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MARTYRS MADE IN THE SKY: THE *ZÉNITH* BALLOON TRAGEDY AND
THE CONSTRUCTION OF THE FRENCH THIRD REPUBLIC'S FIRST
SCIENTIFIC HEROES

by

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Following the balloon's invention in 1783, the French greeted the technology with enthusiasm, speculating extensively about its potential scientific and practical applications. However, the lack of progress in navigating against the winds discredited ballooning, and in the following decades it became the domain of spectacular forms of entertainment and of swindlers trying to defraud public subscriptions. All of this changed after the 1870–1871 Franco-Prussian War, during which balloons were used to breach the siege of Paris. This essay explores how the aeronautical community, led by the recently established Société Française de Navigation Aérienne, mobilized the memory of the war to transform the balloon into a symbol of a heroic republican science. Paramount in that process was the *Zénith*'s 1875 high-altitude ascent that killed two aeronauts—Joseph Crocé-Spinelli and Théodore Sivel. The tragedy reverberated beyond France's scientific community, and through popular acclaim the two aeronauts became the Third Republic's first scientific martyrs, anticipating the eventual apotheoses of figures like Claude Bernard and Louis Pasteur. The ballooning revival in the last third of the century helped strengthen the association between France and aeronautics, thus setting the stage for the country to acquire a central position in the field by the early twentieth century.

**Keywords: ballooning; aeronautics; French Third Republic;
scientific martyrs; Franco-Prussian War**

INTRODUCTION

A rare sunny February day in Paris—a Sunday, as luck would have it—and foreigners and French alike walk through Père-Lachaise's gates on Boulevard de Ménilmontant, stopping in front of the orientation map to jot down which tombstones to visit.¹ Some head towards

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1 Observations for this paragraph were made by the author on 22 February 2015.

the north-eastern end, where a protective barrier cuts short their hopes to plant a kiss on Oscar Wilde's tomb. A tour guide takes his group down Avenue Transervale no. 3, stops in front of Edith Piaf's grave, and tries to get them to sing 'La vie en rose'. Closer to the south-eastern end, people solemnly read the inscriptions on the monuments to those deported by Vichy. The cemetery's north-western end, bounded by Avenue Gambetta, is more deserted. Few go by sector 71, where a bronze effigy almost 2 m long depicts two shrouded corpses holding hands (figure 1). The sculpture, by Alphonse Dumilatre, is in the style of François Rude's famous effigy of Godefroi Cavaignac—stark, sombre realism evoking a sacrificial pathos. Resting between the corpses' heads is a withered bouquet whose colours likely never saw past December. Yet the bronze shows some wear on the right-hand thumb of the man closer to the path—hinting that maybe at some point in time people rubbed that thumb, perhaps as a gesture of affection, perhaps hoping that it would bring good luck. Judging by the inscription on the marble base, affection is the likelier interpretation, for these men were far from lucky:

CATASTROPHE DU BALLON LE ZENITH, 15 AVRIL, 1875
CROCE-SPINELLI et SIVEL
MORTS A 8600 METRES DE HAUTEUR

The two men depicted, Joseph Crocé-Spinelli and Théodore Sivel, died from anoxia (oxygen deprivation) during the *Zénith* high-altitude balloon ascent, the most dramatic event to result from a broader effort to transform ballooning into a heroic science in Third Republic France, thus endowing the chimerical pursuit of flight with an aura of respectability. By focusing on the lead-up to and aftermath of Crocé-Spinelli and Sivel's deaths, this article explains how men of science and ordinary citizens mobilized the memory of the Franco-Prussian War to legitimize the practice of scientific ballooning. The commemoration of Crocé-Spinelli and Sivel transformed the *Zénith* catastrophe into a 'heroic failure' that both mobilized the French aeronautical community and helped it to garner widespread support from the French populace.²

Although the *Zénith*'s high-altitude ascent did not produce major scientific findings, it still helped to crystallize the image of the aeronaut as a self-sacrificing servant of the new republic. Thus, the tragedy was an early manifestation of the Third Republic's 'cult of the hero', a phenomenon identified by Venita Datta as being especially important in the forging of French national identity in the new regime.³ Drawing on examples from the popular theatre and the mass press, Datta places martyrdom at the centre of this cult—a defining feature that is not surprising given that the regime itself was founded on France's catastrophic defeat in the 1870–1871 war. But this phenomenon extended beyond the boulevard theatres of Paris. As shown by Edward Berenson, it coloured the imperial imaginary of a broader French population that celebrated the colonial exploits of the likes of Pierre Savorgnan de Brazza.⁴

The cult of the hero shaped both urban entertainment and imperial adventures—two prominent fields in the articulation of Third Republic culture. It is not surprising, then, that it also shaped a third major field: science. Robert Fox has addressed the expanding public

2 Stephanie Barczewski, *Heroic failure and the British* (Yale University Press, New Haven, 2016).

3 Venita Datta, *Heroes and legends of fin-de-siècle France: gender, politics, and national identity* (Cambridge University Press, Cambridge, 2011).

4 Edward Berenson, *Heroes of empire: five charismatic men and the conquest of Africa* (University of California Press, Berkeley, 2010).



Figure 1. The monument over Crocé-Spinelli and Sivel's tomb in Père-Lachaise. Alphonse Dumilatre, *Monument à Crocé-Spinelli et Sivel*. (Photo by author.) (Online version in colour.)

stature of men of science after the Franco-Prussian War as they fused their scientific ambitions with the nation's *revanchiste* zeal.⁵ The celebration of men of science was especially expressive in civic funerals, like Claude Bernard's in 1878 and Louis Pasteur's in 1895.⁶ However, in periodizing the heroization of men of science, scholars have tended to emphasize the years following the left's victory in the 1877 legislative elections and the subsequent consolidation of the republic. This article focuses instead on the period preceding the 'republican triumph'.⁷ By unpacking the ways in which republicans mobilized scientific associations, the press and public demonstrations, it explains how they were victorious in their clash against the conservative government of Moral Order, whose monarchical and religious sympathies made it hesitant to celebrate men of science. The republican response to Crocé-Spinelli and Sivel's deaths was a prominent example of the transformation of scientists and inventors into heroes, a phenomenon that emerged in

5 Robert Fox, *The savant and the state: science and cultural politics in nineteenth-century France* (The Johns Hopkins University Press, Baltimore, 2012), pp. 227–273.

6 Christiane Sinding, 'Claude Bernard and Louis Pasteur: contrasting images through public commemorations', *Osiris* 14, 61–85 (1999).

7 According to François Furet's influential *Revolutionary France, 1770–1880* (Blackwell, Oxford, 1992), p. 537, by the closing years of the 1870s it was clear that '[t]he French Revolution was coming into port'. Amaud-Domonique Houte's recent synthesis, *Le Triomphe de la République, 1871–1914* (Editions du Seuil, Paris, 2014), offers a similar perspective in its periodization of the Third Republic: from 1871 to 1878 republicans worked on establishing foundations to the new regime, while from 1878 to 1885 they built and expanded.

the long nineteenth century, gained momentum after 1850 and became particularly intense in France after its humiliating defeat to Prussia.⁸

THE REPUBLICAN MOMENT IN BALLOONING

In the years following the Montgolfiers' invention in 1783, balloon ascents became a promising setting to conduct scientific experiments.⁹ Initially, these involved the expanding field of pneumatic chemistry, with balloon manufacturers debating the virtues of different 'gases' (hot air and hydrogen) to inflate the new machines.¹⁰ Soon after, aeronauts started using balloons to conduct atmospheric measurements.¹¹ However, the main interest in the new technology stemmed from its potential to navigate through the air, and, given the lack of progress in that domain, scientific enthusiasm for ballooning quickly waned. As such, except for the isolated scientific ascents conducted by Jean-Baptiste Biot and Joseph Louis Gay-Lussac in 1804, and Jean-Augustin Barral and Jacques Alexandre Bixio in 1850, by the nineteenth century balloons had become associated primarily with spectacular forms of entertainment and swindlers trying to make a quick buck through public subscriptions. They were relegated to places such as the Hippodrome, where members of traditional ballooning families, like the Godards and the Poitevins, made amusing ascents featuring all kinds of acrobatic manoeuvres, including the use of fireworks and live horses.¹²

Then, in the last third of the century, through the works of James Glaisher in England, and Camille Flammarion, Gaston Tissandier and Wilfred de Fonvielle in France, balloons started to be systematically conceived as tools for the construction of scientific knowledge. In the 1860s, Glaisher did his best to disassociate ballooning from Victorian entertainment and link it with rigorous scientific observation.¹³ Meanwhile, Flammarion's accounts of his balloon ascents were a prominent feature in the early stages of what Fox calls the golden age of the popularization of science, which ran from the 1860s to the early twentieth century.¹⁴ While Flammarion did not struggle to the same extent as Glaisher in countering accusations of adventurism and profiteering at the expense of science, he still trod a careful line in fostering a scientific identity.¹⁵

Crocé-Spinelli and Sivel's deaths happened just four years after the end of the Franco-Prussian War. A strategic blunder on Napoleon III's part, the war was catastrophic for France. On 2 September 1870, barely a month and a half into the conflict, Prussian troops forced the emperor's ignominious surrender at Sedan. News of that defeat soon reached Paris, and on 4 September a

8 Christine MacLeod, *Heroes of invention: technology, liberalism, and British identity, 1750–1914* (Cambridge University Press, Cambridge, 2007).

9 On the early history of ballooning, see Marie Thébaud-Sorger, *L'aérostation au temps des Lumières* (Presses Universitaires de Rennes, Rennes, 2009); Michael Lynn, *The sublime invention: ballooning in Europe, 1783–1820* (Pickering & Chatto, London, 2010); Mi Gyung Kim, *The imagined empire: balloon enlightenments in revolutionary Europe* (University of Pittsburgh Press, Pittsburgh, 2016).

10 Mi Gyung Kim, "'Public" science: hydrogen balloons and Lavoisier's decomposition of water', *Ann. Sci.* **63**(3), 291–318 (2006).

11 Marie Thébaud-Sorger, 'La mesure de l'envol à la fin du XVIIIe siècle', *Histoire & Mesure* **21**(1), 35–78 (2006).

12 Luc Robène, *L'homme à la conquête de l'air: des aristocrates éclairés aux sportifs bourgeois*, vol. 1 (L'Harmattan, Paris, 1998), pp. 258–312.

13 Jennifer Tucker, 'Voyages of discovery on oceans of air: scientific observation and the image of science in an age of "Balloonacy"', *Osiris* **11**, 144–176 (1996).

14 Fox, *op. cit.* (note 5), pp. 184–226.

15 Fabien Locher, 'De nouveaux territoires pour la science: les voyages aériens de Camille Flammarion', *Sociétés & Représentations* **21**, 157–173 (2006).

new republic was proclaimed. The Second Empire's fall and the presence of a foreign army in French territory sparked a feverish republican nationalism; instead of recognizing Napoleon III's surrender, the new Government of National Defence, led by Minister of Interior Léon Gambetta, decided to engage in all-out resistance. This turn of events threw a wrench into the usual script of warfare, transforming the conflict into an existential contest.¹⁶

By 19 September, the Prussians had laid a siege on Paris that would last four months. While Parisians were plagued by much of the turmoil that had marked sieges since the age of castles, they also found an ingenious solution to mitigate their isolation.¹⁷ Gaspard-Félix Tournachon (the photographer better known by his pseudonym Nadar) and the Godard fairground ballooning family transformed the city's train stations into balloon factories. Eventually, more than 60 globes breached the Prussian iron belt—an average of one every other day. Aeronauts transported correspondence from Parisian authorities in an effort to coordinate the national defence with the government, which had relocated to Tours. Balloons also carried millions of heartfelt letters from Parisians seeking to assuage the anxiety of friends and family desperate for news. The initiative was deemed so important that the government cut the supply of coal gas to private residences so that it could be preserved to inflate the globes. The use of balloons proved to be both a source of inspiration and a frustration, for they were at the mercy of air currents and the French never found an efficient way to establish a connection from the provinces back to Paris, relying on homing pigeons that increasingly faltered as winter settled.¹⁸ Nevertheless, they saw the siege balloons as one of the few relative heroic successes in a war marked by failures, and, because they rose above the Parisian skyline concurrently with the establishment of the Third Republic, people associated one with the other (figure 2).

The experience with the siege balloons fostered a change in attitude within the country's main aeronautical society, the Société Aéronautique et Météorologique. Before the war, the society's journal, *L'Aéronaute* (headed by the doctor Hureau de Villeneuve), exclusively published articles on heavier-than-air flight, arguing that a century of failed experiments had shown that lighter-than-air technology was not a promising path for flight.¹⁹ But many of the society's members recognized that balloons had been useful during the siege and saw it as a moral imperative to put the once-marginalized apparatus to use. Like much of the French scientific community, these members mobilized a discourse arguing that Prussia had defeated France with science and technology. 'May this sad experience be of use and show us that safety now is in the dissemination of the sciences', *L'Aéronaute* proclaimed in January 1871. The editorial went on to call for more investment in aeronautics, a field ignored by the Académie des Sciences.²⁰ The Société Française de Navigation Aérienne (SFNA) was born out of the Société Aéronautique from this patriotic context, officially

16 Michael Howard, *The Franco-Prussian War: the German invasion of France, 1870–1871* (Macmillan, New York, 1961); Stéphane Audoin-Rouzeau, *1870: la France dans la guerre* (Armand Collin, Paris, 1989).

17 Melvin Kranzberg, *The siege of Paris, 1870–1871* (Cornell University Press, Ithaca, 1950).

18 Contemporary accounts about the use of balloons during the siege of Paris include Gaston Tissandier, *En ballon! Pendant le siège de Paris, souvenirs d'un aéronaute* (E. Dentu, Paris, 1871); F.-F. Steenackers, *Les télégraphes et les postes pendant la guerre de 1870–1871: fragments de mémoires historiques* (G. Charpentier, Paris, 1883). For historical accounts, see Paul Maincent, *Genèse de la poste aérienne du siège de Paris* (Bellanger, Rouen, 1951); Victor Debuchy, *Les ballons du siège de Paris* (Editions France-Empire, Paris, 1973); Maurice Crosland, 'Science and the Franco-Prussian War', *Soc. Stud. Sci.* 6(2), 185–214 (1976); Patrick Luiz Sullivan De Oliveira, 'The Ascending Republic: Aeronautical Culture in France, 1860–1914', PhD thesis, Princeton University (2018), pp. 97–169.

19 'Faits divers', *L'Aéronaute*, May 1869, p. 79.

20 'Notre quatrième année', *L'Aéronaute*, January 1871, pp. 1–2.



Figure 2. The balloon became an emblematic symbol of French resistance and ingenuity during the Franco-Prussian War, making its way into the conflict's rich iconography. In this print, the balloon features as a heraldic charge at the top of Marianne's shield. J. Bocquin, 'Emblèmes patriotiques', c. 1870. The legend reads: 'The Balloon: I was exiled from Paris and it was the one that brought me news from the Capital'. (Library of Congress, Prints & Photographs Division, LC-DIG-ppmsca-02640.) (Online version in colour.)

establishing itself on 12 August 1872. The separatists, who made Joseph Crocé-Spinelli their provisional president, believed that the Société Aéro-nautique was not pursuing aerial navigation in a sufficiently scientific manner.²¹

21 'Statuts de la Société Française de Navigation Aérienne', *L'Aéronaute*, October 1872, p. 167.

Besides an interest in aeronautical science, ties between SFNA members were strengthened by their staunch republicanism. A police informer reported that, right before Crocé-Spinelli and Sivel's funeral, a 'distinguished member of the Institut' told him that the SFNA 'was a purely republican assembly under Gambetta's reins and that science was their lowest priority'.²² Members of the SFNA had been active members of the short-lived Ligue Anti-Monarchique and showed a deep concern over the fate of the republic under the conservative government of Moral Order.²³ In their writings and speeches, they articulated a scientific patriotism in service of the republican ideals, invoking how the siege balloons had rescued the technology from a hollow existence dedicated to trivial entertainment. Their lectures drew hundreds of men and women from all social classes—spectators who listened to scientific explanations of how balloons worked, and stories of dramatic ascents infused with republican boosting. For instance, Wilfred de Fonvielle was fond of blaming the Second Empire for causing ballooning to stagnate for decades and proclaimed that 'only the Republic permitted the aeronautical art to vigorously soar'.²⁴ Associating the republican form of government with aeronautics became a thriving trope in the following years.

The astronomer Jules Janssen was especially adamant in orienting the SFNA towards pursuing scientific ascents in the field of atmospheric science. The way he saw it, the French were naturally sympathetic towards ballooning, since it had been their invention, and the war had only intensified that sentiment, since balloons 'played a considerable moral role'.²⁵ The other major champion of scientific ascents was the physiologist Paul Bert, who today is better known for his profound anticlericalism that shaped the establishment of the 'école gratuite, laïque et obligatoire' during his political tenure in the Chamber of Deputies and as Minister of Public Instruction. But Bert was also a distinguished physiologist who conducted research on the bodily effects caused by changes in atmospheric pressure.²⁶ No one had used balloons for physiological observations at high altitudes since Glaisher in the early 1860s, and Bert saw an opportunity for France to take the lead in this field. The SFNA quickly responded to these appeals, and Bert experimented on Crocé-Spinelli and Sivel in pressure chambers in his Sorbonne laboratory. He noticed a correlation between oxygen intake and mental impairment, and recommended that the aeronauts take small oxygen balloons in their ascents. In 1878, Bert published his monumental *La pression barométrique*, which featured a thorough discussion of the *Zénith* ascents.²⁷ The study was the first major work to establish that low partial oxygen pressure was responsible for physiological problems experienced at high altitudes.²⁸

Finally, one should also take note of the gendered dimensions of aeronautical pursuits in the early Third Republic. One of the defining features of the aeronautical professional class up until the second half of the nineteenth century was the very visible role played by women.

22 Anonymous, 21 April 1875, BA/1023, Archives de la Préfecture de Police de Paris, Paris (hereafter APP).

23 'Adresse de la Ligue Anti-Monarchique à l'Assemblée Nationale' and 'Rapport', 19 May 1873, BA/1023, APP. Crocé-Spinelli wrote to Villeneuve early in 1874 expressing concern for the stability of the republican alliance. Crocé-Spinelli, letter to Villeneuve, 17 January 1874, SFNAé C9 (Crocé-Spinelli, 1), Centre de Documentation du Musée de l'Air et de l'Espace, Le Bourget (hereafter CD-MAE). According to police reports, Villeneuve was a patriotic republican who during the siege of Paris had operated an ambulance in his home: see 'Rapport', 26 December 1872 and 31 December 1873, BA/1122, APP.

24 'Rapport', 12 February 1873, BA/1082, APP.

25 'Assemblée générale du 26 novembre 1873', *L'Aéronaute*, February 1874, pp. 45–58.

26 Bert joined the SFNA on 29 October 1873. 'Séance du 4 Février 1874', *L'Aéronaute*, October 1874, pp. 134–139.

27 Paul Bert, *La pression barométrique: recherches de physiologie expérimentale* (G. Masson, Paris, 1878).

28 John B. West, 'Early history of high-altitude physiology', *Ann. NY Acad. Sci.* **1365**(1), 33–42 (2016).

While not a single woman featured among the six professional aeronauts working between 1783 and 1802, from 1803 to 1848 twenty out of the fifty new professionals were female.²⁹ This relative gender balance in the aeronautical profession during the first half of the nineteenth century is explained by ballooning being a family affair dominated by dynasties that jealously passed on their *savoir faire* to younger generations. Sivel himself was the son-in-law of the famous fairgrounds aeronaut Louise Poitevin.

However, one of the consequences of the SFNA's effort to differentiate itself from this earlier form of ballooning and develop a more legitimate scientific identity was the systematic exclusion of women from ascents, which began to be conceived within the framework of masculine scientific epistemic virtues—discipline, abnegation of luxuries, division of labour and careful observation. These virtues were essentially the privilege of white men who had the cultural, social and financial capital to expend in the form of self-sacrifice.³⁰ By 1905, an aeronautical journalist who wanted to see more female ascents could explain their absence only through innate differences between the sexes. Women did not make ascents because of 'their physiological state, in which a nervous system easily excited when confronted with the unknown predominates', and because 'a native timidity that increases with the kind of education they receive while piously protected under the maternal wing [did] not predispose [them] to taking bold initiatives'.³¹ In short, the crisis of masculinity that arose in France following its traumatic defeat in 1870–1871 meant that, in general, women were not conceived as being able to sacrifice themselves for science.³²

THE ZÉNITH'S ASCENT TOWARDS DEATH

In 1873 the SFNA began a series of scientific ascents, including a record-breaking one that lasted 22 hours and 40 minutes.³³ Balloons, which had been shunned by the Société Aéronautique, moved centre stage. In his opening speech for the 27 November 1873 general assembly, the SFNA president, Charles-François Hervé Mangon, focused exclusively on balloons, not once mentioning heavier-than-air flight. He explained how the war had changed the perception that balloons were frivolous forms of amusement, having instead ennobled France during the *année terrible*:

Paris had no more bread to eat, no more wood for heat, no more gas for lighting; Paris did not even have any more horses to take the countless dead—victims of hunger, victims of Prussian bullets and shells—to their final resting place, but Paris wanted to stay in communion with France, with the world. Paris deprived of everything, however, was able to dispatch a balloon nearly every day.

29 Robène, *op. cit.* (note 12), pp. 284–286.

30 The concept of epistemic virtues is elaborated by Lorraine Daston and Peter Galison in *Objectivity* (Zone Books, New York, 2007). As Rebecca M. Herzog explains in *Suffering for science: reason and sacrifice in modern America* (Rutgers University Press, New Brunswick, 2005), p. 11, 'The ability to be a sacrificial self ... was always structured by the ability to consent, itself dependent on one's embodied "location in the material world".' On the broader issue of scientific masculinities, see Erika Lorrain Milam and Robert A. Nye (eds), 'Scientific masculinities', *Osiris* 30 (2015).

31 G. Espitallier, 'Les femmes aéronautes', *L'Aéronautique*, 1 January 1905, p. 2.

32 Judith Surkis, *Sexing the citizen: morality and masculinity in France, 1870–1920* (Cornell University Press, Ithaca, 2006); Robert A. Nye, *Masculinity and male codes of honor in modern France* (Oxford University Press, New York, 1993).

33 Théodore Sivel, Joseph Crocé-Spinelli, Gaston Tissandier, Claude Jobert and Albert Tissandier, 'Ascension scientifique de longue durée des 23–24 mars 1875', *L'Aéronaute*, May 1875, pp. 140–149.

According to Hervé Mangon, balloons did more than just allow Parisians to maintain contact with the rest of France. Recalling Janssen's 2 December 1870 ascent aboard the *Volta*, in which the astronomer breached the siege of Paris with telescopes and then headed to Algeria to observe a solar eclipse, he stated that, 'Thanks to the balloons, Mr. Janssen proved to the admiring *monde savant* that our cruel enemies were powerless in paralysing French science, or even in slowing down the speed of its discoveries.'³⁴ Never mind that overcast skies in Oran prevented Janssen from making any observations; what mattered was fostering a shift in attitude.

The press covered the scientific ascents extensively, so expectations were high when the SFNA announced that it would organize a high-altitude ascent using the aptly named *Zénith*, a 3000 m³ balloon owned by Sivel. On 15 April 1875, Sivel, Crocé-Spinelli and Tissandier met up at the La Villette gasworks to take off. Sivel's daughter was there to bid her widowed father goodbye, and they shared a hug just before the '*Lâchez tout!*' sounded.³⁵ It was the last time that the two would embrace, for by the time that the balloon had landed only one of the aeronauts was still alive—Tissandier, who related the story of the ascent in various publications to the best of his abilities, given that he had lost consciousness for two hours.³⁶

According to Tissandier, the *Zénith* took off at 11.35 a.m., carrying in its gondola scientific instruments to study the atmosphere, including an aneroid barometer, a hygrometer and an electroscope, plus Bert's oxygen balloons (figure 3). At 7000 m, Sivel was showing visible signs of weariness and grew paler, but he recomposed himself and asked Tissandier to go higher, for he wanted to beat his previous altitude record and reach 8000 m. Tissandier, feeling lethargic because of the altitude and the freezing temperature of -10 Celsius, agreed to the proposal. Sivel proceeded to cut three bags of ballast and the balloon shifted to a quick ascent. By the time that they reached 7500 m, Tissandier could barely move. He described feeling no pain at all, but 'an inner joy' and indifference to the increasingly dangerous situation. The lack of oxygen made him delirious. Increasingly debilitated, Tissandier's memory of the events from hereon became even hazier. He remembered trying to reach for the oxygen but unable to lift his arm. Then, looking at the barometer, he saw the pressure at 280 mm and tried to yell out that they had breached 8000 m, but the words did not come out from his mouth and he fell inert at about 1.30 p.m.

At 2.08 p.m., Tissandier woke up and saw the balloon descending at a perilous speed. Gathering all the strength he could muster, he managed to cut off a bag of ballast to re-establish the equilibrium before passing out again. After a while he was shaken awake by Crocé-Spinelli, who asked to throw out even more ballast. Fading in and out, Tissandier saw Crocé-Spinelli throw out the respirator, blankets and more ballast, which caused the balloon to rise again. Tissandier regained consciousness at 3.30 p.m., the balloon once again plummeting towards the ground. His first reaction was to try to awaken his friends. But Sivel's eyes were dull and Crocé-Spinelli's half-closed. Both aeronauts had blood in their mouths. The *Zénith* finally landed at about 4.00 p.m. in the plains near Ciron,

34 'Séance générale solennelle du 27 novembre 1874', *L'Aéronaute*, January 1875, p. 8.

35 'Informations', *Le Figaro*, 17 April 1875.

36 Tissandier relayed this information to the SFNA in a letter the next day. 'L'ascension du 15 avril 1875', *L'Aéronaute*, May 1875, pp. 150–152. My description of the ascent is based on information conveyed in that letter and in his article 'Le voyage à grande hauteur du ballon "Le Zénith"', *La Nature*, 1 May 1875, pp. 337–344.

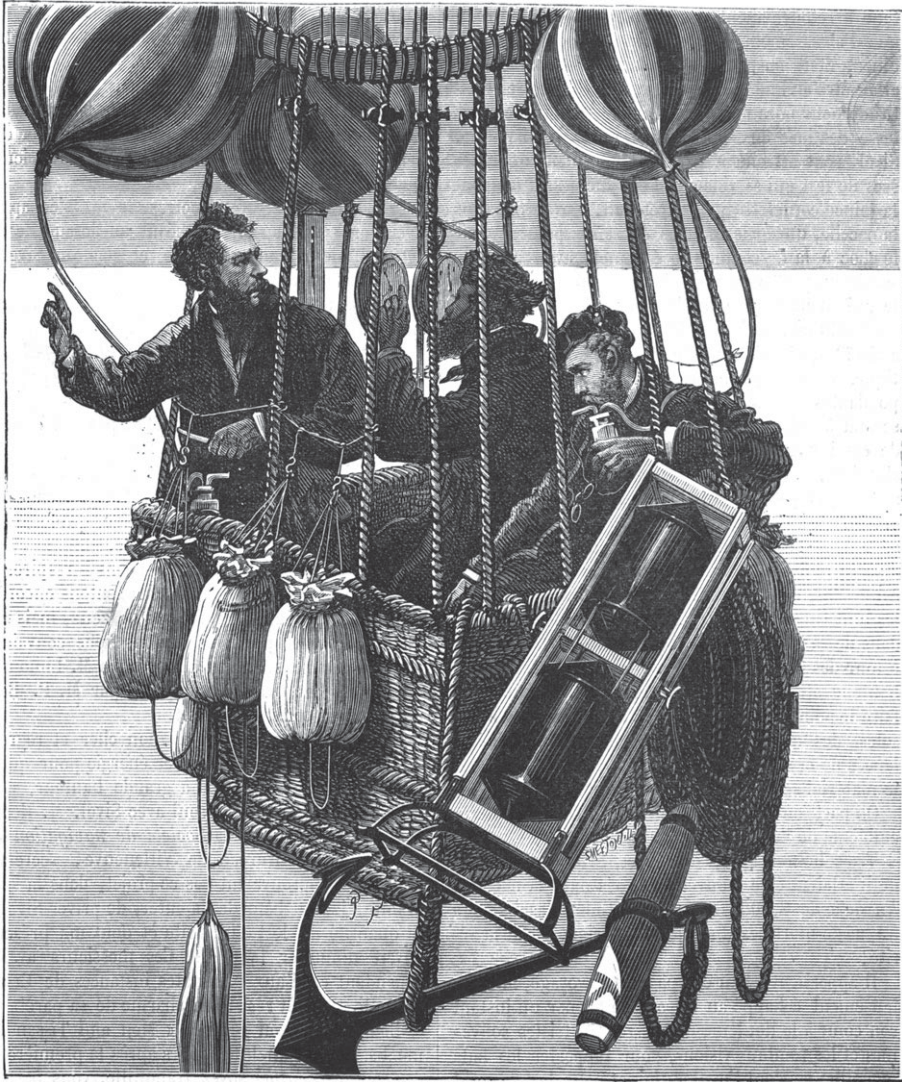


Figure 3. Depiction of Théodore Sivel, Gaston Tissandier and Joseph Crocé-Spinelli in *Zénith*'s fatal ascent of 15 April 1875. 'La nacelle du *Zénith* dans les hautes régions de l'atmosphère', *La Nature*, 1 May 1875, p. 337. (Conservatoire numérique des Arts et Métiers.)

250 km from Paris. By that time, nothing could be done to rescue Tissandier's friends. He had their bodies moved to a nearby barn and broke down sobbing.

Some conjectured that the expanding gas that escaped from the balloon's appendix as it ascended was responsible for the deaths, but, as Tissandier explained, Crocé-Spinelli and Sivel likely died due to the deprivation of oxygen caused by two consecutive and lengthy atmospheric depressurizations. An analysis of the control barometers made at the Sorbonne indicated that the *Zénith* had reached between 8540 m and 8601 m, and Bert claimed in *La pression barométrique* that the two aeronauts must have lost half of the oxygen in their

arterial blood. Tissandier thought that his survival was due to his lymphatic temperament. He regretted that his two friends might have survived if they had not suddenly lost their ability to move and reach for Bert's oxygen balloons. Bert stated that, even so, the balloons were of insufficient capacity, and that a letter he wrote warning Crocé-Spinelli of that fact must not have arrived in time.³⁷

BURYING AERONAUTS, SHAPING REPUBLICANS

The deaths of Crocé-Spinelli and Sivel had deep reverberations across French society. A burgeoning mass press began to make its mark in the early years of the Third Republic, which became a veritable '*civilisation du journal*' where readers were fascinated by the latest salacious *fait divers*.³⁸ The *Zénith* tragedy moved science beyond the rubric of scientific vulgarization and into this more popular space. Newspapers updated readers of every new detail that emerged after the tragedy, including descriptions of Tissandier's emotional breakdowns and a transcription of the last notes that the aeronauts jotted down in their log.³⁹ Formal expressions of collective mourning began to take place as early as 19 April, when the meeting at the Académie des Sciences drew in large crowds. Edmond Frémy, its president, struggled to hold back tears during a speech that set the tone for how the French were going to make sense of the aeronauts' deaths. He referred to them as 'martyrs of science' and said that they were 'two courageous soldiers who fell in the battlefield'.⁴⁰ However, the aeronauts' true apotheosis was to come the following day, with the funeral at Père-Lachaise.

When Crocé-Spinelli and Sivel died, France was in the midst of developing a long tradition of republican funerals. According to Avner Ben-Amos, state funerals—events that drew thousands of French men and women—did more than just reflect republican political culture; they were central in shaping it.⁴¹ Once the Third Republic consolidated itself in 1877 they became a recurring civic festival, with 82 state funerals taking place by 1940. The state funerals that happened between 1871 and 1877, during the Moral Order, were more understated and conservative, since President Patrice de MacMahon and Prime Minister Adolphe Thiers were hesitant about how the masses might react. Yet large non-state funerals of prominent republicans did occur during these years and served as teachable moments where the lives of the dead served to 'illustrate political virtues'.⁴²

Crocé-Spinelli and Sivel's funeral is not mentioned by Ben-Amos, which is all the more surprising given that he includes a section on how republicans used the funerals of scientists to foster an intimate relationship between science and patriotism at a moment when France was undergoing a crisis of confidence. Granted, the funeral was not a state

37 Bert, *op. cit.* (note 27), pp. 1060–1083.

38 Dominique Kalifa, Philippe Régnier, Marie-Ève Thérenty and Alain Vaillant, eds., *La civilisation du journal: histoire culturelle et littéraire de la presse française au XIXe siècle* (Éditions Nouveau Monde, Paris, 2012). See also Dominique Kalifa, *La culture de masse en France* (Découverte, Paris, 2001); Jean-Pierre Rioux and Jean-François Sirinelli (eds), *La culture de masse en France de la Belle Époque à aujourd'hui* (Fayard, Paris, 2002).

39 The accident was widely reported by *Le Rappel*, *Le Petit Journal*, *Le Figaro*, *Le XIXe siècle*, *Le Gaulois*, *Le Temps* and the *Journal Officiel de la République Française*.

40 Félix Caron, 'Les obsèques des victimes du Zénith', *L'Aéronaute*, June 1875, pp. 185–191.

41 Avner Ben-Amos, *Funerals, politics, and memory in modern France, 1789–1996* (Oxford University Press, New York, 2000).

42 *Ibid.*, p. 131.

ceremony, but it allowed republicans to articulate the civic importance of science before they had consolidated power and were able to officially celebrate men such as Claude Bernard and Louis Pasteur.⁴³ Although the French government did not sponsor the ceremonies, it did send representatives, while the municipal council of Paris—the republican stronghold in the country—took a more active role by having its president, Henri Thulié, give a speech at the grave. As such, Crocé-Spinelli and Sivel's funeral was an important event in setting the foundations for the celebration of deceased French men of science and explorers.

On 20 April, the Préfecture de Police, aware that funerary ceremonies would draw a sizeable crowd, dispatched policemen to observe their unfolding. According to police dispatches, by 10.30 a.m. 500 people had gathered at the Gare d'Orléans (known today as the Gare d'Austerlitz), where the two bodies rested. At 11.15 a.m. the liberal Protestant pastor Auguste-Scipion Dide gave a short oration to the crowd, which had grown to 5000 to 6000.⁴⁴ Ten minutes later the bodies were moved to their hearses, each featuring a large wreath of yellow immortelle flowers—a tradition in civic funerals.⁴⁵ Dide led the funeral procession with a young boy in school dress, followed by Tissandier and family members. Various officials also attended as representatives of the president and different ministries. The police estimated that 4000 people began the procession to the Père-Lachaise, while *L'Aéronaute*, a biased party, claimed that the crowd had grown to 20,000 by the time that it reached the cemetery (figure 4). Members of the scientific community and writers from all major newspapers participated in the cortege, as did esteemed republican figures such as Gambetta, Bert and Colonel Denfert-Rochereau (who earned the nickname Lion de Belfort for his valiant resistance during the Franco-Prussian War).⁴⁶

A reporter observed that the funeral was atypical in that no-one seemed indifferent to the dead aeronauts; even with the scorching sun people kept their hats off on the way to Père-Lachaise.⁴⁷ Writing in *Le Petit Journal*, Thomas Grimm explained that Parisians took the *Zénith* tragedy personally because it transported them back to 'those painful weeks of the siege, and we remembered our harrowing shudders on the days when daring aeronauts boarded balloons to bring the rest of France news from the starving capital determined to fight to the last cartridge'.⁴⁸ Processions articulate political narratives, and this case was no different.⁴⁹ Not a single religious site figured in the transport of the bodies from the Gare d'Orléans to Père-Lachaise. The route followed was Gare d'Orléans → Pont d'Austerlitz → Boulevard Contrescarpe (today Boulevard de la Bastille) → Place de la Bastille → Rue de la Roquette → Père-Lachaise.⁵⁰ The Place de la Bastille stands out as an unmistakably republican space within this trajectory, although we must keep in mind that this was also one of the most direct routes. Less obvious was the reaction that the cortege triggered at

43 Sinding, *op. cit.* (note 6).

44 Dide was a leading figure of the 'liberal pastorate', an important group in the construction of the democratic civil society that shaped Third Republic political culture. Philip Nord, *The republican moment: struggles for democracy in nineteenth-century France* (Harvard University Press, Cambridge, MA, 1995), p. 108.

45 Ben-Amos, *op. cit.* (note 41), p. 117.

46 'Rapport', 20 April 1875, BA/1023, APP; Caron, *op. cit.* (note 40), p. 187.

47 'La catastrophe du Zénith', *Le Figaro*, 21 April 1875.

48 Thomas Grimm, 'Les obsèques des aéronautes', *Le Petit Journal*, 22 April 1875.

49 For a quintessential example of 'reading' a parade, see Robert Darnton, *The great cat massacre and other episodes in French cultural history* (Basic Books, New York, 1984), pp. 107–144.

50 Caron, *op. cit.* (note 40), p. 186.



Figure 4. Crocé-Spinelli and Sivel’s funeral drew thousands of Parisians to Père-Lachaise. ‘Derniers épisodes de la catastrophe du Zénith’, *Le Monde illustré*, 1 May 1875, p. 268. (Gallica, Bibliothèque nationale de France.) (Online version in colour.)

Rue de la Roquette, where it was celebrated by workers who had just finished their shift. The memorialization of the aeronauts, and the accompanying commemoration of republican science, transcended class boundaries and was experienced as a moment of national unity.⁵¹

51 ‘La catastrophe du Zénith’, *Le Rappel*, 22 April 1875.

The ceremony at Père-Lachaise smacked of a republican catechism from beginning to end. Following his own political proclivities, Dide gave a long speech that abstained from religious commentary. Instead, he celebrated French science and placed the ‘civic courage’ displayed by the aeronauts on the same level as those who had sacrificed themselves during the recent war.⁵² At one point, a ‘*Vive la République!*’ sounded from the crowd.⁵³ Dide concluded his speech on a *revanchard* note, stating:

France is recovering and is bound to take all its revenges: moral, literary and scientific revenges. The memory of these two illustrious dead will follow us, will encourage us, and it is in following the example of those we mourn that we will contribute to the greatness of humanity by rebuilding the *patrie*.⁵⁴

Henri Thulié, president of the Conseil Municipal de la Ville de Paris, followed suit and, speaking in the city’s name, inscribed the aeronauts’ names in the ‘glorious annals’ of Paris, ‘the heroic city’.⁵⁵ The last orator was Villeneuve. Representing the SFNA, he gave a speech that assuaged the post-war crisis of confidence by drawing a self-assuring lesson from the *Zénith* tragedy. He concluded with a rhetorical tour de force that tied together the threads of patriotism, the cult of great men and national regeneration through science in a knot of a republican tradition harking back to the French Revolution:

Gentlemen, a nation that produces such men is not a nation beyond recovery, and its younger generation can once again repeat this stanza of its national anthem:

We shall enlist in the [military] career
When our elders are no longer there,
There we shall find their dust
And the trace of their virtue.⁵⁶

The decision to quote from ‘La Marseillaise’—the edifying stanza known as the *couplet des enfants*—should not be taken for granted, for the republican anthem had been banned under the Second Empire and was viewed with suspicion by the Moral Order until it was officially adopted in 1879. *Le Petit Journal* pithily summed up the day’s events: ‘Science and patriotism, therefore, contributed to the magnificence of Sivel and Crocé-Spinelli’s funeral service.’⁵⁷

Commemoration of the two aeronauts did not end with the funeral. The SFNA opened a subscription for the victims’ families, so responses extended beyond the rites that only those in Paris could experience. The commission in charge of the subscription worked its connections with newspapers and influential people, publicizing donor lists to encourage more donations.⁵⁸ Efforts paid off, for newspapers from Paris to Algeria and across the

52 ‘Les obsèques des victimes du Zénith’, *Le Temps*, 21 April 1875.

53 ‘Rapport’, 20 April 1875, BA/1023, APP; ‘Les obsèques des aéronautes’, *Le Petit Journal*, 22 April 1875.

54 ‘La catastrophe du Zénith’, *Le Figaro*, 21 April 1875.

55 ‘La catastrophe du Zénith’, *Le Rappel*, 22 April 1875.

56 Caron, *op. cit.* (note 40), p. 191.

57 ‘Les obsèques des aéronautes’, *Le Petit Journal*, 22 April 1875.

58 Procès verbaux of 24 April 1875 and 29 April 1875, in ‘Commission d’études et de contrôle pour la souscription en faveur des familles de Mm. Crocé-Spinelli et Sivel’, scrapbook, SFNAé C9 (Crocé-Spinelli, 2), CD-MAE.

political spectrum followed suit by opening their own subscription lists.⁵⁹ The radical *Le Rappel* donated 500 francs and collected another 2461.75 francs from students, railroad workers, Positivists and many individuals who simply signed themselves ‘a republican’ or ‘a worker’. Most contributions were in the 1–10-franc range, and some were as small as 50 cents. Working-class sentiment regarding the aeronauts can be gleaned from a letter from workers of a rolling stock factory in Batignolles included with their 63-franc donation. As they explained, while their resources were meagre, ‘whenever the opportunity presented itself the workers tended to assert their deep sympathy for anything that is directly or remotely related to the endeavours of science’.⁶⁰ The more conservative *Le Temps* also contributed with 500 francs but was able to collect significantly more from its elite audience (6672 francs).⁶¹ Even those in the German-annexed territories of Alsace-Lorraine pitched in, with the Strasbourg-based *Journal d’Alsace* collecting 4236 francs.⁶²

The subscriptions raised a total of 93,167.14 francs with accumulated interest. After subtracting expenses, which included the funeral, the deceased’s debts and 3000 francs allocated to a monument, the total came to 77,036.36 francs, which were distributed into life pensions between surviving family members.⁶³ People across France had felt the urge to contribute because of a mix of patriotic feelings, reverence for science, enthusiasm for ballooning and admiration for the aeronauts’ bravery.

But the memorialization of Crocé-Spinelli and Sivel was not devoid of controversy, especially in the realm of politics, where radical republicans tried to claim the aeronauts as their own. In his graveside speech, Thulié described the deaths of the two aeronauts as a huge loss to republican France, since it had been shown that ‘under the Republic the savant does not think, produce and expose himself in order to slavishly satisfy the vanities of a man or to give lustre to a kingdom, but to contribute to the *patrie*’s greatness’.⁶⁴ The conservative *Le Figaro* found the comments distasteful, stating that ‘The Republic, whatever [Thulié] says, had nothing to do with the *Zénith* catastrophe, which caused the same painful feeling on all parties. [At the funeral] we were in the presence of French mourning, not of republican mourning’.⁶⁵ The legitimist *Gazette de France* claimed that Thulié’s comments were ‘totally *foreign*, in tone and in substance, to the sadness of the place’, to which *Le Rappel* countered by asking why the *Gazette* thought that ‘when we speak of patriotism, we speak of foreign things’.⁶⁶ Finally, a writer for the monarchist *Le Gaulois* thought that Thulié ‘missed an opportunity to keep quiet’, since he spoke ‘at the very gates of eternity that opened to these two chosen souls words that revealed the eternity of republican nonsense’.⁶⁷

But we should not lose sight of the forest for the trees in the brouhaha concerning the political meaning of the *Zénith* tragedy. While radical republicans were adamant in

59 Many examples, including a note on the 24 September 1876 issue of Algiers’ *Le Mobacher*, are found in SFNAé C9 (Crocé-Spinelli, 1 and 2), CD-MAE.

60 *Le Rappel*’s lists run from the issue of 23 April 1875 to that of 19 June 1875. The letter from the workers is in the 23 April issue.

61 *Le Temps*’s subscription lists run from 20 April 1875 to 28 April 1875.

62 ‘Petites nouvelles’, *Le Petit Journal*, 29 May 1875.

63 ‘Rapport de la Commission chargée de la Répartition des Fonds de la Souscription’, folder 27, box 10, Tissandier Collection, Library of Congress, Washington, DC (hereafter TC-LC).

64 ‘La catastrophe du *Zénith*’, *Le Rappel*, 22 April 1875.

65 ‘La catastrophe du *Zénith*’, *Le Figaro*, 21 April 1875.

66 ‘Les on-dit’, *Le Rappel*, 23 April 1875.

67 Gaston Jollivet, ‘La science et les radicaux’, *Le Gaulois*, 24 April 1875.

claiming the victims as their own martyrs, those on the opposite side of the political spectrum did not disown Crocé-Spinelli and Sivel. On the contrary, the right depicted the aeronauts as national icons who stood above political divisions. Popular sympathy was so strong that not taking part in that sympathy was seen as a risky political move—a situation made evident by the government's eventual decision to support the installation of a monument for the victims. The Conseil Municipal pushed strongly for the initiative but was met with resistance from Ferdinand Duval, the Prefect of the Seine, who saw this as a case of 'paying a public tribute' concerning the state and not the city. In response, Councillor Luth argued that, in passing the measure, 'the City of Paris would fulfil a duty of gratitude by honouring the memory of these two victims of ballooning science, which provided so many services during the siege', while Councillor Taillander indicated that refusing the motion would have 'a very bad effect on public opinion'. The motion was put to a vote and adopted by the Conseil Municipal.⁶⁸

Duval, fearing that the Conseil Municipal was overstepping its prerogatives, brought the issue up with Louis Buffet, the Minister of Interior, explaining that, according to an 1816 royal ordinance, public tribute was a privilege of the state and could only be offered to those who had shown exceptional service, which did not seem to be the case with the aeronauts. Indeed, Buffet did not think that the aeronauts had done enough to 'justify a public tribute'—he saw them as 'victims of their recklessness rather than their dedication'.⁶⁹ But he decided that it would be better to issue the decree rather than risk public controversy. On 18 October 1875, President MacMahon signed the order approving the Conseil Municipal's resolution granting 'by the way of public tribute the free and perpetual concession of a lot for the tomb of Crocé-Spinelli and Sivel, killed during the 15 April 1875 scientific ascent'.⁷⁰ And so it was that popular opinion, followed by pressure from a radical municipal government and acquiescence by a conservative executive branch, made two aeronauts into the Third Republic's first official scientific heroes.

Dumilatre's monument was inaugurated on 25 March 1881, with speeches reiterating the usual rhetoric of scientific patriotism. Bert, a few months away from becoming Minister of Public Instruction, thanked the Conseil Municipal for bestowing the lot, which he saw as a sign that

maybe the death of these two aeronauts reminded [the Conseil] of those nefarious days when aeronauts were the only bonds linking Paris to the rest of armed France, when balloons breached, to the sound of the *Marseillaise*, the iron circle imposed by our enemies upon the intrepid city.

Bert concluded with an appeal for more of these funerary ceremonies, arguing that they encouraged the spirit of civic duty.⁷¹ Befittingly, when he died of dysentery after arriving in Tonkin to take over as resident general in 1886, the government made his funeral into 'a pro-colonial demonstration'.⁷²

68 'Procès-verbal, Séance du mercredi 5 mai 1875', in *Conseil Municipal de Paris, procès-verbaux* (1875), pp. 286–287.

69 Ministre de l'Intérieur, 'Note', 17 June 1875, F/1Ci/168, Archives Nationales, Pierrefitte-sur-Seine (hereafter AN).

70 Ministre de l'Intérieur, letter to Préfet de la Seine, 23 October 1875, F/1Ci/168, AN.

71 'Inauguration du monument élevé à la mémoire de Crocé-Spinelli et de Sivel', *L'Aéronaute*, April 1881, pp. 73–79.

72 Ben-Amos, *op. cit.* (note 41), pp. 229–231.

MAKING POETRY OUT OF AIR

The *Zénith* tragedy had a visible impact on French public life, but its effects extended to more intimate spheres of commemorating and mourning. People were inspired to write poems and send them to Tissandier. Most of these were amateur attempts at versifying that were never published. One writer explained that he took to the pen to express the feelings that the tragedy awakened in his entire town. He asked that Tissandier ‘accept [his verses] with indulgence; they are not a poetry masterpiece but the simple and true expression of the emotions of a 20-year-old heart in the face of such a deadly adventure’.⁷³

All the poems celebrated the aeronauts as martyrs who imparted the importance of the courageous pursuit of science to the French. As T. Véron triumphantly began his poem, ‘The legitimate, the true kings / Are the heroes of Science!’⁷⁴ Louis Baué and other writers placed Crocé-Spinelli and Sivel in the ranks of other ‘children of science who had fallen in the battlefield’, such as John Franklin, who went missing in an 1845 expedition to the Arctic, and David Livingstone, who died in Africa in 1873. Once the French became ‘aware that there are no limits to sacrifice’, they would ‘make the holy ascent / Towards moral greatness and perfection’.⁷⁵ ‘Excelsior’, a motto opening many poems, illustrated more than just the fearlessness that the aeronauts demonstrated in their scientific pursuit; it was a clarion call for the entire French nation.

The poets of the *Zénith* tragedy also found it easy to associate Crocé-Spinelli and Sivel’s sacrifices with casualties from the Franco-Prussian War. Following that defeat, scientific and technological progress was seen as a matter of national survival, so the martyrization of the aeronauts acquired a militarized dimension. As another versifier put it:

Families who weep for these noble victims,
France joins in your innermost pain,
Because your sons are also hers;
And does she not know that they defended her well,
While she struggled, overwhelmed, distraught,
Against the numerous Prussians.⁷⁶

The post-siege aeronauts were ‘Soldiers of science’ who ‘go to combat, counting on victory’, hoping to ‘proudly hold high [France’s] name’.⁷⁷ It was seen as no accident that Dumilatre’s monument to the aeronauts was placed next to the monument to the fallen soldiers of the Franco-Prussian War.

Among the poems that Tissandier received was Sully Prudhomme’s ‘Le Zénith’.⁷⁸ Far from an amateur poet, Prudhomme was one of the leaders of the Parnassians and went on to win the first Nobel Prize for Literature in 1901. He had initially studied engineering, and his ‘ardent desire to introduce the marvellous achievements of science and the elevated syntheses of modern speculation into the domain of poetry’ came from his scientific

73 Paul Roussette, ‘Le Zénith’, 4 May 1875, folder 6, box 19, TC-LC.

74 T. Véron, ‘À Crocé, Sivel et Tissandier: la catastrophe du *Zénith*’, 21 April 1875, Écoles, Association, Lignes 8 (Société Française de Navigation Aérienne II), CD-MAE.

75 Louis Baué, letter to Gaston Tissandier, 15 May 1875, folder 6, box 19, TC-LC.

76 Ad. DeNaucelle, ‘Les martyrs de la science’, 22 March 1881, folder 6, box 19, TC-LC.

77 F. Habert, ‘Ascension du Zénith’, 13 March 1880, folder 6, box 19, TC-LC.

78 ‘Le Zénith’ was first published in *Le Parnasse contemporain: recueil de vers nouveaux* (Alphonse Lemerre, Paris, 1876), pp. 393–404.

education.⁷⁹ The *Zénith* tragedy offered ample inspiration for him to reflect on this ethos, and the poem that it inspired was an early articulation of the uplifting vision of modern science ‘uniting humanistic and scientific mentalities’ that he would develop more thoroughly in the 1890s.⁸⁰

Running to 45 stanzas, ‘Le Zénith’ is an epic hymn to the modern scientific spirit. The first part discusses the secularization of nature, with ‘the expanded real world’ pushing away ‘the heavens’ as ‘the great whip of lightning brandished by Reason’ chases away ‘the herd of crude idols’. After a section describing the preparations for the ascent, Prudhomme presents the reader with a powerful portrayal of the scientific aeronaut as hero. The aeronauts feel no fear; they ascend inspired by the pursuit of truth. Yet courage is not enough to get over the physical challenges posed by the lack of oxygen. As Prudhomme puts it, the aeronauts experience a struggle between the flesh and the mind—‘The flesh, fated to the ground, begs for the descent, / The winged mind cries for an infinite *sursum* ...’. Part three ends with a riveting dialogue between the two entities—the poem’s climax:

Master, she [the flesh] says, enough! My anguish is oppressing me ...
 – Higher! he [the mind] replies. And unburdened of a long stream of sand
 The crew rushes up to the deep sky.
 – Oh master, what torment your willpower inflicts on me!
 I succumb. – Higher! – Mercy! – Higher, I say.
 And the poured sand prompts a new leap.

– Grace, my blood overflows and I have no more breath.
 – Higher! – Stop us, master, I am barely alive ...
 – Ascend. – Oh! cruel one, still? – Ascend, slave! – Still? – Yes.
 But finally exhausted the flesh folds and collapses,
 And like a sacred fire where the priestess burns,
 The abandoned spirit falls unconscious ...

The dialogue dramatically stages the aeronauts’ foolhardiness, but it does not condemn. Instead, the poem celebrates the triumph of the will at the limits of human life, and the making of scientific martyrs whose minds subdued the base needs of the flesh in search of a greater truth.

The poem’s last section discusses the ascent’s legacy, and Prudhomme argues that, while the aeronauts suffered a physical death, in doing so they became immortal. They would spend the rest of their days inspiring youth ‘whose thirst for honour is never quenched’. The novelty of the aeronauts’ courage, Prudhomme concludes, would have even earned the admiration of ‘the heroes of antiquity’. In celebrating the aeronauts’ dedication to science, Prudhomme put into practice the vision of Auguste Comte’s Positivist Calendar, where each day and month named after a historical figure offered a kind of sacro-secular inspiration.⁸¹ The spiritual dimension of Crocé-Spinelli and Sivel’s martyrdom was heightened by the fact that, as with the martyrs of roentgenology, the forces that killed them were invisible.⁸²

79 Camille Hémon, *La philosophie de M. Sully Prudhomme* (Félix Alcan, Paris, 1907), p. 13.

80 Fox, *op. cit.* (note 5), p. 270.

81 John Tresch, *The romantic machine: utopian science and technology after Napoleon* (University of Chicago Press, Chicago, 2012), pp. 253–286.

82 Herzig, *op. cit.* (note 30), pp. 85–99.

CONCLUSION

The commemoration of the *Zénith* martyrs was a crucial piece in constructing a patriotic history of balloons. Numerous books on the topic appeared between 1870 and 1890.⁸³ Their narrative usually culminated with the *Zénith* tragedy after passing through heroic moments such as the Franco-Prussian War's Paris siege balloons, and a constant feature was the association of useful ballooning (scientific and military ascents) with republican regimes, and trivial ballooning (ascents for spectacle and speculation) with the imperial periods. For example, Wilfred de Fonvielle's 1876 *Aventures aériennes* sidestepped the issue that the balloon had been invented under the *Ancien Régime* by emphasizing how the Montgolfiers' first public demonstration happened in front of the Vivarais's Estates General. He explained:

It is worthy of notice that it was not royal princes and peers of the realm who enjoyed this beautiful spectacle. It was given for the first time, on the eve of 1789, to one of the few deliberative assemblies that despotism had not destroyed in that old France, where since the Gauls, our happy ancestors, there persisted an old leaven of freedom.⁸⁴

Fonvielle also fostered the association between ballooning and republicanism, discussing in detail the creation of the *Compagnie des Aéroliers Militaires* under the First Republic and condemning Napoleon for dissolving the ballooning unit.⁸⁵ Tellingly, thanks to the pressure of politicians such as Gambetta and Bert, the Third Republic revived this initiative, founding the *Établissement d'Aérostation Militaire* at Chalais-Meudon in 1877 in the same location as its predecessor. The new institution featured both a laboratory to pursue flight technology and a training school for ballooning units that operated both in mainland France and in the colonial theatre.

Gaston Tissandier, the *Zénith*'s sole survivor, also worked on embedding aeronautical pursuits in the republican imaginary through books and articles in his popular scientific publication *La Nature*. His 1879 *Les martyrs de la science* is a tableau of the personalities whose discoveries and inventions crowded the nineteenth-century's scientific imagination.⁸⁶ The book presents itself as an edifying history, drawing examples of scientific martyrs from all of humanity, yet, unsurprisingly, it had a nationalist bent with more than half of those mentioned being French.⁸⁷ As one reviewer stated, the book's origins were probably to be found in the *Zénith* disaster, and it was a 'pious tribute to the memory of those he was so close to sharing the fate'.⁸⁸ Aeronauts are displayed alongside other famous scientific martyrs and anonymous workers who died in industrial catastrophes, testifying to the belief that the pursuit of science could transcend class divisions and serve the broader national interest.

83 Marie Thébaud-Sorger, *Une histoire des ballons: invention, culture matérielle et imaginaire, 1783–1909* (Éditions du Patrimoine, Paris, 2010), p. 34.

84 W. de Fonvielle, *Aventures aériennes et expériences mémorables des grands aéronautes* (E. Plon et Cie., Paris, 1876), p. 15.

85 On military ballooning under the First Republic, see Jacques Godechot, 'L'aérostation militaire sous le Directoire', *Ann. Hist. Révol. Fr.* 8(45), 213–228 (1931); Patrice Bret, 'Recherche scientifique, innovation technique et conception tactique d'une arme nouvelle: l'aérostation militaire (1793–1799)', in *Lazare Carnot, ou le savant-citoyen: actes du colloque tenu en Sorbonne les 25, 26, 27, 28 et 29 Janvier 1988* (ed. Jean-Paul Charnay), pp. 430–451 (Presses de l'Université de Paris-Sorbonne, Paris, 1990).

86 Gaston Tissandier, *Les martyrs de la science* (Maurice Dreyfous, Paris, 1879).

87 Of the 126 individuals in the index, 69 are French, followed by 14 Englishmen and 8 Germans.

88 Edmond Perrier, 'Revue des sciences: *Les martyrs de la science*', *Le National*, 21 November 1879.

In 1883, the invention's centennial offered another opportunity to celebrate the history of ballooning and cultivate its identification with France. Celebrations were held in Paris and Annonay, which, according to one journalist, saw the most patriotic and lively spectacle in its history with the inauguration of a monument in honour of the Montgolfier brothers.⁸⁹ Orations followed the usual pattern: references to the siege balloons and the *Zénith*, praises to the patriotic self-sacrifice of aeronauts, and assertive calls for further research into aeronautics.⁹⁰

This conflation of fortuitous events—the siege of Paris, the SFNA's embrace of balloons, the publicized martyrdom of two of its members, the revival of military ballooning and the Montgolfier centenary—helped construct a *lieu de mémoire* that inscribed technical knowledge of ballooning and a generalized aspiration for controlled flight in a patriotic republican discourse.⁹¹ It crystallized the sense that the first flying machine had been a French invention, that finding a solution to aerial navigation was a French calling and that pursuing that solution fostered republican values. The French encountered this message through conferences, newspapers, books and a myriad other avenues. Images d'Épinal representing the fated end of the *Zénith* ascent proliferated right after the tragedy.⁹² Later, at the turn of the century, French schoolchildren could boast colourful notebook covers that commemorated the *Zénith*'s tragic ascent as one of the key moments in the French quest for flight (figure 5).

Popular responses to the deaths of Crocé-Spinelli and Sivel indicated a shift in how the French perceived those who ventured up in the air and concerned themselves with aeronautics in general. Indeed, following the Montgolfier brothers' invention and throughout the nineteenth century, balloon ascents (whether blatantly for entertainment or with the declared purpose of attempting navigability) drew the interest of crowds throughout Europe and the United States, and there had been previous examples of aerial martyrdom, such as the deaths of Pilâtre de Rozier and Pierre Romain in 1785. However, the seeds for the image of the aeronaut as a national hero were truly sown through the practical uses of balloons during the Franco-Prussian War and with the emergence of a patriotic rhetoric that alerted the French to the urgency of scientific and technological progress if France was to remain a leader on the world stage. Placed within this context, the deaths of Crocé-Spinelli and Sivel were pregnant with potential meaning to be explored not only by republicans but by all who championed France's nascent aeronautical science. The scientific findings of the *Zénith* voyages did not in themselves do much to advance the solution to aerial navigation, but transforming aeronauts into national heroes granted a refreshing legitimacy to a practice that had throughout the century become the butt of jokes, thus contributing to the sense that the pursuit of flight was a French calling bound to be realized under the framework of a republican society. In that way, the SFNA and the *Zénith* tragedy were central in constructing the early twentieth-century image of France as 'the "winged nation" par excellence'.⁹³

89 'Le centenaire Montgolfier', *Le Nouvelliste de Lyon*, 12 October 1883.

90 See speech transcripts in folder 7, box 7, TC-LC.

91 Thébaud-Sorger, *op. cit.* (note 83), p. 11.

92 'Les accidents de l'aérostat' (Imagerie de P. Didion, Metz, n.d.), Département d'Estampes, Musée Carnavalet, Paris.

93 Robert W. Wohl, *A passion for wings: aviation and the Western imagination, 1908–1918* (Yale University Press, New Haven, 1994), p. 2.



Figure 5. A child's notebook cover depicting the deaths of Crocé-Spinelli and Sivel aboard the *Zénith*. 'Les moyens de locomotion de l'homme', Collection J. Garnier, undated. (Tissandier Collection, Library of Congress.) (Online version in colour.)

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