

# UC Berkeley

## Room One Thousand

### Title

Eiffel's Apartment and the Architecture of Dreams

### Permalink

<https://escholarship.org/uc/item/6tq4c6js>

### Journal

Room One Thousand, 1(1)

### ISSN

2328-4161

### Author

Greene, Gina

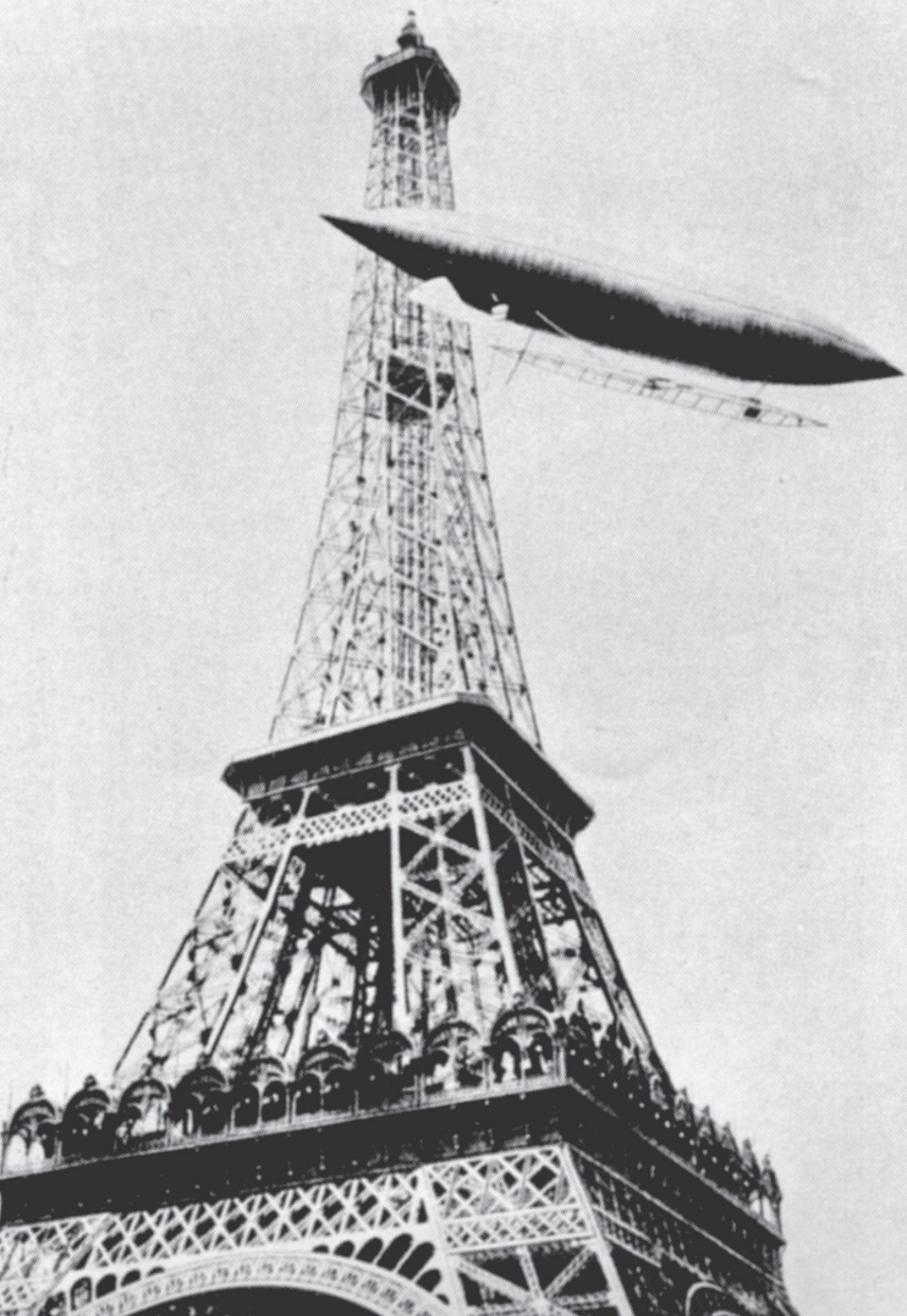
### Publication Date

2013

### Copyright Information

Copyright 2013 by the author(s). All rights reserved unless otherwise indicated. Contact the author(s) for any necessary permissions. Learn more at <https://escholarship.org/terms>

Peer reviewed



Gina Greene

# Eiffel's Apartment and the Architecture of Dreams

[T]he three friends returned to their slumbers. Could they have found a calmer or more peaceful spot to sleep in? On the earth, houses, towns, cottages, and country feel every shock given to the exterior of the globe. On sea, the vessels rocked by the waves are still in motion; in the air, the balloon oscillates incessantly on the fluid strata of divers densities. This projectile alone, floating in perfect space, in the midst of perfect silence, offered perfect repose.

--Jules Verne, *From the Earth to the Moon*, 1890

Who among us, in his idle hours, has not taken a delicious pleasure in constructing for himself a model apartment, a dream house, a house of dreams?

--Charles Baudelaire, 1852

In 1890, the year after the Eiffel Tower opened as the centerpiece of the Paris *Exposition Universelle*, writer Henri Girard declared, in a small volume dedicated to *La Tour Eiffel de Trois Cent Mètres*, that its designer, Gustave Eiffel, had become “the object of general envy” amongst the denizens of Paris [Fig.1].<sup>3</sup> This envy, according to Girard, was inspired not by the fame that had accrued upon its designer, or the fortune the tower generated but, rather, from a single design feature he had built into the plan. Eiffel had installed a private apartment at the summit of his colossal tower to which he alone had access.

Unlike the rest of the tower, the apartment was not notable for its iterations of wrought iron modernity and technological prowess. Rather, it was “furnished in the simple style dear to scientists,” according to Girard, and replete with the wooden cabinets and tables, velvet settees, and flocked wallpaper worthy of any good bourgeois.<sup>4</sup> Yet, despite its commonplace appearance, “[c]ountless numbers of people,” Girard wrote, “have wanted to share the *eyrie* of the eminent engineer. He has received innumerable letters offering him a small fortune to rent his “*pied à terre*” by the night,” he continued, yet all had been refused.<sup>5</sup> What was the appeal of this refuge perched atop the tower? Girard mused upon the joys such a dwelling might offer a man like Eiffel, “far from the noises and from human suffering.” “In the daytime,” he wrote, “he can look out on the splendors of Paris...At night, in the clouds, soothed by the singing wind, he falls asleep by the light of the eternally watchful stars. Is there anyone who can describe to us the dreams that he has in his heavenly residence?”<sup>6</sup>

It is tempting to situate this *pied à terre* in the realm of the domestic. Viewed from this perspective, one can understand the Eiffel apartment as an iteration of domesticity antithetical to the normative space of his other residences: an estate in the French countryside and a massive stone *hôtel particulier* on the Rue Rabelais in Paris replete with French historicist furniture, chandeliers, *objets d'art*, paintings, and other signifiers of upper-class domesticity in the late nineteenth century.

But the installation of such an abode, buffeted by constant wind and cold almost 1,000 feet from the ground, clearly exceeded the bounds of banal, earthbound domesticity and bourgeois respectability. Indeed, such a framework for interpretation is excessively reductive, as the tower apartment so thoroughly foils all notions of traditional domesticity that it clearly defies categorization as such. It was a private space embedded within the very body of a public, purpose-built spectacle. It was an



Figure 1: Eiffel Tower, Anonymous View of the Tower, 1889, photograph.

Figure 7 (Preceding page): Alberto Santos-Dumont circling the Eiffel Tower. Reproduced in Gustave Eiffel, *La tour Eiffel en 1900*, p. 263. photograph.

interior on a structure that, with its open lattice-work frame and exposed staircases, was defined almost entirely by its exteriority and transparency. It represented height firmly anchored to the ground. It was, to borrow Walter Benjamin's poetic description of the Paris arcades, like other enigmatic "dream" structures of the nineteenth century, "both house and stars."<sup>7</sup>

The Eiffel Tower was at the epicenter of a constellation of dreams: of technological progress, modernity, and national prestige. Indeed the metaphor of the dream might provide a more appropriate approach to interpreting such an irrational space. What dreams, motivations and aspirations inspired Eiffel to build his tower-top apartment in the first

place? And, drawing inspiration from Benjamin's assertion that "not architecture alone, but all technology, is at certain stages, evidence of a collective dream," we can inquire as to what the top of the tower can tell us about the collective dreams of the culture more broadly.<sup>8</sup>

Considering such questions is the project of this essay. I argue that it was the twinned dreams of exploration and mastery of the wind which held Eiffel in their thrall and that these dreams were perfectly encapsulated in the idea of flight. The small apartment with its peculiar fairground address and its adjacent tower laboratories can be read as potent iteration of his aeronautic and exploratory ambitions. These ambitions, moreover, were shared by French society more broadly. Seen through this lens, the tower reveals itself as both theater of experiment and experimental object collapsed into one, with conditions of flight a central object of investigation. Like a spectacular airship for one permanently perched in the sky, the top of the tower seemed poised for an exploratory adventure like the "space bullet" aimed at the moon in a Jules Verne adventure. But at the same time, it was also a living laboratory, a theater of experiment in a network of experimental sites for Eiffel's many investigations of the wind. An examination of this space permits us to understand how experimentation and exploration, scientific work and spectacle, were entangled in the late nineteenth-century popular imagination.

## I. Simulation: Voyage

In the fuselage of any kind of aircraft, or in the capsule of a space vehicle: the space occupied by a pilot, observer, astronaut, or (formerly) a passenger.  
--*Oxford English Dictionary* (2013), s.v. "cockpit"

In the style characteristic of the Second Empire, the apartment becomes a sort of cockpit.

--Walter Benjamin, *Paris, Capital of the Nineteenth-Century*<sup>9</sup>

Of all the dreams which may have held the universe of *fin-de-siècle* society in its intoxicating grasp, the complex, eclectic, and characteristically modern desire to be somewhere other than 'here' may have been among the most dominant. Historians of the nineteenth-century have noted that such desires fueled much of the passion for exoticism and historicism evident in both the visual arts and popular culture of the era.<sup>10</sup> In looking at the historicist and orientalist-themed rooms in the home of French travel writer Pierre Loti, for example, historian Stephen Bann discerns an urge, characteristic of the era, to translate places once visited or historical epochs once dreamed of into real spaces for the purposes of fantasized escape. Behind this, Bann sees potent evidence of a phenomenon which drives all representative acts: "the need to exteriorize in a particular medium images and fantasies to which the subject declares a relationship of desire or lack."<sup>11</sup>

Might not the prospect of the exploration of foreign lands and, moreover, the mechanisms of modern travel which permitted such exploration also fit into this schema, articulating this modern desire to be *somewhere other than here*? That the taste for such adventure permeated the culture is evident in, for example, the popularity of travel literature, the diversions offered by panoramas depicting exotic lands, or the science-fiction fantasies of Jules Verne. The explosion of new travel technologies over the course of the nineteenth century—the steam locomotive, steamer ship, and air balloon among others—also fueled these fantasies. Could Eiffel's tower have participated in giving expression, in some fragmentary, subconscious way, to these cultural proclivities?

In 1890, for example, the same year Girard published his description of the adventures to be had in Eiffel's dream apartment, the popular journal *L'Illustration* ran a brief article featuring images of another adventure: a planned expedition to the Antarctic.<sup>12</sup> Such

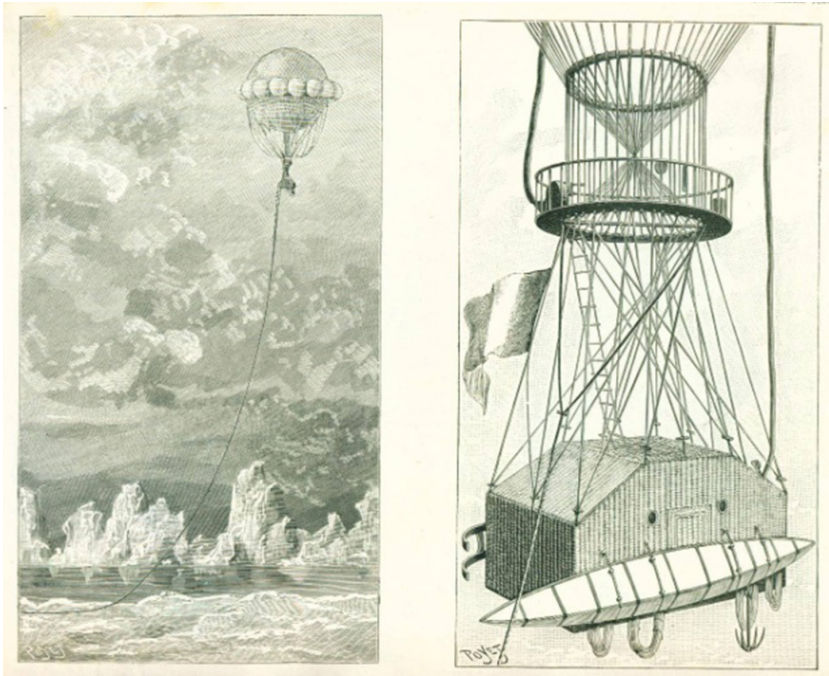


Figure 2: Poyet, « Projet d'une traversée du pôle Nord en ballon » from *L'illustration* no. 2488, p. 374, 1er novembre, 1890.

expeditions frequently attracted considerable public interest throughout the nineteenth-century, both in Europe and abroad and accounts frequently appeared in the popular press.

Here the mode of travel may have been of particular interest. Although there had been a long series of Arctic expeditions in the nineteenth century, many of which ended in catastrophe and failure, they typically commenced with lengthy voyages by ship.<sup>13</sup> What the images in *L'illustration* captured, however, was an attempt to explore the arctic by means of a relatively novel technology, the hot air balloon, a detail that might have fueled even greater interest in the expedition. The fantasy of flight offered by modern air balloons and the attempt to construct steerable airships, called dirigibles, were also objects of great



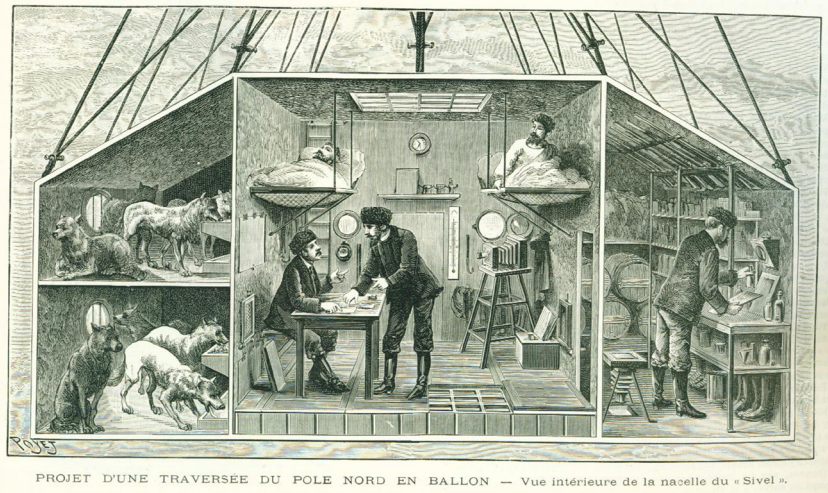


Figure 3. Poyet, « Projet d'une traversée du pôle Nord en ballon » from *L'Illustration*, no. 2488, p. 374, 1er novembre, 1890.

cultural fascination in the period before motorized air travel became possible [Fig. 2]. Interest was fueled by publications such as Gaston Tissandier's *Histoire de mes ascensions* or Jules Verne's *Cinq Semaines en Ballon*, a fictional account of an African exploration via hot air balloon.<sup>14</sup>

In addition to giving the overall aspect of the balloon and its attached riggings and equipment, the artist who illustrated the piece in *L'Illustration* paid particular attention to visually rendering the well-fitted and compact cabin of the explorers [Figs. 2-3]. This was the interior space where, with a bare minimum of equipment and provisions, the intrepid explorers would maintain life under unimaginable atmospheric conditions: able to eat, rest, and conduct scientific experiments while slowly floating towards Antarctica.

Eiffel's apartment symbolically recalled a space not unlike the cockpit/cabin of an actual airship: compact, outfitted for maximum comfort and efficiency, equipped with the necessary tools for scientific experiments (in the form of the adjacent tower-top laboratories), and

tantalizingly inaccessible. It may as well have reproduced some of the physical sensations of being suspended in “a perfect space, in the midst of perfect silence,” to borrow the words of Jules Verne.<sup>15</sup> The milieu within which it was immersed was as remote, thrilling, and alienating as any foreign land. A reporter for the daily *Le Temps* observed that the sense of displacement and disorientation at the top of the tower caused him to feel “completely beyond the normal conditions of experience.”<sup>16</sup> “[T]he confusion caused by the wind,” another writer observed, “...[produces] the surprise of that impression that is well known to aeronauts: space.”<sup>17</sup> “At this height,” the reporter concluded, “you are truly in a void.”<sup>18</sup>

The experience in the tower not only produced foreign sensations of isolation and space, it also produced the illusion of embarking upon a kind of voyage. Writers often took recourse to the language of maritime adventure in describing the tower, as if the experience was comparable to being aboard a seaborne vessel peculiarly bereft of a sea. The illusion began on the first platform which was designed, one author wrote, “to resemble *the bridge of a ship*,” with a poop deck and telescopes.<sup>19</sup> The theater, restaurants, and shops on that level conjured up the image, another observed, of “a whole spa town street transported aloft, among the yards, topmasts, and mizzens of a *sailing ship with no sails*.”<sup>20</sup> Still another writer described the vibrant climate of the first platform as a kind of “city hanging in the immense rigging of a steamer.”<sup>21</sup> The atmosphere enhanced the sensation as “[t]he wind gusts came fresh and sharp like the sea breeze” and the sky, as seen through the iron bars, resembled the “perspective of endless ocean.”<sup>22</sup>

Even the acts of climbing and descending the tower were couched in metaphors of oceanic adventure. Writer Edmond de Goncourt described the ascent in the elevator as producing “the *sensation of a vessel pulling out to sea*” [Fig. 4].<sup>23</sup> On the way down by foot, he wrote, “you feel as if you are an ant descending *the rigging of a warship* on



Figure 4: Cross section view of Otis Elevator on the Eiffel Tower, *La Nature*, May 4, 1889, volume 17, p. 360

which the ropes are made of iron.”<sup>24</sup>

Eiffel’s small cabin was not unlike the helm of the ship from which point a thousand voyages of the imagination could be launched. It even provided what might be called a necessary pre-condition of fantasy: the feeling of safety produced by indulging in what is primarily an *illusion* of danger. As one writer commented, “the deepest impression of a visit to the tower was the secure feeling when, once more, one stood at its foot under the long arches...[One was] surprised that it stood there, so immovably firm in spite of its airy lightness.”<sup>25</sup>

The experience of the tower apartment may have created for Eiffel and his occasional guests, an experience not unlike that recounted by the wealthy and eccentric character Des Esseintes in Joris Karl Huymans’s 1884 novel *À Rebours*. In enjoying his private dining chamber, which had been outfitted to resemble the cabin of a ship, complete with a mechanism to cause the room to rock realistically from side to side, he noted that it satisfyingly produced

...all the sensations of a long sea-voyage without ever leaving home; the pleasure of moving from place to place, a pleasure which in fact exists only in recollection of the past and hardly ever in experience of the present... the imagination could provide a....substitute for the vulgar reality of actual experience.<sup>26</sup>

However, unlike Des Esseinte’s illusory space replicating a ship’s cabin, the Eiffel tower’s chambers created an illusion of something entirely new and unfamiliar: a kind of flight through perfect space. Like the “space bullet” enabling travel to the moon in Jules Verne’s *De la Terre à la Lune*, it referenced a modern fantasy that had yet been iterated.



Figure 5: Second Platform Laboratory, from Gustave Eiffel's *Recherches expérimentales sur la résistance de l'air exécutées à la tour Eiffel*.

## II. Theater of Experiment

To understand the reason why people pay so much for laboratories which are actually ordinary places, one just has to consider these places as nice technological devices to invert the hierarchy of forces.

—Bruno Latour<sup>27</sup>

[A]rtistic feeling is not only served but completed by the scientific approach; the dream must know how to calculate.

--Victor Hugo<sup>28</sup>

Dreams of flight and aeronautic adventure were, perhaps, not new. What *was* new was the dream of an infinitely progressing science capable of calculating the path to such dreams. I have argued thus far that the Eiffel Tower concentrated, constructed, and gave form to a cultural fantasy of travel, exploration, and as-yet-impossible forms of flight. It can equally be said to have given form to another dream domain of exploration in nineteenth-century culture: science. Not only was the tower symbolically envisioned as a paean to the scientific era, an “*arc de triomphe* of science and industry,” according to one contemporary commentator but, even before it was erected, the tower had been conceived of by Eiffel as a kind of 300-meter high laboratory.<sup>29</sup>

In an era during which scientific discoveries in the laboratory were reordering society on multiple levels, the dream space of the laboratory held a seductive appeal. There, the exploratory impulse, writ large in such adventurous undertakings as Arctic expeditions, was expressed on a microcosmic scale. Historians have observed that the nineteenth-century laboratory was a locus of knowledge production and a place where one witnessed the phenomenon of “the staging of nature as spectacle.”<sup>30</sup> Not only was the Eiffel Tower outfitted with three laboratories adjacent to the tower-top apartment, where such activities would take place, the Eiffel Tower itself was utilized by Eiffel as an enormous technological

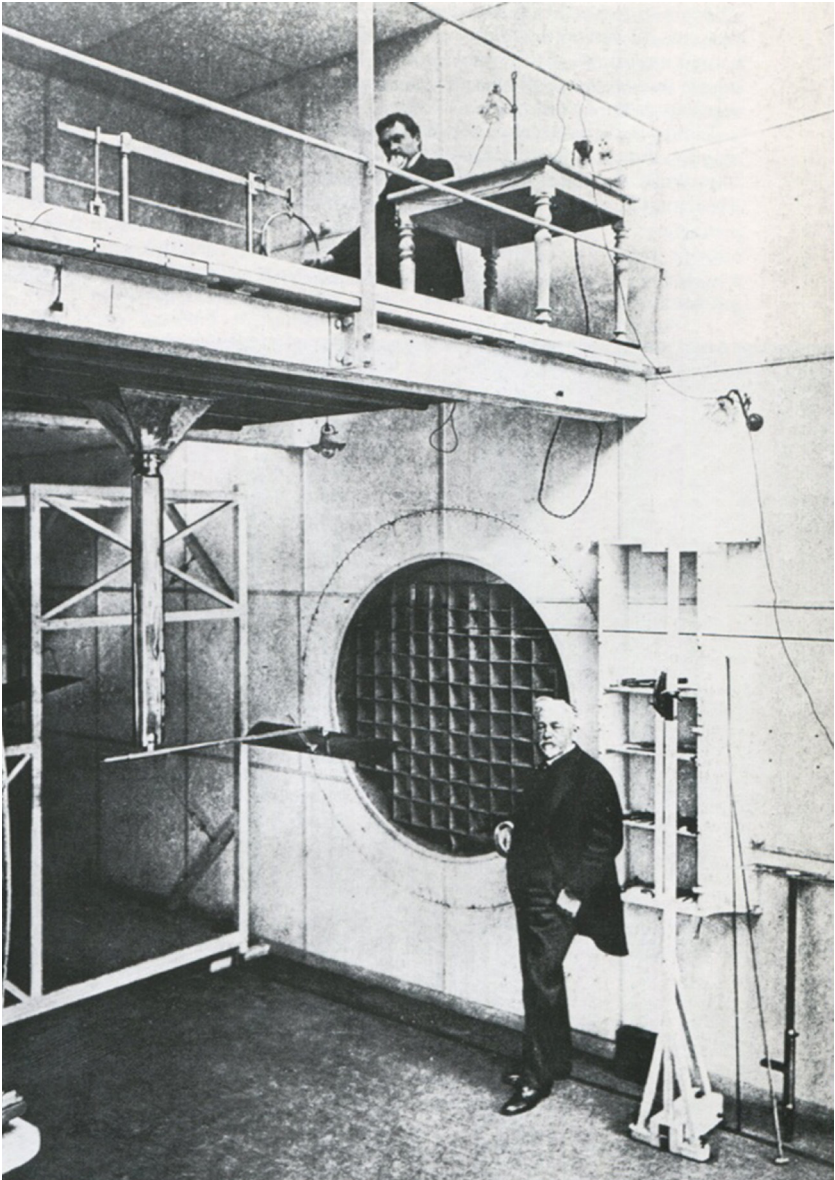


Figure 6: Gustave Eiffel in the experimental chamber of his aerodynamic laboratory, photogravure, reproduced in Loyrette, *Gustave Eiffel*, p. 209.

device—an experimental object designed in part to, in Latour’s words, “invert the hierarchies of forces” by testing and enabling the exploration of the fundamental principles of aerodynamics.

It is no mere lark that the tower became a kind of magnet for would-be scientific experimenters. The intensely public nature of the space, and the access it provided to extraordinary heights made it a particularly dynamic theater of experiment. There were the daredevil experiments, which attracted the attention of the popular press—such as the unauthorized 1912 parachute test by the French tailor Franz Reichelt that ended in his death—but also, and more frequently, much more sober scientific investigations were conducted in Eiffel’s tower laboratories into telegraphic communication, radio transmissions, Foucault’s pendulum, meteorology, and the mercury manometer.

Eiffel had always intended for the tower to serve as an epicenter for scientific inquiry. Indeed it was dominant in his initial justifications of the scheme. In an address delivered at a professional meeting before the tower’s completion, Eiffel enumerated the many ways the tower was a perfect instrument for scientific observation (meteorological and astronomical) and experimentation on such diverse subjects as “the falling of bodies through the air, the resistance of the air at various velocities, certain laws of elasticity, [and] the study of the compression of gas or vapors.”<sup>31</sup> The tower, when completed, was eventually used for all of these purposes, which Eiffel eventually documented in a publication entitled *Travaux scientifiques exécutés à la tour de 300 mètres de 1889 à 1900*.<sup>32</sup>

In a sense, the tower bears some affinity with another sensational project of 1891 with which Eiffel was involved. At the behest of his astronomer friend Pierre Janssen, Eiffel attempted to install an observatory and living space atop Mont Blanc that would enable Janssen to observe phenomena which he declared “are the most subject



to interference by artificial light and atmospheric absorption at lower positions, for example the study of the planets... the telluric spectrum and the normal solar spectrum, and finally, meteorological and physiological observations."<sup>33</sup> An observatory at such a height would, in short, make observation of space easier than from lower ground. However, given the icy conditions of Mont Blanc, Eiffel was unable to complete the project.

The claim that unique atmospheric conditions were available at the uppermost reaches of the tower mirrored Janssen's claims that unique atmospheric conditions were available at the top of the mountain. The critical difference is merely that while Mont Blanc was a natural formation, the Eiffel Tower was man-made technology. This distinction, however obvious, brings the tower more in line with that of the specialized laboratory instrument or experimental object: it was a massive technology for collecting data about meteorological effects, wind directions, and air resistance, at 1,000 feet. Eiffel became somewhat fixated exclusively on investigating these issues, transforming the tower into a giant apparatus for experimentation [Fig. 5]. In 1907, he published the results of his experiments involving dropping various objects from points on the tower in a tome entitled, *Recherches expérimentales sur la résistance de l'air exécutées à la tour Eiffel*.<sup>34</sup>

It is possible that Eiffel conceived of the tower-top laboratories as the initiatory site for a network of personal laboratories and theaters for experiment. Not only did instruments installed all over the crown of the tower transmit data to a meteorological laboratory on the ground, but Eiffel went on to install, in quick succession, weather stations in the towns of Sèvres (in his familial home), Beaulieu, Vacquet, and Ploumanach.<sup>35</sup>

It was his passionate interest in wind, air resistance, and aviation however, which engaged him almost exclusively in scientific pursuits from the early 1900s onward. Wind, of course, had always been central

to Eiffel's work as an engineer of bridges, towers, and other massive structures. The very structure of the tower itself was a powerful testament to Eiffel's sophisticated understanding of the principles of wind-resistance. There was, in 300 meters of iron lattice-work, very little surface for the wind to grab hold of.

His interest in wind exceeded that of the engineer interested in building sturdier structures, however. In the years following the tower's debut, it appears that he became almost obsessed with understanding, measuring, conquering, and reproducing the effects of wind. He eventually constructed two wind tunnels in France, one at the base of the Eiffel Tower in 1906, and another in Auteuil, and used his tunnels to test early airplane models [Fig. 6]. But beyond his scientific investigations, it was clear, by Eiffel's own testimony, that wind was central to his identity, both personal and professional. "During the entire course of my career," he wrote in his memoirs, "...wind was always an absorbing subject for me. It was an enemy against which I had to anticipate a constant battle..."<sup>36</sup>

By the early twentieth century, Eiffel had earned a reputation as a pioneer of aeronautical studies.<sup>37</sup> His work culminated in numerous publications of importance to the field, including the 1910 volume *The Resistance of the Air and Aviation: Experiments carried out at the Champ de Mars laboratory*.<sup>38</sup> In 1913, the Smithsonian Institution in America awarded Eiffel the second ever Langley Prize for aviation research (the first had gone to the Wright Brothers). In his presentation address, Alexander Graham Bell observed that Eiffel had at last given engineers "the data for designing and constructing flying machines upon sound scientific principles."<sup>39</sup> To paraphrase Victor Hugo, Eiffel had given calculus to the dream: the dream of flight.

## Conclusions

If we take the metaphor of the *tour* as a ship immersed in deep space but bereft of a sea, and add to it Eiffel's lifelong fascination with the wind and the air, I want to propose a reading of the Eiffel Tower as a kind of airship. In this sense, I think that we can read Eiffel's little eyrie at the top of the Tower as less a "*pied à terre*" and more as a "*pied en l'air*": a suspended cabin in this fantasized airship. Protected and private, it allowed the inhabitant to go head-to-head with his greatest enemy and his greatest object of fascination: the wind.

Ultimately, the realization of actual flight evaded Eiffel personally. His fascination with aerodynamics, however, directly contributed to the development of technology which enabled the earliest iterations of air travel. And his tower became incidentally linked to one of the breakthrough moments in aeronautics. In 1901, Brazilian-born aeronaut Alberto Santos-Dumont successfully circled around the apex of the Tower with the first motor-powered dirigible airship [Fig. 7]. The real airship twinned the fantasy airship and, in so doing, perhaps inspired Eiffel to pursue his aerial ambitions with even greater fervor. Through metaphor and experiment, metal towers and meticulous observation, Eiffel did, in some measure, achieve the mastery of wind he desired. And the cabin he built at the top of the tower, the dream apartment that was "both house and stars," was, if not the cockpit of an actual flying machine, at the very least, a critical launching point for realizing a cultural dream of flight.

## [Endnotes]

1. Jules Verne, *From the Earth to the Moon*, New York: Scribner, Armstrong & Co., 1874, 169.
2. Citation is quoted in Walter Benjamin, *The Arcades Project*, Cambridge, MA, Harvard University Press, 1999, 227: “Baudelaire in the introduction to his translation of Poe’s “Philosophy of Furniture,” which originally appeared in October 1852 in *Le Magasin des familles*.... Reproduced later in Charles Baudelaire, *Oeuvres complètes*, ed. Crépet, *Histoires Grotesques et Sérieuses par Poe*, Paris, 1937, 304.
3. Henri Girard, *La Tour Eiffel de Trois Cent Mètres*, Firmin-Diot et Cie: Paris, 1891, 91-95, 104-106, 110-111 reproduced in Philip Denis Cate, ed., *The Eiffel Tower, A Tour de Force: Its Centennial Exhibition: April 19-June 3, 1989, The Grolier Club, New York, July 6-September 3, 1989, The Mona Bismarck Foundation, Paris*, New York: Grolier Club, 1989, 57.
4. Henri Girard, *La Tour Eiffel*, 91-95, 104-106, 110-111. Emphasis added by author.
5. *Ibid.*
6. *Ibid.*, Emphasis added by author.
7. Benjamin, *The Arcades Project*, 152.
8. *Ibid.*
9. *Ibid.*, 20.
10. See for example Beatrice Farwell, *French Lithographic Imagery, Vol. 9, Historicism and Exoticism*, Chicago: University of Chicago Press, 1990, 21. She writes that, “exoticism has the same cultural value as historicism: the idea that a distant place is much more wonderful and stimulating than here parallels the feeling that a past epoch is much more wonderful than now.” Also see, Stephen Bann, “Face to Face with History,” *New Literary History* 29/2, 1998, 238. He describes the allure of “the otherness of the past.”
11. Stephen Bann, *Romanticism and the Rise of History*, New York, Toronto: Twayne Publishers; Maxwell Macmillan Canada, Maxwell Macmillan International, 1995, 103.
12. Guy Tomel, “Voyage au Pôle Nord en Ballon,” *L’Illustration*, November

- 1, 1890, 374-376.
13. For a famous failed attempt to reach the Arctic via hot air balloon, see Alec Wilkinson, *The Ice Balloon: S. A. Andrée and the Heroic Age of Arctic Exploration*, New York: Vintage Books, 2012.
14. Gaston Tissandier, *Histoire de mes ascensions récit de quarante aériens* (1868-1886), Paris, Maurice Dreyfous, 1882. Jules Verne, *Cinq Semaines en Ballon: un roman*, J. Hetzel et cie, Paris, 1863.
15. Jules Verne, *From the Earth to the Moon*, 169.
16. Joseph Harriss, *The Tallest Tower*, Bloomington, In: Unlimited Publishing, 2004, 82, referring to an article in *Le Temps* from March 1889.
17. Hughes le Roux, "Une Ascension de la Tour Eiffel," *L'Exposition de Paris*, No. 8, April 1, 1889, reproduced in Philip Denis Cate, ed., *The Eiffel Tower; A Tour de Force: Its Centennial Exhibition: April 19-June 3, 1989, The Grolier Club, New York, July 6-September 3, 1989, The Mona Bismarck Foundation, Paris*, New York: Grolier Club, 1989, 43.
18. Ibid.
19. Ibid., Emphasis added by author.
20. Emile Goudeau, "Ascension à la tour Eiffel," *Revue de l'Exposition Universelle de 1889*, vol. 1, Paris, 1889, 285 quoted in Henri Loyrette, *Gustave Eiffel*, New York: Rizzoli, 1985, 155.
21. Richard Kaufman, *Paris of To-day*, trans. from Danish by Olga Flinch, New York: Cassel, 1891, 287-292 (originally published as *Paris Under Eiffel Tornert*, Stockholm, 1889) quoted in Cate, *The Eiffel Tower: A Tour de Force*, 56.
22. Kaufman, *Paris of To-day*, 287-292.
23. Edmond de Goncourt, *Journal des Goncourt*, Vol. 8, 1889-91, Bibliotheque Charpentier, Paris, 1895, 50-51, 65-66 quoted in Cate, *The Eiffel Tower; A Tour de Force*, 51.
24. Goncourt, *Journal des Goncourt*, 50-51, 65-66.
25. Kaufman, *Paris of To-day*, 56.
26. Joris Karl Huysmans, *Against Nature*, trans. Robert Baldrick, Harmondsworth, England: Penguin Books, 1959, 33-35.
27. Bruno Latour, "Give me a Laboratory and I will raise the World," in *Science*

- Observed: Perspectives on the Social Study of Science*, K. Knorr-Cetina and M. J. Mulkay, London; Beverly Hills: Sage Publications, 1983, 141-170.
28. Victor Hugo quoted in David Harvey, *Paris, Capital of Modernity*, New York: Routledge, 2003, 255.
29. Vanessa R. Schwartz, *Modern France: A Very Short Introduction*, Oxford; New York: Oxford University Press, 2011, 100.
30. David N. Livingstone and Charles W. J. Withers, *Geographies of Nineteenth-Century Science*. Chicago; London: University of Chicago Press, 2011, 10.
31. Reading on behalf of Gustave Eiffel, Max de Nansouty, "Centenaire de 1789," *Le Genie Civil*, Vol. VI, No. 7, December 13, 1884, 108-109.
32. Gustave Eiffel, *Travaux scientifiques exécutés à la tour de 300 mètres, de 1889 à 1900*, Paris: L. Maretheux, 1900.
33. Pierre Janssen, "Un observatoire au Mont-Blanc," paper delivered during the annual meeting of the French Institute, Academy of Sciences on Monday, December 19, 1892, Paris, 1893, 16, quoted in Henri Loyrette, *Gustave Eiffel*, 205.
34. Gustave Eiffel, *Recherches expérimentales sur la résistance de l'air exécutées à la tour Eiffel*, Paris: L. Maretheux, 1907.
35. Loyrette, *Gustave Eiffel*, 206.
36. Gustave Eiffel, *Biographie*, Vol. 3, page 1, translated and quoted in Loyrette, *Gustave Eiffel*, 206.
37. John Anderson, *A History of Aerodynamics: And Its Impact on Flying Machines*, Cambridge; New York: Cambridge University Press, 1997, 273.
38. Gustave Eiffel, *La résistance de l'air et l'aviation; expériences effectuées au Laboratoire du Champ-de-Mars*, Paris: H. Dunod et E. Pinat, 1910.
39. Harriss, *The Tallest Tower*, 140.