

Biographical Encyclopedia of Astronomers

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Arago, Dominique-François-Jean

Born Estagel, (Pyrénées-Orientales), France, 26 February 1786

Died Paris, France, 2 October 1853

François Arago directed the Paris Observatory, was a patron of Urbain Le Verrier, and made significant contributions to the physics of light and electromagnetism. Arago was the fifth son in a family of 11 children raised by François Bonaventure Arago and Marie Roig. Born in the small town of Estagel in Roussillon close to the Spanish border, he was part of a middle-class family of farming origin. His father, who in 1774 passed his school-leaving examination with the right to enter the University of Perpignan, became mayor of Estagel in 1789 and led a lively public career until his death in 1815

It was a mark of his growth as a youth that, in 1795, François Arago moved with his family to Perpignan to commence his secondary studies, which he abandoned in 1800 to prepare himself for entrance into the prestigious École Polytechnique de Paris.

In Toulouse, in 1803, he passed the entrance examination for the École Polytechnique and moved to Paris to take up his studies. Two years later, his friend Denis Poisson, with the aid of the all-powerful Pierre de Laplace, officially proposed him for the post of secretary of the Paris Observatory, a position that had been left vacant by the negligent Augustin Méchain, son of the astronomer of the same name, and that Arago filled temporarily from the end of 1804. On 22 February 1805, he was effectively named to a post at the Bureau of Longitudes, on which the observatory depended

The young Arago's astronomical career began at the Paris Observatory. After meeting with Jean Biot, an already recognized scientist, they worked out a plan to complete the geodesic operations that Pierre Méchain had

left unfinished in Spain. With the support of Laplace, Biot and Arago were designated to complete the work of extending the Paris meridian as far as the Balearic Islands in the Mediterranean Sea, a task they performed between 1806 and 1808

On his return to Paris in July 1809, after many vicissitudes, Arago took possession of the post of astronome adjoint at the Bureau of Longitudes, a position to which he had been appointed, in absentia, in 1807. Two months later, on 11 September, again with the support of Biot and Laplace, he was elected as an astronomer to the Paris Academy of Sciences, in his 23rd year, with 47 of the 52 votes cast. With the confirmation of this appointment by Emperor Napoleon on 23 October 1809, Arago became a public figure. Also in 1809, he succeeded Gaspard Monge in the chair of analytic geometry at the École Polytechnique

From his post in the academy and as a member of the Bureau of Longitudes, Arago assumed effective control of the Paris Observatory. Formal control of the observatory fell to the bureau collegially, although one of its members always took responsibility for its establishment. From 1809, this responsibility fell to Arago, who then moved into a building of the observatory in 1811, after his marriage. On 9 April 1834, in recognition of the actual situation, Arago was named "director of observations," a post he would hold until his death. He had two sons, Emmanuel and Alfred, from his marriage

At the Paris Observatory, Arago began to consolidate his scientific career, which primarily developed between 1809 and 1830. A physicist more than a positional astronomer, Arago mainly occupied himself with the subject of light, its properties, and the instruments for its study. His first discoveries came in 1811 in the area of polarization of light, just before the discoveries of Étienne Malus. In that year he invented an instrument that measured the angle of polarization, and with polarized light he carried out various experiments that convinced him of the superiority of the wave theory over the corpuscular theory of light

As a member of Parisian cultured society at the beginning of the century, Arago forged good friendships with important people. Having close relations with J.-L. Gay-Lussac and Alexander von Humboldt, he was occasionally invited to the Société d'Arcueil, private meetings were encouraged by Claude Berthollet and Laplace, and he began to surround himself with other promising young men. Among his closest friends at the time were Malus (died 1812), Claude Mathieu, Augustin Fresnel, and André-Marie Ampère, but he was estranged from his first friend, Biot

In the midst of political changes in post-Napoleonic France, and from his post at the observatory, Arago specialized in the study of light and the phenomena of electromagnetism. He discovered chromatic and circular polarization of light and investigated refraction in solids and liquids. A defender of the wave theory in opposition to Laplace and Biot, but supported by Fresnel, he was little by little able to overcome the resistance to the theory within the Academy. With his support, Joseph Fourier was elected perpetual secretary, and Arago succeeded him in June 1830.

In fact, after the fall of Charles X, in July 1830, Arago was elected a deputy. From the Chamber of Deputies and the Academy of Sciences, he promoted important initiatives in science policy and education, while at the observatory he encouraged research plans. Le Verrier, for example, owed him the suggestion to carry out investigations that led to the discovery of Neptune

From his high posts, Arago looked out for the careers of the young physicists and astronomers around him. In addition to the polarization of light, he studied the velocity of light, terrestrial, and celestial bodies, the phenomena of refraction, and the recently invented photography. Arago was now at the beginning of a stage in his career as a successful science popularizer and more and more turned his attention to political life

In spite of his much lesser discoveries in fields as far from astronomy as geodesy, optics, electromagnetism, or meteorology, Arago's primary activity was as a cheerleader for science rather than as a pure scientist. A convinced and outspoken republican, he promoted the abolition of slavery in French territories and, after the Revolution of 1848, was named minister of the navy and war, a post he held for four months. Arago was skillful at emphasizing new ideas, important among them being the discoveries in optics, astronomy, and technology. Almost blind during his last years and more preoccupied with politics than with pure science, he died, still in his position as director, to which his rival of the last years, Le Verrier, would succeed.

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Translated by: Richard A. Jarrell

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