

The Life and Work of Joseph Plateau: Father of Film and Discoverer of Surface Tension

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In 1835 Joseph Plateau (1801–1883) was appointed Professor of Physics and Applied Physics at Ghent University, Belgium. By then he was well known for his groundbreaking work on the aftereffect of light on the human retina, and he would go on to become the first person to produce moving images, for which he is considered to be the Father of Film. His greatest scientific achievement, however, was his discovery of surface tension.

Key words: Joseph Plateau; Adolphe Quetelet; Gustave Van der Mensbrugge; Simon Stampfer; Hubert Valerius; Brussels Athenaeum; Institut Gaggia; University of Liège; Ghent University; human vision; moving images; phenakistiscope; film; surface tension; history of physics.

Introduction

Walking around Ghent, the city with one of the largest universities in Belgium, you quickly come across the name of Joseph Plateau (1801–1883). Not only is a street named after him; his name is attached to an international film prize that is awarded at the annual International Film Festival of Ghent.** Indeed, Plateau can be considered to be the Father of Film, since he was the first person to produce moving images. His scientific achievements, however, go much further: He played a crucial role in organizing physics teaching and research at Ghent University, and he is recognized as the discoverer of surface tension.

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** The International Film Festival of Ghent began in 1974 as a local initiative called the *Filmgebeuren van Gent* to promote the alternative film genre. In the late 1970s and early 1980s this became an international event, attracting foreign movie makers. In 1984 the first Night of the Film was organized, marking the establishment of the Joseph Plateau Film Prize; see website <<http://www.filmfestival.be>>.

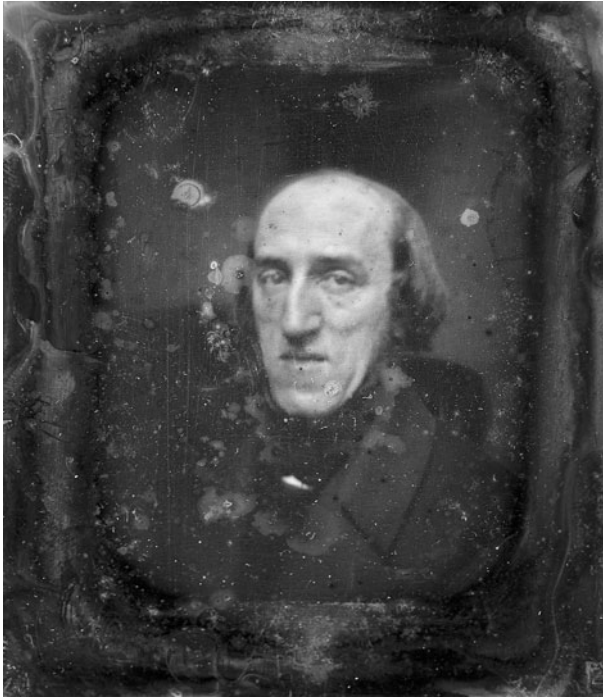


Fig. 1. Daguerreotype of Joseph Plateau (1801–1883) made by Joseph Pelizzaro (1803 to after 1852) around 1843. This is the only known image of Plateau prior to his blindness. *Courtesy of:* Collection Joseph Plateau, Museum for the History of Sciences, Ghent University.

Ghent University was founded in 1817 and comprised the four traditional Faculties of Arts, Law, Science, and Medicine.¹ Owing to several disruptions during the Belgian Revolution and establishment of the independent Kingdom of Belgium in 1830, the university underwent major changes, including the abolition of its Faculty of Science.² Although it was reinstated in 1835,³ some of its professors meanwhile had established a Free Science Faculty,⁴ and several others had migrated to other universities, which required the hiring of new professors for the reinvigorated Ghent University. One of these was Joseph Plateau (figure 1).

Owing to Plateau's long association with Ghent University, a large portion of his scientific legacy relating to the instruments he used in his research and teaching are preserved in its Museum for the History of Sciences,* and form the backbone of our paper.

* The Museum for the History of Sciences is located on the main campus of the Faculty of Science of Ghent University. It holds an extensive historical collection of scientific instruments mainly originating from the university's research laboratories, with which the Museum aims to illustrate the history of the different scientific disciplines through their successive technological advances.

Plateau's Early Years

Joseph Antoine Ferdinand Plateau was born on October 14, 1801, in Brussels,⁵ the son of the renowned floral and decorative painter Antoine Plateau (1759–1815).^{*} He thus grew up in an artistic environment, but as a youth he exhibited a strong urge to learn and developed a profound interest in science, practicing the so-called *physique amusante*. His life took a tragic turn, however, when at barely the age of 14 he lost both of his parents, leaving him in the care of a relative, a lawyer by the name of Thirion.⁶ This heavy blow left a deep wound on the youth; his health deteriorated, and he was advised to spend time in the countryside—where he witnessed the aftermath of the Battle of Waterloo in 1815, a scene he immortalized in a rather naïve watercolor painting.^{**}

Plateau's brief escape to the countryside reinforced his interest in science, stimulating him to assemble an elaborate collection of butterflies.⁷ Indeed, his time in the countryside may have been one of the major driving forces of his interest in science. He spent his holidays at Marche-les-Dames in the Ardennes, visiting his great-uncle, a master blacksmith. The young Plateau took great pleasure and pride in visiting his great-uncle's smithy, whose many mechanical devices and their applications fascinated him.

In 1815, when Plateau returned to Brussels after recovering from his illness, he continued his education, supplementing it in the evening by building physical instruments and performing experiments and demonstrations for himself and his friends.⁸ In 1817, at the age of 16, he continued his studies at the Brussels Atheneum, where during his final years he was taught by the mathematician Adolphe Quetelet (1796–1874, figure 2).^{***} A deep mutual admiration and friendship developed between teacher and student that withstood the test of time and resulted in an extensive correspondence between them.⁹

In 1822, on the advice of his guardian Thirion, Plateau began studying the Arts at the University of Liège, obtaining his candidature degree on July 23, 1823. He then enrolled in the Faculty of Law and obtained his candidature degree in Law on October 26, 1824, but barely three months later he began studying physics

* Although little can be found about Antoine Plateau in standard histories of art, he was highly esteemed by his colleagues, and recent archival research has revealed that his work spanned several European countries, appearing in high-society estates in Belgium and the Netherlands, and even in Vienna, Austria, where his decorative wall panels can be found in the renowned Albertina.

** The original watercolor painting is preserved in the Musée du Dernier Quartier Général de Napoléon in Genappe, Belgium.

*** Adolphe Quetelet was born in Ghent and received his doctorate in mathematics at Ghent University in 1819. On his initiative an astronomical observatory was built in Brussels, which was later moved to Ukkel and became the Royal Observatory of Belgium. His research focused mainly on statistics; he was among the first mathematicians to apply statistical methods in the social sciences.

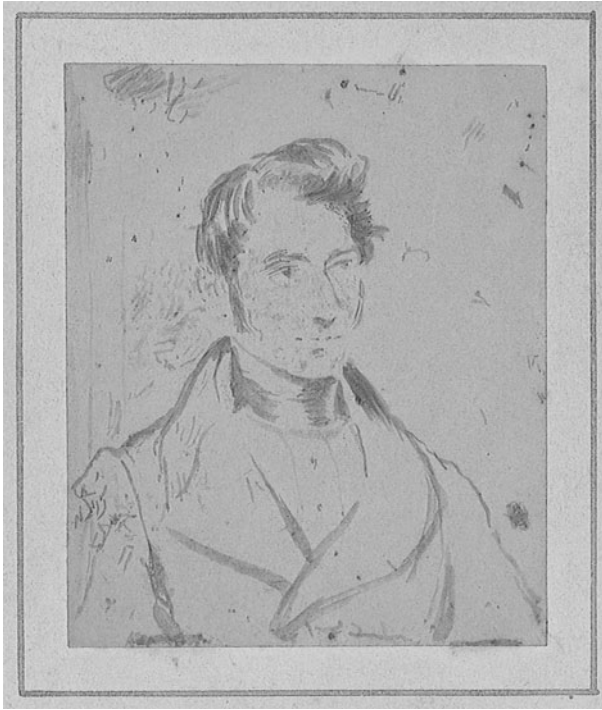


Fig. 2. Original drawing of Adolphe Quetelet (1796–1874), presumably by Joseph Plateau (1801–1883). *Courtesy of:* Collection Joseph Plateau, Museum for the History of Sciences, Ghent University.

and mathematics.¹⁰ He actually had no pronounced preference for any of the sciences, but gradually became deeply interested in chemistry.

Plateau's life now seemed to be on track, but his fortunes soon suffered a serious reversal again when his guardian Thirion became ill, leaving him financially responsible for himself, and also burdening him with the care of his youngest sister Josephine (1806–1894).¹¹ While not forsaking his university studies, he was forced to begin teaching.¹² He was hired as a mathematics teacher at the Liège Athenaeum in 1827, albeit for a very short time owing to his poor health.¹³

Plateau received his Ph.D. degree (*docteur en sciences*) on June 3, 1829. At this time he was not associated with any university, but he submitted his dissertation to the University of Liège. Entitled *Dissertation on some properties of the impressions produced by light on the organ of sight*,¹⁴ his was the first Ph.D. dissertation at the University of Liège that was written in French.¹⁵ His research for it carried a heavy toll: During one of his experiments he stared directly into sunlight for about

25 seconds, which strongly hampered his eyesight for several days.¹⁶ He again recovered by escaping to the countryside, filling his time with long excursions in the provinces of Liège and Namur.

There is some uncertainty about Plateau's whereabouts between 1829 and 1833. His correspondence with Quetelet indicates that he may have resided in Paris in 1831 and 1833 or in Liège in 1832 and 1833.¹⁷ His biographer and son-in-law Gustave Van der Mensbrugge (1835–1911) states that around 1830 he had taken up residence in Brussels shortly before the military turmoil leading to the independence of Belgium.¹⁸ During it he was in the Ardennes; after it, on his return to Brussels, he found that his house had been demolished.

According to Van der Mensbrugge, Plateau remained in Brussels between 1833 and 1834.¹⁹ Thus, on July 22, 1833, Quetelet wrote to Plateau, who meanwhile had obtained a teaching position at the renowned Institut Gaggia in Brussels.²⁰ In his spare time, as recalled by General Jean Baptiste Joseph Liagre (1815–1891),* he continued to entertain his friends with lectures and demonstrations at Quetelet's residence, the Brussels observatory:

They have nearly all disappeared, those who came together over 50 years ago, during the intimate and charming evenings at Quetelet's, to hear Plateau outline his ideas on certain parts of physics, to assist him in his experiments, which given their simplicity were so original, and to see the ingenious instruments that he designed put to work by his skilled hands.²¹

Plateau's Scientific Work Prior to 1835

Plateau's first scientific publication appeared in 1827, in the *Correspondance mathématique et physique* published by his mentor and close friend Quetelet. Entitled "Construction of an equilateral triangle that has its apexes on three given circumferences,"²² his paper comprised an answer to a question that had been posed in a preceding volume of Quetelet's *Correspondance*. Plateau's first publications thus hardly reflect any structured scientific research, nor do they represent the research he was already conducting as indicated in a letter to Quetelet on March 7, 1827:

Mr. Van Rees** gave me reason to believe that I may be able to obtain the authorization for the construction, paid by the university, of a particular

* General Liagre spent a large part of his career at the Royal Military Academy in Brussels. He specialized in statistics and error theory. He was appointed Minister of War in 1879, but resigned one year later owing to political turmoil involving the bridges and fortresses along the Meuse river.

** The physicist and mathematician Richard Van Rees (1797–1875) was Rector of the University of Liège in 1826–1827.