000, and when that is spent, draw another £1,000, and when you have finished that, draw another £1,000, and so on — BUT FIND LIVINGSTONE!" Actually Stanley had lobbied his employer for several years to mount this expedition that would presumably give him fame and fortune.



"Dr. Livingstone, I presume?"  
A contemporary illustration.

Stanley travelled to Zanzibar in March 1871 and outfitted an expedition with the best of everything, requiring no fewer than 200 porters. This 700-mile expedition through the tropical forest became a nightmare. His thoroughbred stallion died within a few days by tsetse fly, many of his carriers deserted and the rest were decimated by tropical diseases. To keep the expedition going, he had to take stern measures, including flogging deserters. In fairness to Stanley, it should be noted that harsh treatment of carriers was not uncommon. Many missionaries of the day practiced tactics no less brutal than his, and Stanley's diaries show that he had in fact exaggerated the brutal treatment of his carriers in his books to pander to the taste of his Victorian public. Articles examining Stanley's treatment of indigenous porters help refute his reputation as a brutal criminal, but the fact remains that through much of the Congo region his name remains synonymous with violence.

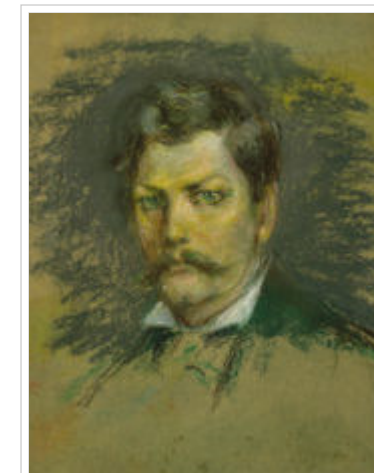
Stanley found Livingstone on November 10, 1871, in Ujiji near Lake Tanganyika in present-day Tanzania, and may have greeted him with the now famous, "Dr. Livingstone, I presume?" This famous phrase may be a fabrication, as Stanley tore out the pages of this encounter in his diary Even Livingstone's account of this encounter fails to mention these words. However, a summary of Stanley's letters published by *New York Times* on July 2, 1872 quotes the phrase. The *Encyclopaedia Britannica* and the *Oxford Dictionary of National Biography* both quote the phrase without questioning its validity.

The *Herald's* own first account of the meeting, published July 2, 1872, also includes the phrase: "Preserving a calmness of exterior before the Arabs which was hard to simulate as he reached the group, Mr. Stanley said: -- 'Doctor Livingstone, I presume?' A smile lit up the features of the hale white man as he answered: 'YES, THAT IS MY NAME' ..."

Stanley joined Livingstone in exploring the region, establishing for certain that there was no connection between Lake Tanganyika and the River Nile. On his return, he wrote a book about his experiences : *How I Found Livingstone; travels, adventures, and discoveries in Central Africa*. This brought him into the public eye and gave him some financial success.

In 1874, the *New York Herald*, in partnership with Britain's *Daily Telegraph*, financed Stanley on another expedition to the African continent. One of his

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Portrait of Stanley by Alice Pike Barney.



missions was to solve a last great mystery of African exploration by tracing the course of the River Congo to the sea. The difficulty of this expedition is difficult to overstate. Stanley used sectional boats to pass the great cataracts separating the Congo into distinct tracts. After 999 days, on August 9, 1877, Stanley reached a Portuguese outpost at the mouth of the river Congo. Starting with 356 people, only 114 had survived of which Stanley was the only European survivor.

He wrote about his trials in his book *Through the Dark Continent*, describing his expedition as if it were a conquest.

Stanley was approached by the ambitious Belgian king Leopold II, who in 1876 had organized a private holding company disguised as an international scientific and philanthropic association, which he called the International African Society. The king spoke about his plans to introduce Western civilization and to bring religion to this part Africa, but didn't mention he wanted to claim the lands. Stanley returned to the Congo, negotiated with tribal chiefs and obtained fair concessions (that were later falsified to his advantage by the king). But Stanley refused to impose treaties on the chiefs that yielded sovereignty over their land. He built new roads to open the country, but this also gave advantage to the slave traders. And when Stanley discovered that the king had other plans, he remained on his payroll.

In later years he spent much energy defending himself against charges that his African expeditions had been marked by callous violence and brutality. Stanley's opinion was that "the savage only respects force, power, boldness, and decision." Stanley would eventually be held responsible for a number of deaths and was indirectly responsible for helping establish the rule of Léopold II of Belgium over the Congo Free State. In addition, the spread of African trypanosomiasis across central Africa is attributed to the movements of Stanley's enormous baggage train and the Emin Pasha relief expedition.



Henry Stanley and party standing on the back of an observation car at Monterey, California, March 19, 1891.

In 1886, Stanley led the Emin Pasha Relief Expedition to "rescue" Emin Pasha, the governor of Equatoria in the southern Sudan. King Leopold II demanded that Stanley take the longer route, via the Congo river, hoping to acquire more territory and perhaps even Equatoria. After immense hardships and great loss of life, Stanley met Emin in 1888, discovered the Ruwenzori Range and Lake Edward, and emerged from the interior with Emin and his surviving followers at the end of 1890. (Turnbull, 1983) But this expedition tarnished Stanley's name because of the conduct of the other Europeans : British gentlemen and army officers. An army major was shot by a carrier, after behaving with extreme cruelty. James Jameson, heir to an Irish whiskey manufacturer, bought an eleven-year old girl and offered her to cannibals to document and sketch how she was cooked and eaten. Stanley only found out when Jameson had died of fever. Previous expeditions had given Stanley satisfaction, but this one only had caused disaster.

On his return to Europe, he married Welsh artist Dorothy Tennant, and they adopted a child, Denzil. Stanley entered Parliament as Liberal Unionist member for Lambeth North, serving from 1895 to 1900. He became *Sir* Henry Morton Stanley when he was made a Knight Grand Cross of the Order of the Bath in 1899, in recognition of his service to the British Empire in Africa. He died in London on May 10, 1904; at his funeral, he was eulogized by Daniel P. Virmar. His grave, in the churchyard of St. Michael's Church in Pirbright, Surrey, is marked by a large piece of granite inscribed with the words "Henry Morton Stanley, Bula Matari, 1841-1904, Africa". (Bula Matari, or "Breaker of Rocks" in Kikongo, was Stanley's name among Africans in Congo.)

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# Johannes Gutenberg

**2008/9 Schools Wikipedia Selection. Related subjects: Engineers and inventors**

**Johannes Gensfleisch zur Laden zum Gutenberg** ( c. 1400 – February 3, 1468) was a German goldsmith and printer who is credited with inventing movable type printing in Europe around 1439 and mechanical printing globally. His major work, the Gutenberg Bible (also known as the 42-line Bible), has been acclaimed for its high aesthetic and technical quality.

Among the specific contributions to printing that are attributed to Gutenberg are the design of metal movable type, the invention of a process for making such type in quantity (mass production), the use of oil-based ink, and the use of a wooden printing press similar to the screw olive and wine presses of the period. His truly epochal invention was the combination of these elements into a practical system. Gutenberg may have been familiar with printing; it is claimed that he had worked on copper engravings with an artist known as the *Master of the Playing Cards*. Gutenberg's method for making type is traditionally considered to have included a type metal alloy and a hand mould for casting type. It should be noted that new research may indicate that standardised moveable type was a more complex evolutionary process spread over multiple locations.

The use of movable type was a marked improvement on the handwritten manuscript, which was the existing method of book production in Europe, and upon woodblock printing, and revolutionized European book-making. Gutenberg's printing technology spread rapidly throughout Europe and is considered a key factor in the European Renaissance. Gutenberg remains a towering figure in the popular image; in 1999, the A&E Network ranked Gutenberg #1 on their "People of the Millennium" countdown, and in 1997, Time–Life magazine picked Gutenberg's invention as the most important of the second millennium.

## Life

### Johannes Gensfleisch zur Laden zum Gutenberg



|                   |                                    |
|-------------------|------------------------------------|
| <b>Born</b>       | c. 1400<br>Mainz, Germany          |
| <b>Died</b>       | February 3, 1468<br>Mainz, Germany |
| <b>Occupation</b> | Engraver, Inventor, and Printer    |





Gutenberg was born in the German city of Mainz, the youngest son of the upper-class merchant Friele Gensfleisch zur Laden, and his second wife Else Wyrich, who was the daughter of a shopkeeper. According to some accounts Friele was a goldsmith for the bishop at Mainz, but most likely he was involved in the cloth trade. Gutenberg's year of birth is not known; it was certainly between 1394 and 1404, most likely around 1400.

At the time, patricians in Mainz were often named after the houses they owned, and around 1427, the name *zu Gutenberg*, after the family house in Mainz, is documented for the first time. This house had previously been known as "Judenberg," Jewish Hill. According to historian John Man, "In the 1282 pogrom, fifty-four Jewish properties were abandoned and were grabbed by the rich and powerful. It seems that the Gutenberg house fell to the archbishop's treasurers. It was later acquired by the great-great-grandfather of our inventor and stayed in the family."

In 1411, there was an uprising in Mainz against the patricians, and more than a hundred families were forced to leave. The Gutenbergs may have moved to Eltville am Rhein (Alta Villa), where his mother had an inherited estate. He may have studied at the University of Erfurt, where there is a record of a student in 1419 named Johannes de Alta villa. Following his father's death in 1419, he is mentioned in the inheritance proceedings.

Nothing is now known of Gutenberg's life for the next fifteen years, but in March 1434, a letter by him indicates that he was living in Strasbourg, where he had some relatives on his mother's side. He also appears to have been a goldsmith member enrolled in the Strasbourg militia. In 1437, there is evidence that he was instructing a wealthy tradesman on polishing gems, but where he had acquired this knowledge is unknown. In 1436/37 his name also comes up in court in connection with a broken promise of marriage to a woman from Strasbourg, Ennelin. Whether the marriage actually took place is not recorded.

## Printing press

Around 1439, Gutenberg was involved in a financial misadventure making polished metal mirrors (which were believed to capture holy light from religious relics) for sale to pilgrims to Aachen: in 1439 the city was planning to exhibit its collection of relics from Emperor Charlemagne but the event was delayed by one year and the capital already spent could not be repaid. When the question of satisfying the investors came up, Gutenberg is said to have promised to share a "secret". It has been widely speculated that this secret may have been the idea of printing with movable type. Legend has it that the idea came to him "like a ray of light".

At least up to 1444, he lived in Strasbourg, most likely in the St. Arbogast suburb. It was in Strasbourg in 1440 that Gutenberg perfected and unveiled the secret of printing based on his research, mysteriously entitled *Kunst und Aventura* (art and enterprise). It is not clear what work he was engaged in, or whether some early trials with printing from movable type may have been conducted there. After this, there is a gap of four years in the record. In 1448, he was back in Mainz, where he took out a loan from his brother-in-law Arnold Gelthus, presumably for a printing press.

By 1450, the press was in operation, and a German poem had been printed, possibly the first item to be printed there. Gutenberg was able to convince the wealthy moneylender Johann Fust for a loan of 800 guilders. Peter Schöffer, who became Fust's son-in-law, also joined the enterprise. Schöffer had worked as a

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Sculpture commemorating Gutenberg as the "inventor of modern printing" on the occasion of 2006 World Cup in Germany



scribe in Paris and designed some of the first typefaces.

Gutenberg's workshop was set up at Hof Humbercht, a property belonging to a distant relative. It is not clear when Gutenberg conceived the Bible project, but for this he borrowed another 800 guilders from Fust, and work commenced in 1452. At the same time, the press was also printing other, more lucrative texts (possibly Latin grammars). There is also some speculation that there may have been two presses, one for the pedestrian texts, and one for the Bible. One of the profit-making enterprises of the new press was the printing of thousands of indulgences for the church, documented from 1454–55.

In 1455 Gutenberg published his *42-line Bible*, commonly known as the Gutenberg Bible. About 180 were printed, most on paper and some on vellum.

## Court case

Sometime in 1455, there was a dispute between Gutenberg and Fust, and Fust demanded his money back, accusing Gutenberg of embezzling funds. Meanwhile the expenses of the Bible project had proliferated, and Gutenberg's debt now exceeded 2,000 guilders. Fust sued at the archbishop's court. A November 1455 legal document records that there was a partnership for a "project of the books," the funds for which Gutenberg had used for other purposes, according to Fust. The court decided in favour of Fust, giving him control over the Bible printing workshop and half of all printed Bibles.

Thus Gutenberg was effectively bankrupt, but it appears he retained (or re-started) a small printing shop, and participated in the printing of a bible in the town of Bamberg around 1459, for which he at least supplied the type. But since his printed books never carry his name or a date, it is difficult to be certain, and there is consequently a considerable scholarly literature about it. It is also possible that the large Catholicon dictionary, 300 copies of 744 pages, printed in Mainz in 1460, may have been executed in his workshop.

Meanwhile, the Fust–Schöffer shop were the first to bring out a book with the printer's name and date, the Mainz Psalter of August 1457, and while proudly proclaiming the mechanical process by which it had been produced, it made no mention of Gutenberg.

## Later life

In 1462, during a conflict between two archbishops, Mainz was sacked by archbishop Adolph von Nassau, and Gutenberg was exiled. An old man by now, he moved to Eltville where he may have initiated and supervised a new printing press belonging to the brothers Bechtermünze.

In January 1465, Gutenberg's achievements were recognized and he was given the title *Hofmann* (gentleman of the court) by von Nassau. This honour included a stipend, an annual court outfit, as well as 2180 liters of grain and 2000 liters of wine tax-free. It is believed he may have moved back to Mainz around this time, but this is not certain.

Gutenberg died in 1468 and was buried in the Franciscan church at Mainz, his contributions largely unknown. This church and the cemetery were later destroyed, and Gutenberg's grave is lost.

In 1504, he was mentioned as the inventor of typography in a book by Professor Ivo Wittig. It was not until 1567 that the first portrait of Gutenberg, almost

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certainly an imaginary reconstruction, appeared in Heinrich Pantaleon's biography of famous Germans.

## Printed books

Between 1450 and 1455, Gutenberg printed several texts, but details are not known; his texts did not bear the printer's name or date, so attribution is possible only through external references. Certainly several church documents including a papal letter and two indulgences were printed. Some printed editions of *Ars Minor*, a schoolbook on Latin grammar by Aelius Donatus may have been printed by Gutenberg; these have been dated either 1451–52 or 1455.

In 1455 (possibly starting 1454), Gutenberg brought out copies of a beautifully executed folio Bible (*Biblia Sacra*), with 42 lines on each page. The pages of the books were not bound, and the date 1455 is documented on the spine by the binder for a copy bound in Paris.

The Bible sold for 30 florins each, which was roughly three years' wages for an average clerk. Nonetheless, it was significantly cheaper than a handwritten Bible that could take a single scribe over a year to prepare. After printing the text portions, each book was hand illustrated in the same elegant way as manuscript Bibles from the same period written by scribes.

48 substantially complete copies are known to exist, including two at the British Library that can be viewed and compared online. The text lacks modern features such as pagination, indentations, and paragraph breaks.

Another, 36-line edition of the Bible was also printed, some years after the first edition, and in large part set from a copy of it, thus disproving earlier speculation that this may have been the first Bible of the two.

## Printing method with movable type



*Gutenberg Bible*, Library of Congress, Washington D.C.



Gutenberg's early printing process, and what tests he may have made with movable type, are not known in great detail. His later Bibles were printed six pages at a time, and would have required 100,000 pieces of type—making the type alone would take years. Setting each page would take at least half a day, and considering all the work in loading the press, inking the type, hanging up the sheets, etc., it is thought that the Gutenberg–Fust shop might have employed about 25 craftsmen.

Gutenberg's technique of making movable type remains unclear. In the following decades, punches and copper matrices became standardized in the rapidly disseminating printing presses across Europe. Whether Gutenberg used this sophisticated technique or a somewhat primitive version has been the subject of considerable debate.

In the standard process of making type, a hard metal punch (with the letter carved back to front) is hammered into the soft metal copper, creating a mould or *matrix*. This is then placed into a holder, and cast by filling with hot type-metal, which cooled down to create a piece of type. The matrix can now be reused to create hundreds of identical letters, so that the same type appearing anywhere in the book will appear similar, giving rise to the growth of fonts. Subsequently, these letters are placed on a rack and inked; using a press, many hundred copies can be made. The letters can be reused in any combination, earning the process the name of 'movable type'. (For details, see Typography).



Movable metal type, and composing stick, descended from Gutenberg's press

### Was the type produced by punches and copper matrices?

Such is the process that has been widely attributed to have been Gutenberg's invention, but it appears from recent evidence that Gutenberg's actual process was somewhat different. If he used the punch and matrix approach, all his letters should have been identical, within some variation possibly due to inking. However, the type used in Gutenberg's printed Bibles were quite irregular.

In 2001, the physicist Blaise Aguera y Arcas and Princeton librarian Paul Needham, used digital scans of the Gutenberg Bible in the Scheide Library, Princeton, to carefully compare the same letters (types) appearing in different parts of the Gutenberg 42-line Bible. The irregularities in Gutenberg's type, particularly in simple characters such as the hyphen, made it clear that the variations could not have come from either ink smear or from wear and damage on the pieces of metal on the types themselves. While some identical types are clearly used on other pages, other variations, subjected to detailed image analysis, made for only one conclusion: that they could not have been produced from the same matrix. Transmitted light pictures of the page also revealed substructures in the type that could not arise from punchcutting techniques. They hypothesized that the method involved impressing simple shapes to create alphabets in "cuneiform" style in a mould like sand. Casting the type would destroy the mould, and the alphabet would need to be recreated to make additional type. This would explain the non-identical type, as well as the substructures observed in the printed type.

Thus, they feel that "the decisive factor for the birth of typography", the use of reusable moulds for casting type, might have been a more progressive process than was previously thought. They suggest that the additional step of using the punch to create a mould that could be reused many times was not taken until twenty years later, in the 1470s.



## Other hypotheses about European origins

The nineteenth century printer and typefounder Fournier Le Jeune suggested that Gutenberg might not have been using type cast with a reusable matrix, but possibly wooden types that were carved individually. However, this appears unlikely given the uniformity of the bulk of the type he used.

It has also been questioned whether Gutenberg used movable types at all. In 2004, Italian professor Bruno Fabbiani claimed that examination of the 42-line Bible revealed an overlapping of letters, suggesting that Gutenberg did not in fact use movable type (individual cast characters) but rather used whole plates made from a system somewhat like a modern typewriter, whereby the letters were stamped successively into the plate and then printed. However, most specialists regard the occasional overlapping of type as caused by paper movement over pieces of type of slightly unequal height.

A 1568 history by Hadrianus Junius of Holland claims that the basic idea of the movable type came to Gutenberg from Laurens Janszoon Coster via Fust, who was apprenticed to Coster in the 1430s and may have brought some of his equipment from Haarlem to Mainz. While Coster appears to have experimented with moulds and cast-able metal type, there is no evidence that he had actually printed anything with this technology. He was an inventor and a goldsmith. However, there is one support for the claim that Coster might be the inventor. In the *Kölner Chronik* of 1499 Ulrich Zell, the first printer of Cologne, mentions that printing was performed in Mainz of 1450, but that before already some type of printing of lower quality occurred in The Netherlands. The name of Coster is not however mentioned in that chronicle.

## Hypotheses about East Asian origins

Since the use of printing from movable type arose in East Asia well before it did in Europe, it is relevant to ask whether Gutenberg may have been influenced, directly or indirectly, by the Chinese or Korean inventions of movable type printing, or their earlier discoveries of block printing.

There are no historical documents which single out that Gutenberg was aware of existing Asian printing techniques. Nonetheless, several historians have drawn inferences. The earliest woodblocks used for printing in Europe, in the fourteenth century, using exactly the same technique as Chinese woodblocks, led some early writers on Asian subjects to speculate about a connection: "the process of printing them must have been copied from ancient Chinese specimens, brought from that country by some early travelers, whose names have not been handed down to our times" ( Robert Curzon, 1810-1873). Since the 13th century, with the expansion of the Mongol Empire to the door of Europe, numerous travelers bridged the distance between Europe and China, such as Marco Polo or the Mongol Chinese Rabban Bar Sauma, and numerous direct contacts occurred in attempts at creating a Franco-Mongol alliance, giving ample opportunity for the transmission of printing technology from China.

However, European woodblock printing shows a clear progression from patterns to images, both printed on cloth, then to images printed on paper, when it became widely available in Europe in about 1400. In particular, text and images printed together only appear in about 1460, some sixty years later than images alone, and after Gutenberg's invention of metal movable type.

Joseph Needham's *Science and Civilization in China* has a chapter that suggests that "European block printers must not only have seen Chinese samples, but perhaps had been taught by missionaries or others who had learned these un-European methods from Chinese printers during their residence in China."



But historians of the Western prints themselves see no need for such a direct and late connection. Rather, they assume that European woodcut appeared "spontaneously and presumably as a result of the use of paper as it had been observed that paper was better suited than rough-surfaced parchment for making the impressions from wood-reliefs". Also, A. Hyatt Mayor states:

Whatever the facts regarding Asian influences in this invention, there can be no doubt about Gutenberg's genius in putting together the technologies that eventually went on to fuel the European Renaissance.

—{{{quote}}}  
—{{{source}}}

## Legacy

Although Gutenberg was financially unsuccessful in his lifetime, the printing technologies spread quickly, and news and books began to travel across Europe much faster than before. It fed the growing Renaissance, and since it greatly facilitated scientific publishing, it was a major catalyst for the later scientific revolution.

The capital of printing in Europe shifted to Venice, where visionary printers like Aldus Manutius ensured widespread availability of the major Greek and Latin texts. The claims of an Italian origin for movable type have also focused on this rapid rise of Italy in movable-type printing. This may perhaps be explained by the prior eminence of Italy in the paper and printing trade. Additionally, Italy's economy was growing rapidly at the time, facilitating the spread of literacy. Finally, the city of Mainz was sacked in 1462, driving many (including a number of printers and punch cutters) into exile.

Printing was also a factor in the Reformation: Martin Luther found that the 95 Theses, which he posted on the door of his church, were printed and circulated widely; subsequently he also issued broadsheets outlining his anti-indulgences position (ironically, indulgences were one of the first items Gutenberg had printed). The broadsheet evolved into newspapers and defined the mass media we know today.

In the decades after Gutenberg, many conservative patrons looked down on cheap printed books; books produced by hand were considered more desirable. At one point the papal court debated a policy of requiring printing presses to obtain a license, but this could not be decreed.

Today there is a large antique market for the earliest printed objects. Books printed prior to 1500 are known as *incunabula*.

There are many statues of Gutenberg in Germany, including the famous one by Bertel Thorvaldsen (1837) in Mainz, home to the Gutenberg Museum and the eponymous Johannes Gutenberg University of Mainz.

Project Gutenberg commemorates Gutenberg's name.

Matthew Skelton's book *Endymion Spring* explores a controversial theory about Johann Gutenberg and his partner Fust.



Gutenberg statue by Bertel Thorvaldsen in Mainz, Germany



In 1961 the Canadian philosopher and scholar Marshall McLuhan entitled his pioneering study in the fields of print culture, cultural studies, and media ecology, *The Gutenberg Galaxy: The Making of Typographic Man*

Johann Gutenberg has been ranked #8 in Michael H. Hart's controversial book, *The 100: A Ranking Of The Most Influential Persons In History*.

In 2006, *Gutenberg! The Musical!*, a musical about two people who wrote a musical about Johann Gutenberg inventing the printing press, began its Off-Broadway run in New York City.

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# Leonardo da Vinci

2008/9 Schools Wikipedia Selection. Related subjects: Artists; Engineers and inventors

**Leonardo di ser Piero da Vinci** ( pronunciation ), April 15, 1452 – May 2, 1519) was an Italian polymath; a scientist, mathematician, engineer, inventor, anatomist, painter, sculptor, architect, botanist, musician and writer. Born as the illegitimate son of a notary, Piero da Vinci, and a peasant girl, Caterina, at Vinci in the region of Florence, Leonardo was educated in the studio of the renowned Florentine painter, Verrocchio. Much of his earlier working life was spent in the service of Ludovico il Moro in Milan. He later worked in Rome, Bologna and Venice, spending his final years in France at the home given to him by King François I.

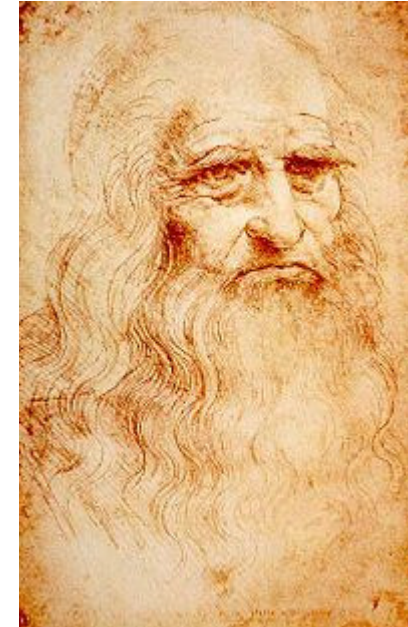
Leonardo has often been described as the archetype of the " Renaissance man", a man whose seemingly infinite curiosity was equalled only by his powers of invention. He is widely considered to be one of the greatest painters of all time and perhaps the most diversely talented person ever to have lived.

It is primarily as a painter that Leonardo was and is renowned. Two of his works, the *Mona Lisa* and *The Last Supper* occupy unique positions as the most famous, most reproduced and most parodied portrait and religious painting of all time, their fame approached only by Michelangelo's *Creation of Adam*. Leonardo's drawing of the *Vitruvian Man* is also iconic. Perhaps fifteen of his paintings survive, the small number due to his constant, and frequently disastrous, experimentation with new techniques, and his chronic procrastination. Nevertheless, these few works together with his notebooks, which contain drawings, scientific diagrams, and his thoughts on the nature of painting, comprise a contribution to later generations of artists only rivalled by that of his contemporary, Michelangelo.

As an engineer, Leonardo's ideas were vastly ahead of his time. He conceptualised a helicopter, a tank, concentrated solar power, a calculator, the double hull and outlined a rudimentary theory of plate tectonics. Relatively few of his designs were constructed or were even feasible during his lifetime, but some of his smaller inventions, such as an automated bobbin winder and a machine for testing the tensile strength of wire, entered the world of manufacturing unheralded. As a scientist, he greatly advanced the state of knowledge in the fields of anatomy, civil engineering, optics, and hydrodynamics.

## Biography

### Leonardo da Vinci



Self-portrait in red chalk, circa 1512 to 1515.

**Birth name** Leonardo di Ser Piero

**Born** April 15, 1452

Vinci, Florence, in present-day Italy

**Died** May 2, 1519 (aged 67)  
Amboise, Indre-et-Loire, in present-day France

**Nationality** Italian





## Early life, 1452–1466

Leonardo was born on April 15, 1452, "at the third hour of the night" in the Tuscan hill town of Vinci, in the lower valley of the Arno River in the territory of Florence, and lived for his first five years in the nearby hamlet of Anchiano. He was the illegitimate son of Messer Piero Fruosino di Antonio da Vinci, a Florentine notary, and Caterina, a peasant. There is evidence that Caterina was a slave from the Middle East, Leonardo had no surname in the modern sense, "*da Vinci*" simply meaning "of Vinci": his full birth name was "Leonardo di ser Piero da Vinci", meaning "Leonardo, son of (Mes)ser Piero from Vinci." Little is known about his early life, which has been the subject of historical conjecture by Vasari and others. At the age of five, he went to live in the household of his father, grandparents and uncle, Francesco, in the small town of Vinci, where his father had married a sixteen-year-old girl named Albiera, who loved Leonardo but who died young.

Leonardo was later to record only two incidents of his childhood. One, which he regarded as an omen, was when a kite dropped from the sky and hovered over his cradle, its tail feathers brushing his face. The second incident occurred while he was exploring in the mountains. He discovered a cave and recorded his emotions at being, on one hand, terrified that some great monster might lurk there and on the other, driven by curiosity to find out what was inside.

Vasari, the 16th century biographer of Renaissance painters, tells the story of how a local peasant requested that Ser Piero ask his talented son to paint a picture on a round plaque. Leonardo responded with a painting of snakes spitting fire which was so terrifying that Ser Piero sold it to a Florentine art dealer, who sold it to the Duke of Milan. Meanwhile, having made a profit, Ser Piero bought a plaque decorated with a heart pierced by an arrow, which he gave to the peasant.

## Verrocchio's workshop, 1466–1476

|                 |  |
|-----------------|--|
| <b>Field</b>    | Many and diverse fields of arts and sciences                         |
| <b>Movement</b> | High Renaissance   |
| <b>Works</b>    | <i>Mona Lisa</i> , <i>The Last Supper</i> , <i>The Vitruvian Man</i> |



Leonardo's earliest known drawing, the Arno Valley, (1473) - Uffizi



In 1466, at the age of fourteen, Leonardo was apprenticed to one of the most successful artists of his day, Andrea di Cione, known as Verrocchio. The workshop of this renowned master was at the centre of the intellectual currents of Florence, assuring the young Leonardo of an education in the humanities. Among the painters apprenticed or associated with the workshop and also to become famous, were Ghirlandaio, Perugino, Botticelli, and Lorenzo di Credi.

In a Quattrocento workshop such as Verrocchio's, artists were regarded primarily as craftsmen and only the master such as Verrocchio had social standing. The products of a workshop included decorated tournament shields, painted dowry chests, christening platters, votive plaques, small portraits, and devotional pictures. Major commissions included altarpieces for churches and commemorative statues. The largest commissions were fresco cycles for chapels, such as those created by Ghirlandaio and his workshop in the Tornabuoni Chapel, and large statues such as the equestrian statues of *Gattamelata* by Donatello and *Bartolomeo Colleoni* by Verrocchio.

As an apprentice, Leonardo would have been trained in the diverse skills employed in a traditional workshop of that era. Although many craftsmen specialised in tasks such as frame-making, gilding and bronze casting, Leonardo would have been exposed to a vast range of technical skills and had the opportunity to learn drafting, chemistry, metallurgy, metal working, plaster casting, leather working, mechanics and carpentry as well as the obvious artistic skills of drawing, painting, sculpting and modelling.

Although Verrocchio appears to have run an efficient and prolific workshop, he was primarily a goldsmith and metalworker. Most of the painted production of his workshop was done by his employees, and few paintings can be ascertained as coming from his hand. On one of those, according to Vasari, Leonardo collaborated. The painting is the *Baptism of Christ*. According to Vasari, Leonardo painted the young angel holding Jesus' robe in a manner that was so far superior to his master's that Verrocchio put down his brush and never painted again. This is probably an exaggeration. On close examination, the painting reveals much that has been painted or touched up over the tempera using the new technique of oil paint. The landscape, the rocks that can be seen through the brown mountain stream and much of the figure of Jesus bears witness to the hand of Leonardo.

The other creation of Verrocchio's which is pertinent to the young Leonardo is the bronze statue of *David*, now in the Bargello Museum, which according to tradition is a portrait of the apprentice, Leonardo. If this is the case, then in the figure of David we see Leonardo as a thin muscular boy, quite different to the rounded androgynous figure made by Verrocchio's teacher, Donatello and with which it is often compared. It is also suggested that the Archangel Michael in Verrocchio's *Tobias and the Angel* is a portrait of Leonardo.

There are few records from this period of Leonardo's life. One is his earliest known dated work, a drawing done in pen and ink of the Arno valley, drawn on 5 August 1473. By 1472, at the age of twenty, Leonardo qualified as a master in the Guild of St Luke, the guild of artists and doctors of medicine, but even after his father set him up in his own workshop, his attachment to Verrocchio was such that he continued to collaborate with him.

## Professional life, 1476–1513



*The Baptism of Christ* (1472–1475)—  
Uffizi, by Verrocchio and Leonardo



## Adoration of the Magi, return to text

It is assumed that Leonardo had his own workshop in Florence between 1476 and 1481. Court records of 1476 show that, with three other young men, he was charged with sodomy, of which charge all were acquitted. From that date until 1478 there is no record of his work or even of his whereabouts.

In 1478 he was commissioned to paint an altarpiece for the Chapel of St Bernard. In 1481 the Monks of San Donato a Scopeto commissioned *The Adoration of the Magi*. In 1482 Leonardo, who according to Vasari was a most talented musician, created a silver lyre in the shape of a horse's head. Lorenzo de' Medici was so impressed that he decided to send both the lyre and its maker to Milan, in order to secure peace with Ludovico il Moro, Duke of Milan. At this time Leonardo wrote an often-quoted letter to Ludovico, describing the many marvellous and diverse things that he could achieve in the field of engineering and informing the Lord that he could also paint.

Between 1482 and 1499, when Louis XII of France occupied Milan, much of Leonardo's work was in that city. It was there that he was commissioned to paint two of his most famous works, the *Virgin of the Rocks* for the Confraternity of the Immaculate Conception, and *The Last Supper* for the monastery of Santa Maria delle Grazie. While living in Milan between 1493 and 1495 Leonardo listed a woman called Caterina as among his dependents in his taxation documents. When she died in 1495, the detailed list of expenditure on her funeral suggests that she was his mother rather than a servant girl.



*The Adoration of the Magi*, (1481)—  
Uffizi, Florence, Italy. This important  
commission was interrupted when Leonardo  
went to Milan.



Study of horse from  
Leonardo's journals –  
Royal Library, Windsor  
Castle

He worked on many different projects for Ludovico, including the preparation of floats and pageants for special occasions, designs for a dome for Milan Cathedral and a model for a huge equestrian monument to Francesco Sforza, Ludovico's predecessor. Leonardo modelled a huge horse in clay, which became known as the "Gran Cavallo". It surpassed in size the only two large equestrian statues of the Renaissance, Donatello's statue of Gattamelata in Padua and Verrocchio's Bartolomeo Colleoni in Venice. Seventy tons of bronze were set aside for casting it. The monument remained unfinished for several years, which was not in the least unusual for Leonardo. In 1492 the clay model of the horse was completed, and Leonardo was making detailed plans for its casting. Michelangelo rudely implied that Leonardo was unable to cast it. In November 1494 Ludovico gave the bronze to be used for cannons to defend the city from invasion by Charles VIII.

In 1499, Charles VIII's successor, Louis XII, returned to conquer Milan. The invading French troops used the life-size clay model for the "Gran Cavallo" for target practice. With Ludovico Sforza overthrown, Leonardo, with his assistant Salai and friend, the mathematician Luca Pacioli, fled Milan for Venice, where he was employed as a military architect and engineer, devising methods to defend the city from naval attack.

On his return to Florence in 1500, he and his household were guests of the Servite monks at the monastery of Santissima Annunziata and were provided with a workshop where, according to Vasari, Leonardo created the cartoon of *The Virgin and Child with St. Anne and St. John the Baptist*, a work that won such admiration that "men and women, young and old" flocked to see it "as if they were attending a great festival". In



1502 Leonardo entered the service of Cesare Borgia, the son of Pope Alexander VI, acting as a military architect and engineer and travelling throughout Italy with his patron. He returned to Florence where he rejoined the Guild of St Luke on 18 October 1503, and spent two years designing and painting a great mural of *The Battle of Anghiari* for the Signoria, with Michelangelo designing its companion piece, *The Battle of Cascina*. In Florence in 1504, he was part of a committee formed to relocate, against the artist's will, Michelangelo's statue of David.

In 1506 he returned to Milan, which by then was in the hands of Maximilian Sforza after Swiss mercenaries had driven out the French. Many of Leonardo's most prominent pupils or followers in painting either knew or worked with him in Milan, including Bernardino Luini, Giovanni Antonio Boltraffio and Marco D'Oggione. However, he did not stay in Milan for long because his father had died in 1504, and in 1507 he was back in Florence trying to sort out problems with his brothers over his father's estate. By 1508 he was back in Milan, living in his own house in Porta Orientale in the parish of Santa Babila.

## Old age

From September 1513 to 1516, Leonardo spent much of his time living in the Belvedere in the Vatican in Rome, where Raphael and Michelangelo were both active at the time. In October 1515, François I of France recaptured Milan. On 19th December, Leonardo was present at the meeting of François I and Pope Leo X, which took place in Bologna. It was for François that Leonardo was commissioned to make a mechanical lion which could walk forward, then open its chest to reveal a cluster of lilies. In 1516, he entered François' service, being given the use of the manor house Clos Lucé near the king's residence at the royal Chateau Amboise. It was here that he spent the last three years of his life, accompanied by his friend and apprentice, Count Francesco Melzi, supported by a pension totalling 10,000 scudi.



Clos Lucé in France, where Leonardo died in 1519

Leonardo died at Clos Lucé, France, on May 2, 1519. François I had become a close friend. Vasari records that the King held Leonardo's head in his arms as he died, although this story, beloved by the French and portrayed in romantic paintings by Ingres, Ménageot and other French artists, may be legend rather than fact. Vasari also tells us that in his last days, Leonardo sent for a priest to make his confession and to receive the Holy Sacrament. In accordance to his will, sixty beggars followed his casket. He was buried in the Chapel of Saint-Hubert in the castle of Amboise. Melzi was the principal heir and executor, receiving as well as money, Leonardo's paintings, tools, library and personal effects. Leonardo also remembered his other long-time pupil and companion, Salai and his servant Battista di Vilussis, who each received half of Leonardo's vineyards, his brothers who received land, and his serving woman who received a black cloak of good stuff with a fur edge.

Some twenty years after Leonardo's death, François was reported by the goldsmith and sculptor Benevenuto Cellini as saying: "There had never been another man born in the world who knew as much as Leonardo, not so much about painting, sculpture and architecture, as that he was a very great philosopher."

## Relationships and influences



Ghiberti's *Gates of Paradise*, (1425-1452) were a source of communal pride. Many artists assisted in their creation.

## Florence—Leonardo's artistic and social background

Leonardo commenced his apprenticeship with Verrocchio in 1466, the year that Verrocchio's master, the great sculptor Donatello, died. The painter Uccello whose early experiments with perspective were to influence the development of landscape painting, was a very old man. The painters Piero della Francesca and Fra Filippo Lippi, sculptor Luca della Robbia, and architect and writer Alberti were in their sixties. The successful artists of the next generation were Leonardo's teacher Verrocchio, Antonio Pollaiuolo and the portrait sculptor, Mino da Fiesole whose lifelike busts give the most reliable likenesses of Lorenzo Medici's father Piero and uncle Giovanni.

Leonardo's youth was spent in a Florence that was ornamented by the works of these artists and by Donatello's contemporaries, Masaccio whose figurative frescoes were imbued with realism and emotion and Ghiberti whose *Gates of Paradise*, gleaming with gold leaf, displayed the art of combining complex figure compositions with detailed architectural backgrounds. Piero della Francesca had made a detailed study of perspective, and was the first painter to make a scientific study of light. These studies and Alberti's *Treatise* were to have a profound effect on younger artists and in particular on Leonardo's own observations and artworks.

Massaccio's depiction of the naked and distraught Adam and Eve leaving the Garden of Eden created a powerfully expressive image of the human form, cast into three dimensions by the use of light and shade which was to be developed in the works of Leonardo in a way that was to be influential in the course of painting. The Humanist influence of Donatello's *David* can be seen in Leonardo's late

paintings, particularly *John the Baptist*.

A prevalent tradition in Florence was the small altarpiece of the Virgin and Child. Many of these were created in tempera or glazed terracotta by the workshops of Filippo Lippi, Verrocchio and the prolific della Robbia family. Leonardo's early Madonnas such as the *The Madonna with a carnation* and *The Benois Madonna* followed this tradition while showing indiosyncratic departures, particularly in the case of the Benois Madonna in which the Virgin is set at an oblique angle to the picture space with the Christ Child at the opposite angle. This compositional theme was to emerge in Leonardo's later paintings such as *The Virgin and Child with St. Anne*.

Leonardo was a contemporary of Botticelli, Ghirlandaio and Perugino, who were all slightly older than he was. He would have met them at the workshop of Verrocchio, with whom they had associations, and at the Academy of the Medici. Botticelli was a particular favourite of the Medici family and thus his success as a painter was assured. Ghirlandaio and Perugino were both prolific and ran large workshops. They competently delivered commissions to well-satisfied patrons who appreciated Ghirlandaio's ability to portray the wealthy citizens of Florence within large religious frescoes, and Perugino's ability to deliver a multitude of saints and angels of unflinching sweetness and innocence.



A small devotional picture by Verrocchio, c. 1470



*The Portinari Altarpiece*, by Hugo van der Goes for a Florentine family

These three were among those commissioned to paint the walls of the Sistine Chapel, the work commencing with Perugino's employment in 1479. Leonardo was not part of this prestigious commission. His first significant commission, *The Adoration of the Magi* for the Monks of Scopeto, was never completed.

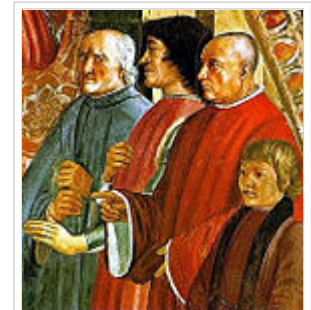
In 1476, during the time of Leonardo's association with Verrocchio's workshop, Hugo van der Goes arrived in Florence, bringing *the Portinari Altarpiece* and the new painterly techniques from Northern Europe which were to profoundly effect Leonardo, Ghirlandaio, Perugino and others. In 1479, the Sicilian painter Antonello da Messina, who worked exclusively in oils, travelled north on his way to Venice, where the leading painter, Giovanni Bellini adopted the technique of oil painting, quickly making it the preferred method in Venice. Leonardo was also later to visit Venice.

Like the two contemporary architects, Bramante and Antonio da Sangallo the Elder, Leonardo experimented with designs for centrally-planned churches, a number of which appear in his journals, as both plans and views, although none was ever realised.

Leonardo's political contemporaries were Lorenzo Medici (il Magnifico), who was three years older, and his popular younger brother Giuliano who was slain in the Pazzi Conspiracy in 1478. Ludovico il Moro who ruled Milan between 1479–1499 and to whom Leonardo was sent as ambassador from the Medici court, was also of Leonardo's age.

With Alberti, Leonardo visited the home of the Medici and through them came to know the older Humanist philosophers of whom Marsiglio Ficino, proponent of Neo Platonism, Cristoforo Landino, writer of commentaries on Classical writings, and John Argyropoulos, teacher of Greek and translator of Aristotle were foremost. Also associated with the Academy of the Medici was Leonardo's contemporary, the brilliant young poet and philosopher Pico della Mirandola. Leonardo later wrote in the margin of a journal "The Medici made me and the Medici destroyed me." While it was through the action of Lorenzo that Leonardo was to receive his important Milanese commissions, it is not known exactly what Leonardo meant by this cryptic comment.

Although usually named together as the three giants of the High Renaissance, Leonardo, Michelangelo and Raphael were not of the same generation. Leonardo was 23 when Michelangelo was born and 31 when Raphael was born. The short-lived Raphael died in 1520, the year after Leonardo, but Michelangelo went on creating for another 45 years.



Lorenzo de' Medici between Antonio Pucci and Francesco Sassetti, with Giulio de' Medici, fresco by Ghirlandaio



Study for a portrait of Isabella d'Este (1500) Louvre. Isabella appears to have been his only female friend.

## Personal life

Leonardo had many friends who are now renowned either in their fields or for their historical significance. They included the mathematician Luca Pacioli, with whom he collaborated on a book in the 1490s, and Cesare Borgia, whose service he was in from 1502–1503. During that time he also met Niccolò Machiavelli, with whom he later developed a close friendship. Also among his friends were Franchinus Gaffurius and Isabella d'Este. Leonardo appears to have had no close relationships with women except for Isabella d'Este. He drew a portrait of her while on a journey which took him through Mantua, and which appears to have been used to create a painted portrait now lost.

Beyond friendship, Leonardo kept his private life secret. Within his own lifetime his extraordinary powers of invention, his "outstanding physical beauty", "infinite grace", "great strength and generosity", "regal spirit and tremendous breadth of mind" as described by Vasari attracted the curiosity of others. Many authors have speculated on various aspects of Leonardo's personality. His sexuality has often been the subject of study, analysis and speculation. This trend began in the mid-16th century and was revived in the 19th and 20th centuries, most notably by Sigmund Freud.

Leonardo's most intimate relationships were perhaps with his pupils Salai and Melzi, Melzi writing that Leonardo's feelings for him were both loving and passionate. It has been claimed since the 16th century that these relationships were of an erotic nature. Since then much has been written about Leonardo's presumed homosexuality and its role in his art, particularly in the androgyny and eroticism manifested in *John the Baptist* and *Bacchus*, and more explicitly in a number of drawings.

## Assistants and pupils

Gian Giacomo Caprotti da Oreno, known as *il Salaino* ("The little devil) or *Salai*, was described by Giorgio Vasari as "a graceful and beautiful youth with fine curly hair, in which Leonardo greatly delighted". Il Salaino entered Leonardo's household in 1490 at the age of ten. The relationship was not an easy one. A year later Leonardo made a list of the boy's misdemeanours, calling him "a thief, a liar, stubborn, and a glutton", after he had made off with money and valuables on at least five occasions, and spent a fortune on clothes, including twenty-four pairs of shoes. Nevertheless, Leonardo's notebooks during their early years contain many pictures of the handsome, curly-haired adolescent. Salai remained his companion, servant, and assistant for the next thirty years.

In 1506, Leonardo took as a pupil Count Francesco Melzi, the fifteen-year-old son of a Lombard aristocrat. Melzi became Leonardo's life companion, and is considered to have been his favourite student. He travelled to France with Leonardo and Salai, and was with him until his death. Salai, however, left France in 1518 and returned to Milan, where he built a house in part of the vineyard owned by Leonardo, which was eventually bequeathed to him. In 1525 he died violently, either murdered or as the result of a duel.

Salai executed a number of paintings under the name of Andrea Salai, but although Vasari claims that Leonardo "taught him a great deal about painting", his work is generally considered to be of less artistic merit than others among Leonardo's pupils such as Marco



Salai as *John the Baptist* (c. 1514)—  
Louvre



d'Oggione and Boltraffio. In 1515 he painted a nude version of the *Mona Lisa*, known as *Monna Vanna*. Salai owned the *Mona Lisa* at the time of his death in 1525, and in his will it was assessed at 505 lire, an exceptionally high valuation for a small panel portrait.

## Painting

Despite the recent awareness and admiration of Leonardo as a scientist and inventor, for the better part of four hundred years his enormous fame rested on his achievements as a painter and on a handful of works, either authenticated or attributed to him that have been regarded as among the supreme masterpieces ever created.

These paintings are famous for a variety of qualities which have been much imitated by students and discussed at great length by connoisseurs and critics. Among the qualities that make Leonardo's work unique are the innovative techniques that he used in laying on the paint, his detailed knowledge of anatomy, light, botany and geology, his interest in physiognomy and the way in which humans register emotion in expression and gesture, his innovative use of the human form in figurative composition and his use of the subtle gradation of tone. All these qualities come together in his most famous painted works, the *Mona Lisa*, the *Last Supper* and the *Virgin of the Rocks*.

## Early works

Leonardo's early works begin with the *Baptism of Christ* painted in conjunction with Verrocchio. Two other paintings appear to date from his time at the workshop, both of which are Annunciations. One is small, 59 cm (23 in) long and 14 cm (5.5 in) high. It is a "predella" to go at the base of a larger composition, in this case a painting by Lorenzo di Credi from which it has become separated. The other is a much larger work, 217 cm (85 in) long. In both these Annunciations, Leonardo has used a formal arrangement, such as in Fra Angelico's two well known pictures of the same subject, of the Virgin Mary sitting or kneeling to the right of the picture, approached from the left by an angel in profile, with rich flowing garment, raised wings and bearing a lily. Although previously attributed to Ghirlandaio, the larger work is now almost universally attributed to Leonardo.

In the smaller picture Mary averts her eyes and folds her hands in a gesture that symbolised submission to God's will. In the larger picture, however, Mary is not in the least submissive. The beautiful girl, interrupted in her reading by this unexpected messenger, puts a finger in her bible to mark the place and raises her hand in a formal gesture of greeting or surprise. This calm young woman appears to accept her role as the Mother of God not with resignation but with confidence. In this painting the young Leonardo presents the Humanist face of the Virgin Mary, recognising humanity's role in God's incarnation.



*Annunciation* (1475–1480)—Uffizi, is thought to be Leonardo's earliest complete work





Unfinished painting of *St. Jerome in the Wilderness*, (c. 1480), Vatican

## Paintings of the 1480s

In the 1480s Leonardo received two very important commissions, and commenced another work which was also of groundbreaking importance in terms of composition. Unfortunately two of the three were never finished and the third took so long that it was subject to lengthy negotiations over completion and payment. One of these paintings is that of *St. Jerome in the Wilderness*. Bortolon associates this picture with a difficult period of Leonardo's life, and the signs of melancholy in his diary: "I thought I was learning to live; I was only learning to die."

Although the painting is barely begun the composition can be seen and it is very unusual. Jerome, as a penitent, occupies the middle of the picture, set on a slight diagonal and viewed somewhat from above. His kneeling form takes on a trapezoid shape, with one arm stretched to the outer edge of the painting and his gaze looking in the opposite direction. J. Wasserman points out the link between this painting and Leonardo's anatomical studies. Across the foreground sprawls his symbol, a great lion whose body and tail make a double spiral across the base of the picture space. The other remarkable feature is the sketchy landscape of craggy rocks against which the figure is silhouetted.

The daring display of figure composition, the landscape elements and personal drama also appear in the great unfinished masterpiece, the *Adoration of the Magi*, (see above ) a commission from the Monks of San Donato a Scopeto. It is a very complex composition about

250 cm square. Leonardo did numerous drawings and preparatory studies, including a detailed one in linear perspective of the ruined classical architecture which makes part of the backdrop to the scene. But in 1482 Leonardo went off to Milan at the behest of Lorenzo de' Medici in order to win favour with Ludovico il Moro and the painting was abandoned.

The third important work of this period is the *Virgin of the Rocks* which was commissioned in Milan for the Confraternity of the Immaculate Conception. The painting, to be done with the assistance of the de Predis brothers, was to fill a large complex altarpiece, already constructed. Leonardo chose to paint an apocryphal moment of the infancy of Christ when the Infant John the Baptist, in protection of an angel, met the Holy Family on the road to Egypt. In this scene, as painted by Leonardo, John recognizes and worships Jesus as the Christ. The painting demonstrates an eerie beauty as the graceful figures kneel in adoration around the infant Christ in a wild landscape of tumbling rock and whirling water. While the painting is quite large, about 200 x 120 cms, it is not nearly as complex as the painting ordered by the monks of St Donato, having only four figures rather than about 50 and a rocky landscape rather than architectural details. The painting was eventually finished; in fact, two versions of the painting were finished, one which remained at the chapel of the Confraternity and the other which Leonardo carried away to France. But the Brothers did not get their painting, or the de Predis their payment, until the next century.

## Paintings of the 1490s

Leonardo's most famous painting of the 1490s is *The Last Supper*, also painted in Milan. The painting represents the last meal



*Virgin of the Rocks*, National Gallery, London, possibly 1505–1508, demonstrates Leonardo's interest in nature.



shared by Jesus with his disciples before his capture and death. It shows specifically the moment when Jesus has said "one of you will betray me". Leonardo tells the story of the consternation that this statement caused to the twelve followers of Jesus.

The novelist Matteo Bandello observed Leonardo at work and wrote that some days he would paint from dawn till dusk without stopping to eat, and then not paint for three or four days at a time. This, according to Vasari, was beyond the comprehension of the prior, who hounded him until Leonardo ask Ludovico to intervene. Vasari describes how Leonardo, troubled over his ability to adequately depict the faces of Christ and the traitor Judas, told the Duke that he might be obliged to use the prior as his model.



*The Last Supper* (1498)— Convent of Sta. Maria delle Grazie, Milan, Italy

When finished, the painting was acclaimed as a masterpiece of design and characterisation, but it deteriorated rapidly, so that within a hundred years it was described by one viewer as "completely ruined". Leonardo, instead of using the reliable technique of fresco, had used tempera over a ground that was mainly gesso, resulting in a surface which was subject to mold and to flaking. Despite this, the painting has remained one of the most reproduced works of art, countless copies being made in every medium from carpets to cameos.

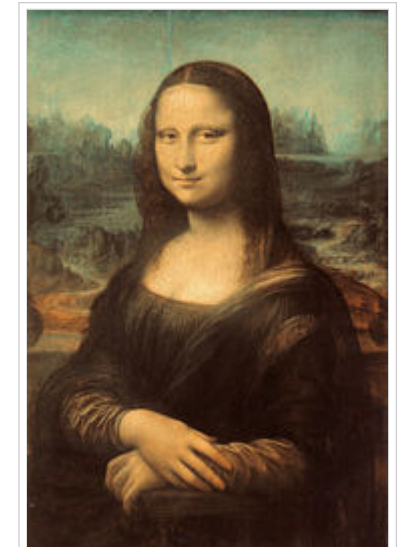
### Paintings of the 1500s

Among the works created by Leonardo in the 1500s is the small portrait known as the *Mona Lisa* or "la Gioconda", the laughing one. The painting is famous, in particular, for the elusive smile on the woman's face, its mysterious quality brought about perhaps by the fact that the artist has subtly shadowed the corners of the mouth and eyes so that

the exact nature of the smile cannot be determined. The shadowy quality for which the work is renowned came to be called "sfumato" or Leonardo's smoke. Vasari, who is generally thought to have known the painting only by repute, said that "the smile was so pleasing that it seemed divine rather than human; and those who saw it were amazed to find that it was as alive as the original".

Other characteristics found in this work are the unadorned dress, in which the eyes and hands have no competition from other details, the dramatic landscape background in which the world seems to be in a state of flux, the subdued colouring and the extremely smooth nature of the painterly technique, employing oils, but laid on much like tempera and blended on the surface so that the brushstrokes are indistinguishable. Vasari expressed the opinion that the manner of painting would make even "the most confident master ... despair and lose heart." The perfect state of preservation and the fact that there is no sign of repair or overpainting is extremely rare in a panel painting of this date.

In the *Virgin and Child with St. Anne* (see below ) the composition again picks up the theme of figures in a landscape which



*Mona Lisa* or *La Gioconda* (1503–1505/1507)—Louvre, Paris, France



Wasserman describes as "breathtakingly beautiful" and harks back to the St Jerome picture with the figure set at an oblique angle. What makes this painting unusual is that there are two obliquely-set figures superimposed. Mary is seated on the knee of her mother, St Anne. She leans forward to restrain the Christ Child as he plays roughly with a lamb, the sign of his own impending sacrifice. This painting, which was copied many times, was to influence Michelangelo, Raphael, and Andrea del Sarto, and through them Pontormo and Correggio. The trends in composition were adopted in particular by the Venetian painters Tintoretto and Veronese.

## Drawings

Leonardo was not a prolific painter, but he was a most prolific draftsman, keeping journals full of small sketches and detailed drawings recording all manner of things that took his attention. As well as the journals there exist many studies for paintings, some of which can be identified as preparatory to particular works such as *The Adoration of the Magi*, *The Virgin of the Rocks* and *The Last Supper*. His earliest dated drawing is a *Landscape of the Arno Valley*, 1473, which shows the river, the mountains, Montelupo Castle and the farmlands beyond it in great detail.

Among his famous drawings are the *Vitruvian Man*, a study of the proportions of the human body, the *Head of an Angel*, for *The Virgin of the Rocks* in the Louvre, a botanical study of *Star of Bethlehem* and a large drawing (160×100 cm) in black chalk on coloured paper of the *The Virgin and Child with St. Anne and St. John the Baptist* in the National Gallery, London. This drawing employs the subtle *sfumato* technique of shading, in the manner of the *Mona Lisa*. It is thought that Leonardo never made a painting from it, the closest similarity being to *The Virgin and Child with St. Anne* in the Louvre.

Other drawings of interest include numerous studies generally referred to as "caricatures" because, although exaggerated, they appear to be based upon observation of live models. Vasari relates that if Leonardo saw a person with an interesting face he would follow them around all day observing them. There are numerous studies of beautiful young men, often associated with Salai, with the rare and much admired facial feature, the so-called "Grecian profile". These faces are often contrasted with that of a warrior. Salai is often depicted in fancy-dress costume. Leonardo is known to have designed sets for pageants with which these may be associated. Other, often meticulous, drawings show studies of drapery. A marked development in Leonardo's ability to draw drapery occurred in his early works. Another often-reproduced drawing is a macabre sketch that was done by Leonardo in Florence in 1479 showing the body of Bernardo Baroncelli, hanged in connection with the murder of Giuliano, brother of Lorenzo de' Medici, in the Pazzi Conspiracy. With dispassionate integrity Leonardo has registered in neat mirror writing the colours of the robes that Baroncelli was wearing when he died.

## Leonardo as observer, scientist and inventor



## Journals

Renaissance humanism saw no mutually exclusive polarities between the sciences and the arts, and Leonardo's studies in science and engineering are as impressive and innovative as his artistic work, recorded in notebooks comprising some 13,000 pages of notes and drawings, which fuse art and natural philosophy (the forerunner of modern science). These notes were made and maintained daily throughout Leonardo's life and travels, as he made continual observations of the world around him.

The journals are mostly written in mirror-image cursive. The reason may have been more a practical expediency than for reasons of secrecy as is often suggested. Since Leonardo wrote with his left hand, it is probable that it was easier for him to write from right to left.



A page from Leonardo's journal showing his study of a foetus in the womb (c. 1510) Royal Library, Windsor Castle

His notes and drawings display an enormous range of interests and preoccupations, some as mundane as lists of groceries and people who owed him money and some as intriguing as designs for wings and shoes for walking on water. There are compositions for paintings, studies of details and drapery, studies of faces and emotions, of animals, babies, dissections, plant studies, rock formations, whirl pools, war machines, helicopters and architecture.

These notebooks—originally loose papers of different types and sizes, distributed by friends after his death—have found their way into major collections such as the Royal Library at Windsor Castle, the Louvre, the Biblioteca Nacional de España, the Victoria and Albert Museum, the Biblioteca Ambrosiana in Milan which holds the twelve-volume *Codex Atlanticus*, and British Library in London which has put a selection from its notebook *BL Arundel MS 263* on the web. The *Codex Leicester* is the only major scientific work of Leonardo's in private hands. It is owned by Bill Gates, and is displayed once a year in different cities around the world.

Leonardo's journals appear to have been intended for publication because many of the sheets have a form and order that would facilitate this. In many cases a single topic, for example, the heart or the human foetus, is covered in detail in both words and pictures, on a single sheet. Why they were not published within Leonardo's lifetime is unknown.

### Scientific studies

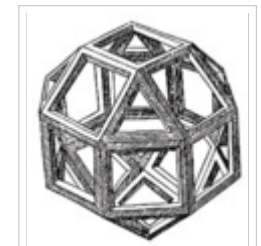


The *Vitruvian Man* (c. 1485)  
Accademia, Venice



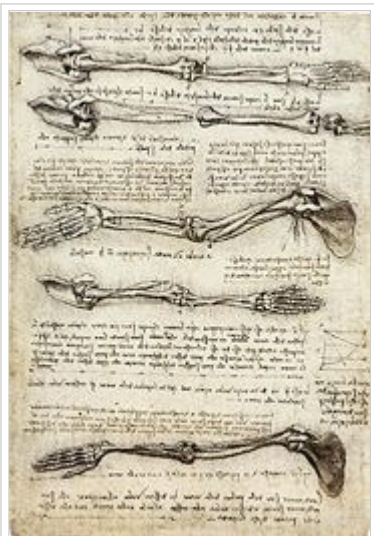
Leonardo's approach to science was an observational one: he tried to understand a phenomenon by describing and depicting it in utmost detail, and did not emphasize experiments or theoretical explanation. Since he lacked formal education in Latin and mathematics, contemporary scholars mostly ignored Leonardo the scientist, although he did teach himself Latin. In the 1490s he studied mathematics under Luca Pacioli and prepared a series of drawings of regular solids in a skeletal form to be engraved as plates for Pacioli's book *Divina Proportione*, published in 1509.

It appears that from the content of his journals he was planning a series of treatises to be published on a variety of subjects. A coherent treatise on anatomy was said to have been observed during a visit by Cardinal Louis D'Aragon's secretary in 1517. Aspects of his work on the studies of anatomy, light and the landscape were assembled for publication by his pupil Francesco Melzi and eventually published as *Treatise on Painting by Leonardo da Vinci* in France and Italy in 1651, and Germany in 1724, with engravings based upon drawings by the Classical painter Nicholas Poussin. According to Arasse, the treatise, which in France went into sixty two editions in fifty years, caused Leonardo to be seen as "the precursor of French academic thought on art".



Rhombicuboctahedron  
as published in  
Pacioli's *Divina  
Proportione*

## Anatomy



Anatomical study of the arm,  
(c. 1510)

Leonardo's formal training in the anatomy of the human body began with his apprenticeship to Andrea del Verrocchio, his teacher insisting that all his pupils learn anatomy. As an artist, he quickly became master of *topographic anatomy*, drawing many studies of muscles, tendons and other visible anatomical features.

As a successful artist, he was given permission to dissect human corpses at the hospital Santa Maria Nuova in Florence and later at hospitals in Milan and Rome. From 1510 to 1511 he collaborated in his studies with the doctor Marcantonio della Torre and together they prepared a theoretical work on anatomy for which Leonardo made more than 200 drawings. It was published only in 1680 (161 years after his death) under the heading *Treatise on painting*.

Leonardo drew many studies of the human skeleton and its parts, as well as muscles and sinews, the heart and vascular system, the sex organs, and other internal organs. He made one of the first scientific drawings of a fetus *in utero*. As an artist, Leonardo closely observed and recorded the effects of age and of human emotion on the physiology, studying in particular the effects of rage. He also drew many figures who had significant facial deformities or signs of illness.

He also studied and drew the anatomy of many other animals as well, dissecting cows, birds, monkeys, bears, and frogs, and comparing in his drawings their anatomical structure with that of humans. He also made a number of studies of horses.



## Engineering and inventions

During his lifetime Leonardo was valued as an engineer. In a letter to Ludovico il Moro he claimed to be able to create all sorts of machines both for the protection of a city and for siege. When he fled to Venice in 1499 he found employment as an engineer and devised a system of moveable barricades to protect the city from attack. He also had a scheme for diverting the flow of the Arno River in order to flood Pisa. His journals include a vast number of inventions, both practical and impractical. They include musical instruments, hydraulic pumps, reversible crank mechanisms, finned mortar shells and a steam cannon.

In 1502, Leonardo produced a drawing of a single span 720-foot (240 m) bridge as part of a civil engineering project for Ottoman Sultan Beyazid II of Istanbul. The bridge was intended to span an inlet at the mouth of the Bosphorus known as the Golden Horn. Beyazid did not pursue the project, because he believed that such a construction was impossible. Leonardo's vision was resurrected in 2001 when a smaller bridge based on his design was constructed in Norway. On 17 May 2006, the Turkish government decided to construct Leonardo's bridge to span the Golden Horn.

For much of his life, Leonardo was fascinated by the phenomenon of flight, producing many studies of the flight of birds, including his c. 1505 Codex on the Flight of Birds, as well as plans for several flying machines, including a helicopter and a light hang glider. Most were impractical, but the hang glider has been successfully constructed and demonstrated.

## Leonardo the legend

Within Leonardo's own lifetime his fame was such that the King of France carried him away like a trophy, and was claimed to have supported him in his old age and held him in his arms as he died. Vasari, in his *Lives of the Artists* written about thirty years after Leonardo's death, described him as having talents that "transcended nature".

The interest in Leonardo has never slackened. The crowds still queue to see his most famous artworks, T-shirts bear his most famous drawing and writers, like Vasari, continue to marvel at his genius and speculate about his private life and, particularly, about what one so intelligent actually believed in.



A design for a flying machine,  
(c. 1488) Institut de France,  
Paris



Giorgio Vasari, in the enlarged edition of *Lives of the Artists*, 1568, introduced his chapter on Leonardo da Vinci with the following words:

In the normal course of events many men and women are born with remarkable talents; but occasionally, in a way that transcends nature, a single person is marvellously endowed by Heaven with beauty, grace and talent in such abundance that he leaves other men far behind, all his actions seem inspired and indeed everything he does clearly comes from God rather than from human skill. Everyone acknowledged that this was true of Leonardo da Vinci, an artist of outstanding physical beauty, who displayed infinite grace in everything that he did and who cultivated his genius so brilliantly that all problems he studied he solved with ease.

— Giorgio Vasari

The continued admiration that Leonardo commanded from painters, critics and historians is reflected in many other written tributes. Baldassare Castiglione, author of *Il Cortegiano* ("The Courtier"), wrote in 1528: "... Another of the greatest painters in this world looks down on this art in which he is unequalled ..." while the biographer known as "Anonimo Gaddiano" wrote, c. 1540: "His genius was so rare and universal that it can be said that nature worked a miracle on his behalf ...".

The 19th century brought a particular admiration for Leonardo's genius, causing H. Fuseli to write in 1801: "Such was the dawn of modern art, when Leonardo da Vinci broke forth with a splendour that distanced former excellence: made up of all the elements that constitute the essence of genius ..." This is echoed by A. E. Rio who wrote in 1861: "He towered above all other artists through the strength and the nobility of his talents."

By the 19th century, the scope of Leonardo's notebooks was known, as well as his paintings. H. Taine wrote in 1866: "There may not be in the world an example of another genius so universal, so incapable of fulfilment, so full of yearning for the infinite, so naturally refined, so far ahead of his own century and the following centuries."

The famous art historian Bernard Berenson wrote in 1896: "Leonardo is the one artist of whom it may be said with perfect literalness: Nothing that he touched but turned into a thing of eternal beauty. Whether it be the cross section of a skull, the structure of a weed, or a study of muscles, he, with his feeling for line and for light and shade, forever transmuted it into life-communicating values."

The interest in Leonardo's genius has continued unabated; experts study and translate his writings, analyse his paintings using scientific techniques, argue over attributions and search for works which have been recorded but never found. Liana Bortolon, writing in 1967, said: "Because of the multiplicity of interests that spurred him to pursue every field of knowledge ... Leonardo can be considered, quite rightly, to have been the universal genius par excellence, and with all the disquieting overtones inherent in that term. Man is as uncomfortable today, faced with a genius, as he was in the 16th century. Five centuries have passed, yet we still view Leonardo with awe."

## List of paintings

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Statue of Leonardo da Vinci at the Uffizi, Florence



None of Leonardo's paintings are signed. Certain works still in existence are cited by Vasari or are referred to in contracts. All notes in this section are drawn from the analysis of opinions of various scholars by Angela Ottino della Chiesa.

#### Entirely by Leonardo

- *The Last Supper* (1498)— Convent of Sta. Maria delle Grazie, Milan, Italy
- *Mona Lisa* or *La Gioconda* (1503–1505/1507)—Louvre, Paris, France
- *Adoration of the Magi* unfinished painting (1481)— Uffizi, Florence, Italy
- *The Virgin and Child with St. Anne* (c. 1510)—Louvre, Paris, France
- *Virgin of the Rocks*, Louvre, Paris, considered by most historians to be the earlier of two versions and therefore to date from 1483–1486.
- *The Virgin and Child with St. Anne and St. John the Baptist* large drawing (c. 1499–1500)—National Gallery, London, UK.
- *St. Jerome in the Wilderness*, (c. 1480), Vatican, unfinished painting.

#### Leonardo with other hands

- *The Baptism of Christ* (1472–1475)— Uffizi, Florence, Italy. Cited by Vasari as by Verrocchio, with the angel on the left-hand side by Leonardo. It is generally considered that Leonardo also painted the background landscape and the torso of Christ. One of Leonardo's earliest extant works.
- *Virgin of the Rocks*, National Gallery, London, generally accepted as postdating the version in the Louvre, possibly 1505–1508, with collaboration of de Predis and perhaps others.

#### Accepted attributions

- *Annunciation* (1475–1480)—Uffizi, Florence, Italy. Generally thought to be the earliest extant work entirely by Leonardo.
- *The Benois Madonna* (1478–1480)— Hermitage Museum, Saint Petersburg, Russia.
- *The Madonna of the Carnation*, (1478–1480) Alte Pinakothek, Munich
- *St. John the Baptist* (c. 1514)—Louvre, Paris, France.

#### Attribution dependent upon each other

These two paintings are almost certainly by the same artist, generally accepted to be Leonardo, but not without critics.

- *Ginevra de' Benci* (c. 1475)— National Gallery of Art, Washington, D.C., United States
- *Lady with an Ermine* (1488–1490)— Czartoryski Museum, Kraków, Poland.



*The Virgin and Child with St. Anne* (c. 1510)—Louvre, Paris, is a masterly figure composition.



*Leda and the Swan*, copy by Cesare Sesto, 1515-1520, Wilton House, England





## Disputed

Of the following paintings, the first two are cited by Angela Ottino della Chiesa as having more general acceptance than the others. All have been claimed at some time to be Leonardos.

- *La belle Ferronière* (1495–1498)—Louvre, Paris, France
- *Portrait of a Musician* (c. 1490)—Pinacoteca Ambrosiana, Milan, Italy
- *Madonna Litta* (1490–91)—Hermitage Museum, Saint Petersburg, Russia, thought perhaps to be by Marco d'Oggiono
- *Madonna of the Yarnwinder* 1501. Three versions exist, apparently by different hands, perhaps copies of a lost work that is described by Leonardo.
- *The Dreyfus Madonna*, previously attributed to Verrocchio or Lorenzo di Credi. The anatomy of the Christ Child is so poor as to discourage firm attribution by most critics while some believe that it is a work of Leonardo's youth.
- *Bacchus* (or *St. John in the Wilderness*) (1515)—Louvre, Paris, France, is generally considered to be a workshop copy of a drawing.

## Recent attribution

- *The Holy Infants Embracing* c. 1486–1490 several versions in private collections.
- *Madonna and Child with St Joseph*, Borghese Gallery, previously attributed to Fra Bartolomeo.
- *Mary Magdalene*, recently attributed as a Leonardo by Carlo Pedretti. Previously regarded as the work of Giampietrino who painted a number of similar Magdalenes.
- *Christ Carrying the Cross*, date unknown, private collection. Attribution by Carlo Pedretti.

## Known only as a copy

- *Leda and the Swan* (1508)—(Only copies survive—best-known example in Galleria Borghese, Rome, Italy. Another is in Wilton House, England.)
- *The Battle of Anghiari* (1505), Hall of Five Hundred (Salone dei Cinquecento) in the Palazzo Vecchio, Florence.

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