

PLANETS:

What Good Is a Magnetic Field?

PAGE 34

DIY:

Modding Your Scope

PAGE 60

METEOR SHOWER:

A Grand Year for the Geminids

PAGE 48

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Andromeda's Riotous Past

Page 12

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E. M. Antoniadi

The Astronomer Who Decoded Mars

This Greek-French astronomer is perhaps history's greatest visual planetary observer.

Eugène Michel Antoniadi is one of the most famous of all planetary astronomers. Known for his artistic, highly detailed, and accurate drawings of Mars, he's also remembered for his battle with Percival Lowell over the so-called Martian canals. However, despite his fame, Antoniadi's life story is relatively little known. How did this man from the remote capital of the dying Ottoman Empire become such a skilled observer and rise in prominence to challenge the authority of one of the era's most celebrated astronomers?

Coming of Age in Tatabla

E. M. Antoniadi was born on March 1, 1870, in the Tatabla quarter of Constantinople (present-day Istanbul, Türkiye). His parents were wealthy merchants, and growing up, Antoniadi wanted for little.

Astronomy during the Ottoman period had reached its heyday centuries earlier when, in 1421, the Timurid sultan Ulugh Beg established the great observatory at Samarkand in present-day Uzbekistan. However, scientific progress slowed badly in the centuries that followed — so much so that the Copernican theory was not officially recognized in the Ottoman Empire until early in the 19th century. Thankfully, there was an accumulated legacy of astronomical literature available in Greek, French, and English, which Antoniadi, who was fluent in all three languages, must have devoured.

In addition to receiving an excellent education, Antoniadi seems to have been something of a savant, with exceptional powers of concentration and a compulsion to focus

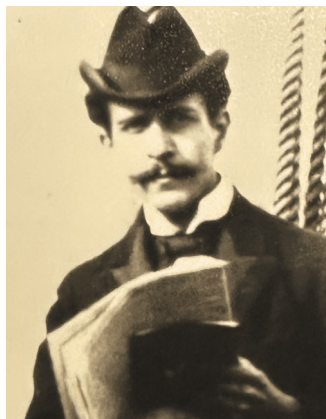
obsessively on whatever captivated him, even at the exclusion of pursuits he embraced with passionate intensity at other times. He was interested in how things work and in extracting the underlying rules that govern the behavior of systems, whether in astronomy or works of architecture. In people, not so much. In addition, he seems to have had a nearly photographic memory, which enabled him to render a landscape from memory after seeing it once — something that would later stand him in good stead when he began to draw Mars.

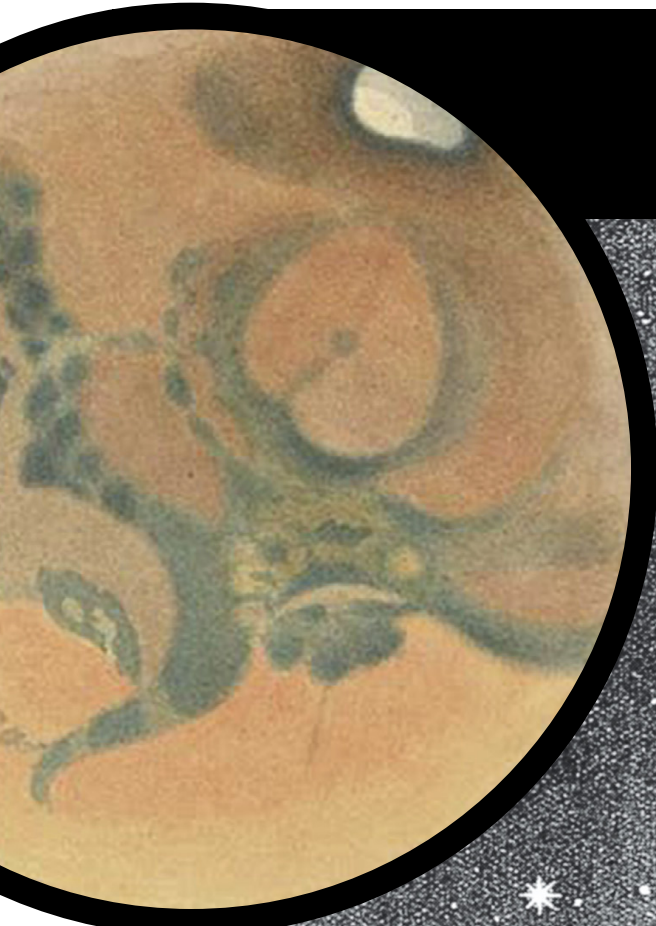
Antoniadi's tendency to withdraw into intense but solitary interests was enhanced by the distressing social and political circumstances of his youth. By the mid-19th century, the Ottoman Empire was already being referred to as “the sick man of Europe” as it charted an inevitable path through despotism to terminal decline and

finally extinction. A significant catalyst was the Russo-Turkish War of 1877-78, leaving the Empire with huge reparations to pay the victors, which wreaked havoc with its finances. Although Antoniadi was relatively unaffected in Tatabla, he must have begun to strategize an escape to Europe and, in particular, to France.

The rising tensions that would lead to the First World War were only good for one industry: arms manufacturing.

▲ **SAILING TO TOTALITY** Antoniadi was Director of the British Astronomical Association's Mars Section when, in 1896, he boarded the *Norse King* with the Association's first-ever eclipse expedition to Norway. Unfortunately, the sky was cloudy on the day of the eclipse.





MAGICAL NIGHT Mars as rendered by Eugène M. Antoniadi on September 20, 1909, his first night with the 83-cm Meudon Observatory Grande Lunette refractor. The telescope is housed in the dome shown in this sketch by Antoniadi, which was published in the *Bulletin de la Société Astronomique de France* in 1927.

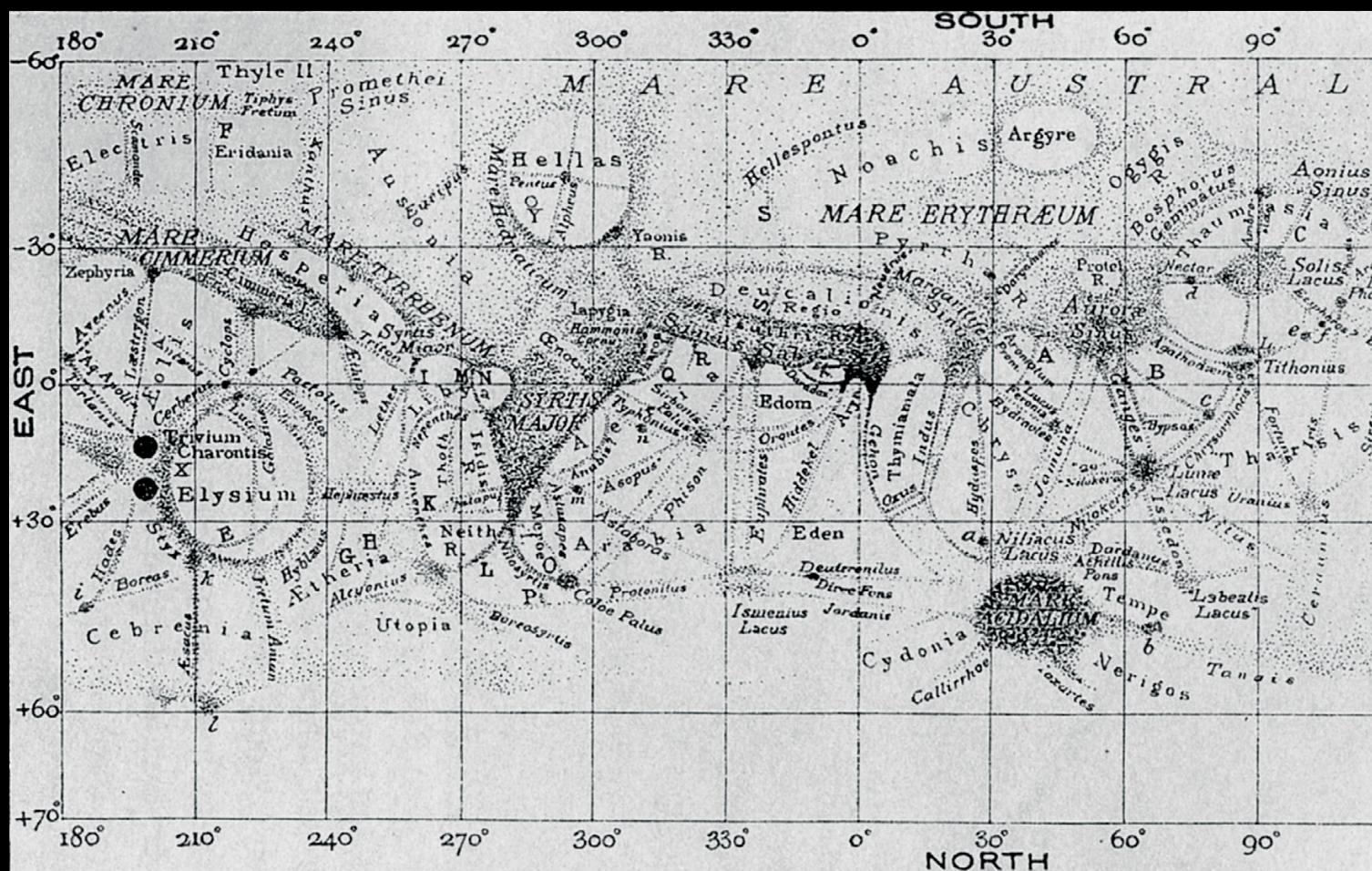
Curiously, Antoniadi was first cousin to the infamous arms dealer Vasileos Zacharias, better known as Basil Zaharoff, who became one of the wealthiest men in Europe through his corrupt business practices, which included selling arms to opposing sides in conflicts. (He also inspired numerous future villains, including Ernst Stavro Blofeld in the James Bond movies.) If Antoniadi made his reputation for his studies of the planet named for the god of war, his cousin worshipped a different war god. Zaharoff's greatest "success" was his zealous promotion of the British inventor Hiram Maxim's machine gun — a weapon probably responsible for more deaths than any other in human history.

As Zaharoff ranged over Europe looking for customers, Antoniadi occupied himself by producing excellent drawings of sunspots, Mars, Jupiter, and Saturn, made at the eyepiece

▼ **SEEING AND BELIEVING** As Director the BAA Mars Section, Antoniadi was responsible for collating observations of the planet and producing maps summarizing each year's results. His first *Memoir of the Mars Section* described work done at the 1896 opposition, and it included this map which, as was typical of the time, is crisscrossed with canals.

of a small refractor likely set up at a family summer home in the Princes' Islands in the Sea of Marmara. He submitted his works to the Société Astronomique de France, founded by Camille Flammarion in 1887. Staggered by Antoniadi's talent, Flammarion hired the 23-year-old as an assistant astronomer at his observatory in Juvisy-sur-Orge in 1893, just two years after Antoniadi became a member of the Société. Flammarion's chateau housed a 9-inch refractor with which he observed the planets, especially Mars. In emigrating from Türkiye to France, it's possible that Antoniadi would have traveled on the famous Orient Express, perhaps in the company of Cousin Basil himself, who had his own private sleeping compartment.

A new era in Antoniadi's life had begun at this rail-stop town south of Paris. Antoniadi never lived at Juvisy-sur-Orge, residing instead in the 8th arrondissement of Paris, one of the most expensive parts of the city — an area that even today is noted for its luxury hotels and designer boutiques. Although he must have been eager to work for the famous French astronomer, the contract he signed paid a mere 300



francs per month (equivalent to about \$1,400 today), while Flammarion also retained exclusive rights to publish any of Antoniadi's work in France. Although Antoniadi eventually came to resent this, at first all must have been sweetness and light. Flammarion was a fascinating figure, bubbling with ideas. He had just completed his magnum opus, *La Planète Mars* — a detailed summary of all the observations of the planet beginning with Galileo and running through the recent 1892 opposition. Under Flammarion's influence, Mars would become (and remain) Antoniadi's main astronomical interest. Before moving to France, Antoniadi had also joined the newly founded British Astronomical Association (BAA), and in 1896 he became director of its Mars Section and edited the Section's *Memoirs*.

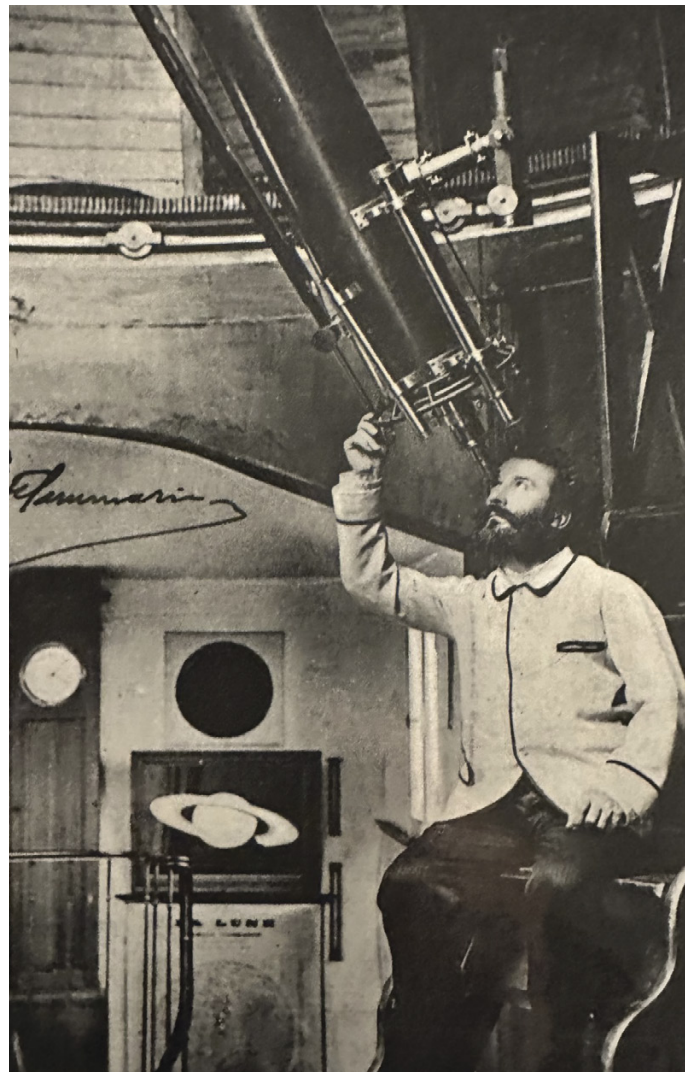
As is inevitable when two strong personalities interact at close quarters, Flammarion and Antoniadi began to fall out. It could have been anticipated from the start that the younger man would eventually grow weary of being dominated by the older. By 1900 Antoniadi wrote, "I cannot stand Flammarion anymore," and resigned his position.

Rendezvous with Martian Destiny

Antoniadi achieved financial security and domestic happiness in 1902 through his marriage to Katherine Sevastupulo, who was also from a well-to-do Constantinople Greek family. They moved into a new residence, still in the 8th arrondissement, where they remained for many years. In addition, perhaps soured by his experience with Flammarion or just restless for change, Antoniadi seemed to have given up on astronomy. In its place, other interests came to the fore. He'd picked up chess in 1893 and now devoted serious attention to it, eventually attaining the level of a near-master, with some highly creditable matches to his name.

Most important, he embarked on an enormous project of drawing and (for the first time) photographing the interior of the Hagia Sophia mosque in Istanbul, leading to the publica-

▼ **KEEN-EYED OBSERVER** Arguably the 19th century's greatest popularizer of astronomy, and a dedicated observer of Mars, Camille Flammarion peers through the eyepiece of the 9-inch Bardou refractor at his private observatory at Juvisy-sur-Orge, France. Antoniadi served as his assistant from 1893 to 1900.





tion in 1907 of the three volumes of the *Ekphrasis tes Hagias Sophias* (Atlas of the Hagia Sophia). Here Antoniadi honed the already peculiarly realistic and meticulous drawing style he had exhibited in his BAA Mars maps, which included making extensive use of the time-consuming technique of *stippling* — rendering a scene with many tiny dots.

Upon returning from a chess tournament in Athens in the summer of 1909, Antoniadi found in his letterbox a note from Henri-Alexandre Deslandres, director of the Meudon Observatory, inviting him to Paris where he might observe that year's favorable opposition of Mars with the observatory's Grande Lunette. With an aperture of 83 cm (33 inches), it was the masterpiece of the French opticians Paul and Prosper Henry, and even today it remains the largest refractor in Europe. Lured out of astronomical retirement, his long apprenticeship at last over, Antoniadi now emerged as a consummate master, a prince among Mars observers.

That summer, as Mars approached its late-September opposition, the planet's features were largely obliterated by a great dust storm such as had never been seen before. Meanwhile, on Earth, the dust seems to have settled on a different storm. Perhaps because the two men no longer worked together, relations with Flammarion had improved significantly — to the point where Flammarion invited Antoniadi to set up his 8½-inch Calver reflector to monitor conditions on Mars from his lawn at Juvisy-sur-Orge. As August turned to September, the Martian dust had mostly cleared, and the planet's surface details began to re-emerge.

It was a magical night when Antoniadi at last took his place at the eyepiece of the Grande Lunette on September 20, 1909. Although most of the stars above Paris that evening were hidden behind a veil of fog, the air was exceptionally calm — a planet observer's dream. Antoniadi would never experience better seeing than he did that night. "The first glance cast on the planet," he wrote in an interim report for the *Journal of the BAA*, "was a revelation . . . I did not believe that our present means could ever yield us such images of Mars."

The 1890s and 1900s were the heyday of the Martian canal controversy, and almost every Mars observer's chart was crisscrossed with linear canals — even the one Antoniadi had prepared for the BAA Mars Section. But now, with the Grande Lunette, the Red Planet presented a different appearance. Using a magnification of 320×, Antoniadi saw "a host of bewildering irregularities, all held steadily, and standing out with a boldness and definiteness defying description." He observed details that weren't linear, but

◀ **HAGIA SOPHIA** This painting from Antoniadi's privately published (and now very rare) *Ekphrasis tes Hagias Sophias* (Atlas of the Hagia Sophia) is notable for its stippling technique, which he later used in many of his planetary drawings.

▶ **CAMERA SHY** Antoniadi, who rarely posed for photos, is shown here taking notes at the desk on the observing platform of the Grande Lunette. This is the only known photo showing Antoniadi observing.

instead "natural and logical, irregular and chequered." The south part of Syrtis Major was "a maze," the Mare Tyrrenum appeared spotted "like a leopard skin."

Confronted with such a vast amount of Martian detail, an ordinary observer wouldn't have even attempted to draw the planet, and even Antoniadi noted that the perfect representation of every detail "was evidently beyond the power of man." But it was at this point that his savant-like qualities entered. Lurking in the darkness, with the shutter of the dome opened to the brilliant planet shining like a red-hot coal in the night sky, he concentrated on a particular small region and awaited the most favorable moments to catch the fine details and engrave them in his memory. He did the same with each adjacent region until, having stored all the shapes in their relative positions, he withdrew from the eyepiece and sat at a table where he quickly worked to set down everything on paper from memory — with exquisite results.

From Paris to Arizona

Just before that monumental night at Meudon, Antoniadi had renewed a long-dormant correspondence with the famous American astronomer and arch-canalist, Percival Lowell. Some years earlier, Antoniadi had tactlessly criticized some of Lowell's observations of Venus. He now apologized for the tone of his criticisms and promised to send Lowell the results of his work at Meudon. In response, Lowell lectured Anto-



niadi, whom he regarded as something of a neophyte, on the proper method of observing planets, which included the usual Flagstaff Observatory practice of stopping down the lens of the telescope in order to match its aperture to the size of the air cells passing overhead.

Ever since he began observing Mars in 1894, Lowell had seen no reason to doubt that the Martian atmosphere was almost always clear. Consequently, he failed to recognize the dust storm that had rushed across the planet that summer and instead ascribed its detail-obscuring effects to a case of bad seeing on Earth. Thus, he had made relatively sparse observations until late September, when he reported the discovery of two new “canals” on Mars. His drawing of September 30th shows the Syrtis Major region Antoniadi had represented so beautifully 10 days earlier. The difference in their styles is almost alarming.

Lowell did not receive Antoniadi’s drawings until early November. Since Antoniadi had not stopped down his telescope’s aperture as advised, Lowell thought that the younger astronomer had been betrayed by poor technique. In Lowell’s opinion, Antoniadi’s view of Mars must have been affected “by a fine imperceptible blurring which transforms the detail

▼ **UNDER THE DOME** A new copper dome protects the Grand Lunette, a century after Antoniadi’s famous Mars observation. After a hiatus of several years, the telescope is now available for public viewing.



really continuous into apparent patches.” Antoniadi thought this line of argument ludicrous. The two men debated for a while, but in the end, both remained set in their views. Lowell went to his grave believing in the canals, but the verdict of truth ultimately fell on Antoniadi’s side.

Antoniadi’s 1909 work on Mars represents his finest hour. He made further observations of Mars and Jupiter with the Grande Lunette in 1911, after which it was closed for some years due to repairs to the dome. During the First World War, he devoted a great deal of time to catching up on the backlog of BAA Mars reports and performed war-related work (what exactly is unknown) for which he received France’s Legion of Honour. In 1917, he relinquished directorship of the Mars Section and resigned his membership in the BAA outright. It seems that the work of preparing the *Memoirs* and the stress of the war may have strained his delicate health. But then, Antoniadi always upheld the ideals of a true amateur. If an interest became a grind, he broke off from it. As he wrote to the Astronomer Royal, Frank Dyson, science “must be cultivated for its own sake, for the pure love of truth, rather than for the applause or profit that it brings.” He took up chess again for a while, then returned to Meudon for the great opposition of Mars in 1924. He also began a long series of Mercury observations.

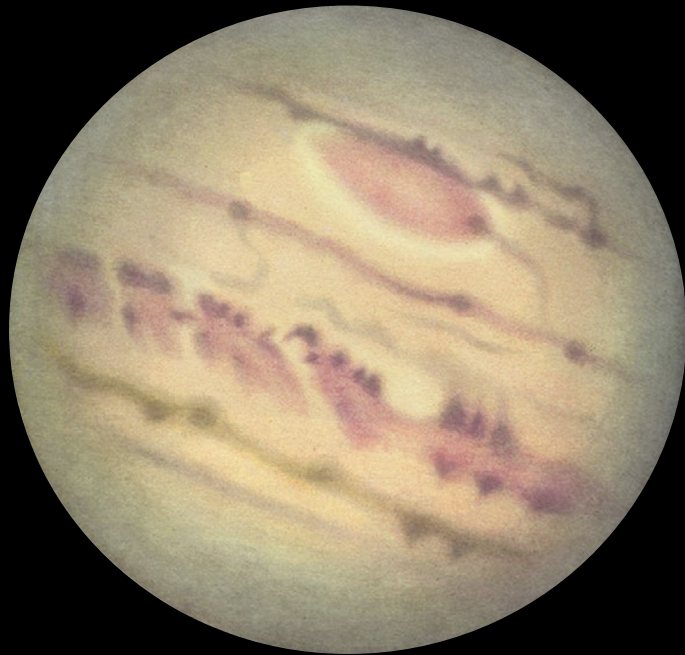
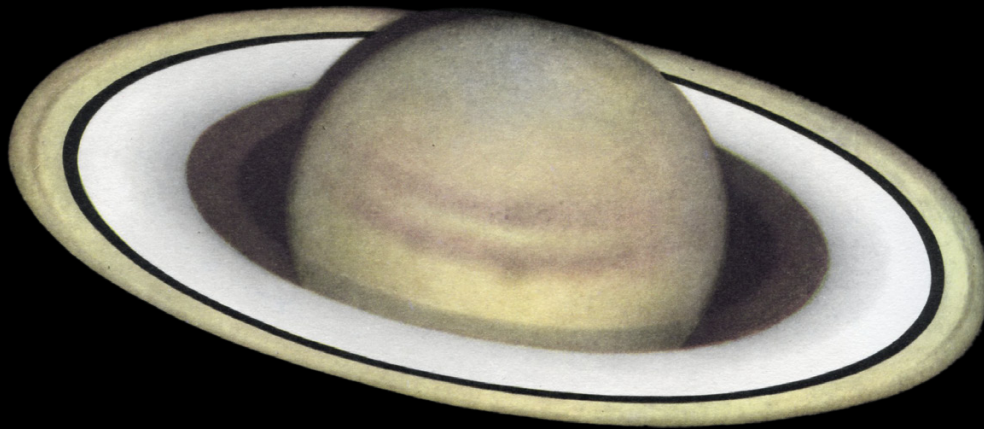
In June 1940 the Nazis occupied Paris. Antoniadi’s health was beginning to fail, and despite being of comfortable means, he shared the lot of most Parisians during this period, living “by expediency, their meager rations eked out by food parcels from the country, their apartments heated by stoves filled with sawdust,” as described by a diarist at the time.

He continued to observe at Meudon and repaired each year to Juvisy-sur-Orge to mark, with colleagues, the anniversary of Flammarion’s death in 1925. The younger generation of planetary observers regarded him with awe and dared not approach him. French astronomer Gérard de Vaucouleurs noted his “naturally curt manner,” but also acknowledged that he was “by far the best planetary observer ever [with] an unsurpassed skill in transferring to paper fleeting telescopic views.”

Although Antoniadi destroyed all his papers before he died in 1944 (possibly to avoid them falling into the hands of the Nazis), he nevertheless conveyed a sense of how he wanted to be remembered in a 1913 letter to the great American astronomer Edward Emerson Barnard:

“. . . my only ambition is to defend the truth and write nothing susceptible of being overthrown. When we feel sure that our work will remain, that our representations of the heavenly bodies are accurate . . . then we may quit this world with the satisfaction of accomplished duty.”

■ **BILL SHEEHAN**’s love of Mars began before the Mariner 4 flyby in 1965 and has persevered into the Perseverance era. He is author (with Jim Bell) of the modern classic, *Discovering Mars: A History of Observation and Exploration of the Red Planet* (University of Arizona Press, 2021).



PLANETARY WONDERS Although Antoniadi is best remembered for his work on Mars and Mercury, he also made observations of the other planets with the Grande Lunette, including Jupiter and Saturn. Indeed, one of his last observations was this one of Saturn, made on October 7, 1941. Both illustrations appeared in the 1964 work *The Flammarion Book of Astronomy*.