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Vladimir Prelog: Stalwarts of stereochemistry

Vladimir Prelog, a Swiss eminent chemist of Croatian origin, was the first scientist to synthesize the symmetrical hydrocarbon adamantane. The derivatives of adamantane are used for medical applications. His research was of fundamental importance to the understanding of biological processes. Prelog performed research of reference on the stereochemistry of alkaloids, enzymes, antibiotics, and several natural compounds. He developed a nomenclature for describing complex organic compounds. This system, known as the Cahn–Ingold–Prelog system, provided a standard and international language for precisely specifying a compound's structure.

Prelog is recognized for his application of X-ray analysis techniques for determining the structures of many types of antibiotics, such as rifamycin, which is widely used to treat tuberculosis, and for his work on the architecture of molecules such as cholesterol and antibiotics. His research in what is known as stereochemistry bore rich fruit in the development of pharmaceuticals. He contributed to the understanding of stereoisomerism, in which two compounds of identical chemical composition have different mirror-image configurations. For his research into the stereochemistry—the study of the relative spatial arrangements of atoms—of organic molecules and reactions, Prelog (along with the British research chemist J. W. Cornforth) was awarded the 1975 Nobel Prize in Chemistry.

He was a brilliant chemist, a scholar, and great intellectual possessing a deep cultural background. All his life he had one attitude toward men, he never exercised his authority, and tried to avoid any sort of confrontation. He was one of the people who signed the peace appeal for Croatia, which was signed by 109 Nobel Prize winners in 1991.

Prelog was a member of the French Academy of Sciences. During 2016, the French Academy of Science is celebrating its 350th anniversary, which is also the 110th anniversary of the birth of Prelog and the perfect occasion to remember him.

1. Route of the bright boy and brilliant scientist

Vladimir, the son of Mara Cettolo (Prelog) and Milan Prelog, was born on 23 July 1906 in the Serbian city of Sarajevo, in the provinces of Bosnia and Herzegovina, which then belonged to the Austrian-Hungarian Monarchy and later, in 1918, became part of Yugoslavia as an independent country. In 1915, the concomitance of two events in the life of Prelog, that is, the eruption of the First World War and the divorce of his parents, Mara and Milan, forced Prelog, who was 9 years old, to move to Zagreb (180 miles northwest of Sarajevo), the capital of Croatia, to live with an aunt. He attained his primary education and part of his secondary education in Zagreb. His father was a teacher of history and later a professor at the University of Zagreb; thus, Prelog appreciated the value of education. He spent the last 2 years of secondary school in Osijek, Croatia, after his father started working there. The school in Osijek proved to be crucial because his chemistry teacher, Ivan Kurija, sparked his interest and love for chemistry. He was an eminent student, particularly in chemistry. In 1922, his first study in chemistry was published in the German science journal, *Chemiker Zeitung*. Two years later, in 1924, Prelog graduated from school and began pursuing a diploma in chemical engineering from Prague's famous "Czech Technical University". From 1924 to 1928, he attended the Institute of Technology in Prague, Czechoslovakia, from which he received a diploma in chemical engineering (the equivalent of a bachelor's degree) in 1928. Prelog's hard work and brilliant research as he undertook graduate studies earned him a doctorate in science and technology from the same institution in 1929. The supervisor of his thesis was Professor Emil Votocek, one of the prominent founders of chemical research in Czechoslovakia. He was tutored also by his mentor, Rudolf Lukes (then lecturer and later successor of Votocek to the chair of organic chemistry), who introduced him to the fascinating world of organic chemistry.

Every beginning is a battle in itself, and any change in life is a battle with others...

The year 1929 coincided with the worldwide severe economic crisis, a phase termed as the “Great Depression”; in that time, it was impossible to find an academic position. As such, he started working in a small private plant, where he was in charge of the production of rare chemicals not found on the market, while he spent his free time continuing his own research. He concentrated on his personal research in the chemistry of natural compounds; he started investigating alkaloids from the bark of cacao trees. He had there a modest opportunity to do some research, but he wanted to work in an academic environment. He worked there until 1935. In 1935, Prelog was employed as a lecturer of chemical engineering and organic chemistry at the University of Zagreb. From 1935 to 1942, he was lecturer and associate professor as part of the Technical Faculty of Zagreb University. He founded the Zagreb School of Organic Chemistry and a research laboratory at the Kaštel factory, today's Pliva, which later grew into a modern and successful pharmaceutical company. The constant political turmoil in the Balkans and the prevailing poverty in this region influenced his work in a specific way. Owing to the political circumstances of that time, after the German occupation of Zagreb in 1941, he understood that he was likely to get into serious trouble if he remained there. *Ipsa facto*, his initiative and dedication to scientific research helped Prelog to overcome all difficulties. At this critical point in his life, he received an invitation from Richard Kuhn to give some lectures in Germany, and afterward Leopold Ruzicka, whom Prelog had asked for help, invited Prelog to visit him on the way. Ruzicka helped Prelog to obtain Swiss visas for himself and his wife, and Prelog decided also to emigrate from Zagreb to Switzerland. Through Ruzicka, Prelog obtained generous support from CIBA Ltd. and started work in the Organic Chemistry Laboratory at the Federal Institute of Technology (ETH) in Zurich. The cooperation with Ruzicka lasted many years, and Ruzicka enabled Prelog to progress up the academic hierarchical ladder. He was promoted from private senior lecturer (1942–1947) to teacher (1947–1950) and to professor (1950–1976). Finally, in 1957, Prelog succeeded Ruzicka as head of the laboratory, heightened achievement that he never dreamt of when he was a student in Prague; he continued to expand the laboratory's activity.

As a teacher of organic chemistry and a lecturer of distinctive style and eloquence, he trained many generations of chemists.

2. Scientific achievements

The way from Sarajevo to Stockholm is a long but not impossible route. And every long journey begins with a small step...

His first publication came when Prelog was only 15 years old! He published his first scientific work in 1922, in the German science journal *Chemiker Zeitung*. It is an important article. After reading it, one is struck by the

maturity of the mind of the author, both in its clarity of thought and expression.

Science is organized knowledge and wisdom is organized life (Emmanuel Kant (1724–1804))

Starting in his young life, his main interest focused on research involving chemical compounds called alkaloids from the bark of cacao trees. He began to investigate the alkaloid “quinine” and its chemical compounds, with the help of financial assistance from Kaštel, now known as Pliva, a famous pharmaceutical company. He developed an anti-microbial sulfonamide drug called streptazol, which soon became well known in the pharmaceutical industry. The brilliant scientist continued his research on alkaloids, working on chemical structures of plants such as *Cinchona* and *Erythrina*. Prelog focused on the elucidation of the structure of solanidin and *Cinchona* alkaloids and started to investigate strychnine. He showed that Robert Robinson's formula for strychnine was not correct. Although the formula he proposed was also incorrect, the discovery increased his personal and international prestige. Later, he worked on elucidating the structures of aromatic *Erythrina* alkaloids and (together with D. R. H. Barton, O. Jeger, and R. B. Woodward) Cevin, which was his last project in alkaloid chemistry.

Note that in the mid-century, purely chemical methods had become outstated and had lost some of their intellectual appeal. In this period, the instrumental revolution concerning the introduction to organic chemistry of the physical methods of X-ray analysis, molecular spectroscopy, and chromatography necessitated a new approach to structural elucidation. Recognizing the growing importance of microbial metabolites, Prelog started working on these compounds, which possess unusual structures and interesting biological properties. This led him to antibiotics, and he subsequently elucidated the structures of such compounds as boromycin, ferrioxamines, nonactin, and rifamycin (used to treat tuberculosis and leprosy).

He worked on removing certain compounds called “chiral enantiomers” from an organic compound called Tröger's base, which contains carbon, hydrogen, and nitrogen atoms. He did this by using the chromatography technique for separating mixtures, proving that the belief that carbon atoms were the only constituents of chiral molecules was inadequate. He stated that even nitrogen atoms could comprise the center of a chiral (nonsuperimposable mirror image) compound. The work of Prelog on medium-sized alicyclic and heterocyclic rings established him as a pioneer in stereochemistry and conformational theory and yielded an invitation to give the first Centenary Lecture of the Chemical Society in London in 1949. He synthesized medium-sized ring compounds with 8–12 members from dicarboxylic acid asters via acyloin condensation and explained their unusual chemical reactivity by using a “nonclassical” strain because of energetically unfavorable conformations. He also contributed to the understanding of Bredt's rule (in bridged-ring systems, a double bond cannot start from a bridgehead) by showing that a double bond cannot occur at the bridgehead if the ring is large enough. In his research on asymmetric syntheses, Prelog studied enantioselective reactions and established rules for the relationship between the configuration of educts and products. The transition from the

stereoselectivity of asymmetric syntheses to a study of enzymatic reactions was only a small step because the mystery of enzymic activity and specificity will not be elucidated without knowledge of the intricate stereochemical details of enzymic reactions. Through Prelog's research into the stereospecificity of microbiological reductions of alicyclic ketones and the enzymic oxidation of alcohols, he contributed not only to the knowledge of the mechanism of the stereospecificity of enzymic reactions in general but also to the knowledge of the structure of the active site of the enzyme. Specifying the growing number of stereoisomers of organic compounds became one of Prelog's important aims. In 1954, he joined R. S. Cahn and Sir Christopher Ingold in their efforts to build a system for specifying a particular stereoisomer by using simple and unambiguous descriptors that could be easily assigned and deciphered. The Cahn–Ingold–Prelog system was developed to define the absolute configuration using “sequence rules”. He introduced the so-called Prelog's regulation, which determines the conformational relations between reactants and products.

Prelog is well known because he developed X-ray analysis techniques that reveal the stereochemical structures of numerous complex organic molecules and laid out the general rules of molecular structures in relation to the properties of chemical compounds. He also developed reliable systemic rules for using X-ray analysis to determine whether the atoms of a lopsided, or asymmetric, carbon-based molecule are arranged in “right-handed” or “left-handed” placement (either arrangement contains the same atoms, but the atoms are connected in mirror-image arrangements). He studied the effects on chemical compounds created by the three-dimensional arrangement of their atoms, particularly the molecules of cholesterol and antibiotics. He won the Nobel Prize for Chemistry in 1975.

As we observed, during his life, Prelog had to move several times, including to Sarajevo, Zagreb, Osijek, Prague, and Zurich. The way from *Sarajevo* to *Stockholm* was a long one, and he was fully aware that *to be unrepeatable and eternal, one must work very deeply...*

Throughout his career, his scientific research encompassed more than 400 works, making him one of the stalwarts of stereochemistry.

Many scientific societies elected him to membership. He became a member of many science academies and received honorary titles from numerous universities. In 1986, he became an honorary member of the Croatian Academy of Sciences and Arts. A frequent visitor to the United States, he was elected as a foreign member of the National Academy of Sciences in 1961. The Royal Academy of Britain followed suit a year later (1962). Dr. Prelog also won many other prestigious awards: Marcel Benoist Award (1965), Davy Medal (1967), August Wilhelm von Hofmann Medal for Chemistry (1968), ACS Roger Adams Medal (1969), Nobel Prize for Chemistry (1975), Paracelsus Medal (1976), Member of the Board of Ciba (1963–1971), Member of the Board of Ciba-Geigy (1971–1978), of the Academy of Pharmaceutical Sciences, of the Accademia dei Lincei, Foreign Member of the German Academy of Sciences Leopoldina, Foreign Member of the Russian Academy of Sciences, Foreign Member of the Royal Irish Academy, Foreign Member of the Royal Danish Academy of Sciences.

I have briefly summarized the career and works of Prelog, which I believe define the man Prelog. Prelog was, above all, a modest, eclectic, and generous man. He had a right course and character, and he attracted the affection and respect of all. He always remembered his origins, encouraged young investigators, and never sought recognition – being much more interested in talking about science. Although his mother tongue was Croatian, he was well able to converse, read, and write in several other languages.

Prelog married Kamila in Prague in 1933 and had a son, Jan, who was born in Zurich in 1949. He was a much beloved father and was invariably generous and supportive of his son in whatever he did.

He died in Zurich, Switzerland, on 7 January 1998. His last earthly days were spent in Zurich, but he was ultimately buried in the memorial tomb of the Croatian Academy of Sciences.

Prelog was one of the most important chemists of the 20th century; his research and theories exerted a powerful influence on the development of chemistry. He worked deeply, and his lonely effort can finally become collective for other generations of scientists and our society. Through these sentences, that nobility of spirit and modesty of this great scientist are conveyed! The memory of the noble soul of this great servant of science and of his country will not pass. *A fortiori causa*, Prelog was a fighter in science and in life. Prelog was triumphant in science, which required a plenitude of force to create an everlasting way.

References

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Ioana Fechete

Institut de chimie et procédés pour l'énergie, l'environnement et la santé (ICPEES), UMR 7515 CNRS, Université de Strasbourg, 25, rue Beccquerel, 67087 Strasbourg Cedex 2, France

E-mail addresses: ifechete@unistra.fr, i_fechete@yahoo.com

(I. Fechete)

July

JULY	MEMBERS OF THE FRENCH ACADEMY OF SCIENCES
1	<p>Leibnitz, Gottfried Wilhelm (1 July 1646–14 November 1716), German polymath and philosopher. Poncelet, Jean-Victor (1 July 1788–22 December 1867), French mathematician. Caquot, Albert Irénée (1 July 1881–28 November 1976), French engineer. Dieudonné, Jean Alexandre Eugène (1 July 1906–29 November 1992), French mathematician. Edelman, Gerald (1 July 1929–17 May 2014), American biologist and Nobel laureate (1972).</p>
2	<p>Fleurieu, Charles Pierre Claret de (2 July 1738–18 August 1810), French explorer and politician. Chaussier, François (2 July 1746–19 June 1828), French forensic doctor. Huber, François (2 July 1750–22 October 1831), Swiss naturalist. Ladenburg, Albert (2 July 1842–15 August 1911), German chemist. Maupas, François Émile (2 July 1842–18 October 1916), French zoologist and botanist. Bertrand, Marcel Alexandre (2 July 1847–13 February 1907), French geologist. Henriot, Émile Jean Charles (2 July 1885–1 February 1961), French-Belgian physicist. Dryden, Hugh Latimer (2 July 1898–2 December 1965), American aeronautical scientist. Jaeger, Paul (2 July 1905–27 December 1999), French biologist and botanist.</p>
3	<p>Lassone, Joseph-Marie-François de (3 July 1717–10 December 1788), French medical doctor. Branças de Lauragais, Louis-Léon-Félicité (3 July 1733–8 October 1824), French general. Coquebert de Montbret, Charles-Étienne de (3 July 1755–9 April 1831), French professor. Berthier, Pierre (3 July 1782–24 August 1861), French geologist. Séguier, Armand Pierre (3 July 1803–14 February 1876), French advocate. Lalanne, Léon Louis Chrétien (3 July 1811–12 March 1892), French engineer and politician. Jonquières, Jean Philippe Ernest de Fauque de (3 July 1820–12 August 1901), French mathematician. Grimaux, Louis Édouard (3 July 1835–2 May 1900), French chemist. Blondlot, René Prosper (3 July 1849–24 November 1930), French physicist. Termier, Pierre Marie (3 July 1859–23 October 1930), French geologist. Michel-Lévy, Albert Victor (3 July 1877–2 May 1955), French geologist.</p>
4	<p>Rocheffoucauld, Louis-Alexandre de La (4 July 1743–4 September 1792), French politician. Civiale, Jean (4 July 1792–13 June 1867), French surgeon. Picart, Théophile Luc (4 July 1867–26 December 1956), French astronomer. Loewy, Maurice (4 July 1868–15 October 1907), French astronomer. Pascal, Paul Victor Henri (4 July 1880–26 January 1968), French chemist. Moret, Léon Marie Louis (4 July 1890–22 November 1972), French geologist. Lazorthes, Guy (4 July 1910–25 March 2014), French medical doctor. Wollman, Elie Léo (4 July 1917–1 June 2008), French microbial geneticist. Debreu, Gérard (4 July 1921–31 December 2004), French mathematician. Moser, Jürgen Kurt (4 July 1928–17 December 1999), German-American mathematician.</p>
5	<p>Odonais, Jean Godin des (5 July 1713–1 March 1792), French cartographer and naturalist. Poissonnier, Pierre-Isaac (5 July 1720–15 September 1798), French medical doctor. Degaulle, Jean-Baptiste (5 July 1732–18 April 1810), French engineer. Fitz-Roy, Robert (5 July 1805–30 April 1865), English scientist. Vergnette-Lamotte, Gérard Elisabeth Alfred de (5 July 1806–28 May 1886), French enologist. Vogt, Karl Christoph (5 July 1817–5 May 1895), German scientist. Bourcart, Jacques Paul (5 July 1891–24 June 1965), French geologist and oceanographer. Koch, Lauge (5 July 1892–5 June 1964), Danish geologist. Mayr, Ernst (5 July 1904–3 February 2005), German-American biologist. Hooft, Gerard't (5 July 1946), Dutch theoretical physicist and Nobel laureate (1999).</p>
6	<p>Jacobaeus, Oliger (6 July 1650–18 June 1701), Danish naturalist and physicist. Jussieu, Antoine de (6 July 1686–22 April 1758), French medical doctor and botanist. Jaskiewicz, Jean (6 July 1749–14 November 1809), Polish intellectual. Svanberg, Jöns (6 July 1771–15 January 1851), Swedish scientist. Saint-Vincent, Jean-Baptiste Geneviève Marcellin Bory de (6 July 1778–22 December 1846), French naturalist. Hooker, William Jackson (6 July 1785–12 August 1865), English botanist. Lépine, Jacques-Raphaël (6 July 1840–17 November 1919), French physiologist. Devaux, Henri Edgard (6 July 1862–14 March 1956), French pharmacist. Avel, Marcel (6 July 1900–6 December 1983), French zoologist. Malgrange, Bernard (6 July 1928), French mathematician.</p>
7	<p>Larrey, Dominique-Jean (7 July 1766–25 July 1842), French surgeon. Breschet, Gilbert (7 July 1784–10 May 1845), French anatomist. Wolf, Rudolf (7 July 1816–6 December 1893), Swiss astronomer and mathematician. Dalcq, Albert Maurice (7 July 1893–29 October 1973), Belgian doctor and embryologist. Blanc-Lapierre, André Joseph Lucien (7 July 1915–14 December 2001), French physicist and mathematician. Huet, Gérard (7 July 1947), French informatician.</p>
8	<p>Larrey, Dominique Jean (8 July 1766–25 July 1842), French surgeon. Vayssière, Albert Jean Baptiste Marie (8 July 1854–13 January 1942), French scientist. Carleman, Tage Gilis Torsten (8 July 1892–11 January 1949), Swedish mathematician. Trillat, Jean-Jacques Marie Joseph (8 July 1899–24 December 1987), French physicist.</p>

Cartan, Henri (8 July 1904–13 August 2008), French mathematician.
Chevé, Jean Lucien (8 July 1908–12 March 1982), Veterinarian.

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- 9** **Maurepas, Jean-Frédéric Phélypeaux de Pontchartrain, comte de** (9 July 1701–21 November 1781), French politician.
Moseley, Henry (9 July 1801–26 January 1872), English scientist and mathematician.
Schloesing, Jean Jacques Théophile (9 July 1824–8 February 1919), French chemist.
Darwin, George Howard (9 July 1845–7 December 1912), English astronomer and mathematician.
Guntz, Antoine Nicolas (9 July 1859–7 August 1935), French chemist.
Millot, Jacques (9 July 1897–23 January 1980), French arachnologist.
Lacombe, Paul Gilbert Jean (9 July 1911–18 December 1997), French chemist.
Picasso, Emilio (9 July 1927–12 October 2014), Italian physicist.
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- 10** **Marsili, Luigi Ferdinando** (10 July 1658–1 November 1730), Italian scientist.
Bosc d'Antic, Paul (10 July 1726–June 1784), French chemist.
Kramp, Chrétien (10 July 1760–14 May 1826), French teacher and medical doctor.
Lugeon, Maurice (10 July 1870–23 October 1953), French geologist.
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- 11** **Morin de Saint-Victor, Louis** (11 July 1635–1 March 1715), French botanist.
Anville, Jean-Baptiste Bourguignon d' (11 July 1697–28 January 1782), French geographer.
Lalande, Joseph-Jérôme Lefrançois de (11 July 1732–4 April 1807), French astronomer.
Joly, Nicolas (11 July 1812–17 October 1885), French zoologist.
Larmor, Joseph (11 July 1857–19 May 1942), French physicist and mathematician.
Guillet, Léon Alexandre (11 July 1873–9 May 1946), French engineer.
Delépine, Gaston Georges (11 July 1878–16 March 1963), French mineralogist and geologist.
Westgren, Arne Fredrick (11 July 1889–3 March 1975), Swedish metallographer.
Allaines, François Louis Paul de Gaudard d' (11 July 1892–19 October 1974), French surgeon.
Benoît, Henri (11 July 1921–23 March 2009), French chemist.
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- 12** **Dutour, Étienne-François** (12 July 1711–6 August 1789), French physicist.
Bernard, Claude (12 July 1813–10 February 1878), French medical doctor and physiologist.
Desains, Quentin Paul (12 July 1817–3 May 1885), French physicist.
Cannizaro, Stanislas (12 July 1826–10 May 1910), Italian chemist.
Trabut, Louis (12 July 1853–25 April 1929), French botanist.
Pictet, Amé (12 July 1857–11 March 1937), Swiss chemist.
Calmette, Léon Charles Albert (12 July 1863–29 October 1933), French physicist and bacteriologist.
Dugac, Pierre (12 July 1926–7 March 2000), French scientist.
Nishizuka, Yasutomi (12 July 1932–4 November 2004), Japanese biochemist.
Omura, Satoshi (12 July 1935), Japanese biochemist.
Lesieur, Marcel (12 July 1945) French scientist.
Sahel, José-Alain (12 July 1955), French ophthalmologist and entrepreneur.
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- 13** **Truchet, Jean** (13 July 1657–5 February 1729), French mathematician.
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- 14** **Louville, Jacques-Eugène d'Allonville de** (14 July 1671–10 September 1732), French astronomer and mathematician.
Gaubil, Antoine (14 July 1689–24 July 1759), French Jesuit missionary to China.
Duval-Le Roy, Nicolas Claude (14 July 1731–6 December 1810), French mathematician.
Dumas, Jean Baptiste André (14 July 1800–11 April 1884), French chemist.
Müller, Johann (14 July 1801–28 April 1858), German physiologist.
Miège, Émile (14 July 1880–18 July 1969), French engineer.
Gaussen, Henri Marcel (14 July 1891–29 July 1981), French botanist.
Glangeaud, Louis (14 July 1903–22 March 1986), French mineralogist.
Férey, Gérard (14 July 1941), French chemist.
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- 15** **Longueil, Jean-René de** (15 July 1699–13 September 1731), French chemist.
Desgrez, Alexandre (15 July 1863–20 January 1940), French chemist.
Lespieau, Pierre Léon Robert (15 July 1864–21 April 1947), French chemist.
Charcot, Jean-Baptiste Étienne Auguste (15 July 1867–16 September 1936), French medical doctor.
Gentil, Louis Émile (15 July 1868–12 June 1925), French geographer and mineralogist.
Buisson, Henri Auguste (15 July 1873–6 January 1944), French physicist.
Casimir, Hendrick Brugt Gerhard (15 July 1909–4 May 2000), Dutch physicist.
Hamburger, Jean (15 July 1909–1 February 1992), French medical doctor.
Schnell, Raymond Albert Alfred (15 July 1913–7 February 1999), French botanist.
Mountcastle, Vernon (15 July 1918–11 January 2015), American neuroscientist.
Rassat, André (15 July 1932–16 July 2005), French chemist.
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- 16** **Hermann, Jakob** (16 July 1678–11 July 1733), Swiss mathematician.
Montalembert, Marc-René de (16 July 1714–29 March 1800), French engineer.
Gérard, Louis (16 July 1733–16 November 1819), French botanist.
Piazzi, Giuseppe (16 July 1746–22 July 1826), Italian astronomer and mathematician.
Bernard, Pons Joseph (16 July 1748–29 July 1816), French scientist.
Lawrence, William (16 July 1783–5 July 1867), English surgeon.
Plücker, Julius (16 July 1801–22 May 1868), German physicist and mathematician.
Petit, Jean Marc Alexis Frédéric (16 July 1810–27 November 1865), French astronomer.
Fosse, Richard Jules (16 July 1870–18 December 1949), French biochemist.
Amundsen, Roald Engelreth Gravning (16 July 1872–18 June 1928), Norwegian explorer of polar regions.
Zernike, Frits (16 July 1888–10 March 1966), Dutch physicist and Nobel laureate (1953).
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- 17** **Littré, Alexis** (17 July 1654–3 February 1726), French medical doctor.
Maupertuis, Pierre Louis Moreau de (17 July 1698–27 July 1759), French physicist and astronomer.
Oriani, le comte Barnaba (17 July 1752–12 November 1832), Italian astronomer and scientist.
Hatt, Philippe Eugène (17 July 1840–9 October 1915), French engineer.
Mrazec, Ludovic (17 July 1867–9 June 1944), Romanian geologist.
Lucas, René Auguste (17 July 1898–16 June 1900), French physicist.
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- 18** **Bouvet, Joachim** (18 July 1656–28 June 1730), French Jesuit in China.
Helvétius, Jean Claude Adrien (18 July 1685–17 July 1755), French intellectual.
Favé, Louis Eugène Napoléon (18 July 1853–30 July 1922), French engineer.
Lorentz, Hendrik Antoon (18 July 1853–4 February 1928), Dutch physicist and Nobel laureate (1902).
Dufay, Jean Claude Barthélemy (18 July 1896–6 November 1967), French astronomer.
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- 19** **Kresa, Jacques** (19 July 1645–28 July 1715), French intellectual.
Bache, Alexander Dallas (19 July 1806–17 February 1867), American scientist.
Damour, Augustin Alexis (19 July 1808–22 September 1902), French mineralogist.
Potain, Pierre Carl Édouard (19 July 1825–5 January 1901), French cardiologist.
Pickering, Edward Charles (19 July 1846–3 February 1919), American physicist and astronomer.
Launay, Louis Alphonse Auguste de (19 July 1860–30 June 1938), French mineralogist.
Friedel, Georges (19 July 1865–11 December 1933), French mineralogist.
Meyer, Yves (18 July 1939), French mathematician.
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- 20** **Bohn, Johann** (20 July 1640–19 December 1718), German physicist.
Salvador y Pedrol, Jaime (20 July 1649–20 June 1740), Spanish pharmacist.
Monceau, Henri Louis Duhamel du (20 July 1700–22 August 1782), French botanist.
Marmont, Auguste-Frédéric-Louis Viesse de (20 July 1774–2 March 1852), French general.
Owen, Richard (20 July 1804–18 December 1892), English biologist.
Puiseux, Pierre Henri (20 July 1855–28 September 1928), French astronomer.
Raveau, Bernard (20 July 1940), French scientist.
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- 21** **Picard, Jean** (21 July 1620–12 October 1682), French astronomer and geodesist.
Littré, Alexis (21 July 1658–3 February 1725), French physicist.
Regnault, Henri Victor (21 July 1810–19 January 1878), French chemist.
Guyon, Jean Casimir Félix (21 July 1831–21 July 1920), French surgeon.
Dorveaux, Paul Marie Jean (21 July 1851–7 January 1938), French medical doctor.
Quénu, Édouard André Victor Alfred (21 July 1852–28 July 1933), French surgeon.
Gija, Jean Ivan (21 July 1884–1 October 1957), French-Serbian physiologist.
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- 22** **Prony, Gaspard Clair François Marie Riche baron de** (22 July 1755–29 July 1839), French engineer.
Brisbane, Thomas Makdougall (22 July 1773–27 January 1860), Scottish governor of New South Wales.
Reboul, Henri Paul Irénée (22 July 1783–18 February 1839), French chemist.
Bessel, Friedrich Wilhelm (22 July 1784–17 March 1846), German physicist and astronomer.
Largeteau, Charles-Louis (22 July 1791–11 September 1857), French physicist and astronomer.
Lamé, Gabriel (22 July 1795–1 May 1870), French mathematician.
Cosson, Ernest Saint Charles (22 July 1819–31 December 1889), French botanist.
Bischoffsheim, Raphaël Louis (22 July 1823–20 May 1906), French politician.
Waksman, Selman Abraham (10 July 1888–16 August 1973), Russian-American biochemist and Nobel laureate (1952).
Giraud, Georges Julien (22 July 1889–16 March 1943), French mathematician.
Prévot, André-Romain (22 July 1894–21 November 1982), French bacteriologist.
Combes, Claude (22 July 1935), French biologist.
Roques, Bernard (22 July 1935), French biochemist.
Kourilsky, Philippe (22 July 1942), French biologist.
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- 23** **Brückner, Isaac** (23 July 1686–6 April 1762), Swiss scientist.
Petit, Antoine (23 July 1722–21 October 1794), French medical doctor.
Pictet, Marc Auguste (23 July 1752–18 April 1825), Swiss scientific journalist.
Malus, Étienne-Louis (23 July 1775–24 February 1812), French engineer and physicist.
Wertheimer, Pierre Léon (23 July 1892–24 May 1982), French surgeon.
Merle d'Aubigné, Robert (23 July 1900–11 October 1989), French medical doctor.
Prelog, Vladimir (23 July 1906–7 January 1998), Croatian-Swiss chemist and Nobel laureate (1975).
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- 24** **Chazelles, Jean-Mathieu de** (24 July 1657–16 January 1710), French hydrographer.
Boistissandeau, Jean Baptiste Laurent de Hillerin de (24 July 1704–14 February 1779), French scientist.
Cadet de Gassicourt, Louis Claude (24 July 1731–17 October 1799), French chemist.
Deslandres, Henri Alexandre (24 July 1853–15 January 1948), French astronomer.
Picard, Charles Émile (24 July 1856–11 December 1941), French mathematician.
Achard, Émile Charles (24 July 1860–7 August 1944), French medical doctor.
Yor, Marc (24 July 1949–9 January 2014), French mathematician.
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- 25** **La Hire, Gabriel-Philippe de** (25 July 1677–4 June 1719), French astronomer.
Wiebeking, Karl Friedrich von (25 July 1762–29 May 1842), German architect and engineer.
Wallerant, Frédéric Auguste Félix (25 July 1858–11 July 1936), French mineralogist.
Peyer, Bernhard (25 July 1885–23 February 1963), Swiss paleontologist and anatomist.
Stefanski, Witold (25 July 1891–18 July 1972), Polish zoologist.
Morin, Jean Antoine Georges (25 July 1903–8 December 1979), French intellectual.
Hirth, Léon Jean André (25 July 1916–7 September 1991), French biologist.

- 26** **Carré, Louis** (26 July 1663–11 April 1711), French mathematician.
Aguesseau de Valjoing, alias Valjouan, Joseph-Antoine d' (26 July 1676–15 April 1744), French intellectual.
Jalabert, Jean (26 July 1712–11 March 1768), Swiss physicist and politician.
Boucher, Jules Armand Guillaume (26 July 1757–24 November 1844), French botanist.
Debray, Jules Henri (26 July 1827–19 July 1888), French chemist.
Walden, Paul (26 July 1863–22 January 1957), Russian-Latvian-German chemist.
Dessens, Henri Jean Joseph (26 July 1911–22 May 1971), French intellectual.
Witten, Edward (26 July 1951), American physicist and mathematician.
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- 27** **Bernoulli, Jean Ter** (27 July 1667–1 January 1748), Swiss physicist and mathematician.
Palisot, Ambroise-Marie-François-Joseph de Beauvois (27 July 1752–21 January 1820), French naturalist.
Airy, Georges Biddel (27 July 1801–4 January 1892), English astronomer and mathematician.
Sella, Quintino (27 July 1827–14 March 1884), Italian mineralogist and politician.
Jost, Alfred Daniel (27 July 1916–3 February 1991), French endocrinologist.
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- 28** **Vibraye, Guillaume Marie Paul Louis Hurault de** (28 July 1809–14 July 1878), French intellectual.
Saporta, Louis Charles Joseph Gaston de (28 July 1823–26 January 1895), French paleobotanist.
Haton de La Goupillière, Julien Napoléon (28 July 1833–7 January 1927), French scientist.
Wintrebert, Paul Marie Joseph (28 July 1867–3 May 1966), French medical doctor and biologist.
Melin, Johannes Botvid Elias (28 July 1889–22 March 1979), Swedish botanist.
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- 30** **Lory, Charles** (30 July 1823–3 May 1889), French geologist.
Manen, Eugène Hippolyte Léopold Marie (30 July 1829–21 May 1897), French engineer.
Bertrand, Léon Louis Théophile (30 July 1869–24 February 1947), French geologist.
Vening Meinesz, Felix Andries (30 July 1887–10 August 1966), Dutch geophysicist.
Georges, André Léon (30 July 1942), Belgian climatologist.
Bihan, Denis Le (30 July 1957), French medical doctor and physicist.
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- 31** **Koenig, Johann Samuel** (31 July 1712–22 July 1757), German mathematician.
Meckel, Johann Friedrich (31 July 1724–18 September 1774), German anatomist.
Fouquet, Henri (31 July 1727–10 October 1806), French medical doctor.
Pelletier, Bertrand (31 July 1761–21 July 1797), French chemist.
Wöhler, Friedrich (31 July 1800–23 September 1882), German chemist.
Mangon, Charles François Hervé (31 July 1821–15 May 1888), French engineer.
Helmert, Friedrich Robert (31 July 1843–5 October 1915), German geodesist.
Smith, Theobald (31 July 1859–10 December 1934), American epidemiologist and pathologist.
Velluz, Léon Antoine (31 July 1904–28 May 1981), French chemist.
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