

# AIRPOWER VISIONARIES



*A Cautionary  
Tale for  
Modern Times*  
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**M**an has always had a keen desire to push the boundaries of his physical world. One such boundary was to fly and to reach for the stars, which came true during the 20<sup>th</sup> century. But such desires were nurtured by the dreams of the visionaries of the 19<sup>th</sup> century, like H.G.

Wells, in their writings.<sup>1</sup> In time the visions of the future passed from fiction to reality. Still there was little to guide mankind other than the phantasmagorical that had to be rendered to reality.

It was also a time when the world was starting to become a smaller place. New wonders and modern marvels such as the airplane and wireless telegraphy served to shrink time and geography. It was a heady time for technology and scientific innovation was seen as a panacea for solving all man's problems and easing strife, burden, and labour. There was little contextual experience or history guiding this new fantastic technological revolution. It was akin to receiving a gift in a box where the plans or the blueprints were sketchy and lacking detail. Final assembly was often left to the imagination of the beholder. Thus the dreamers and visionaries were necessary to guide the placement of new innovations in context of modern times.

New technology, though, ultimately influenced the battlefield of World War I and in the end it influenced man's post-war thinking. Modern military aviation was still a relatively new element and was not yet considered a decisive factor in the conduct of war. Many saw air power as an aberration of war. It was not a decisive factor in winning the war, and consequently, its utility was questioned by the wider establishment.

On the other hand, visionaries such as Giulio Douhet saw the land battles of the Great War largely as unprofitable ventures that

were locked in virtual stalemate. The human cost in casualties and investment of national treasure was enormous. Many felt the war leadership of the day was incapable of dealing with or managing new technologies on the battlefield. The horror was telling;<sup>2</sup> more men were killed on the western front in the First World War than on the same front in the Second World War.<sup>3</sup> This left the survivors to contemplate and wonder how to avoid this morass in future.

**“And it shall come to pass afterward, that I will pour out my spirit upon all flesh; and your sons and your daughters shall prophesy, your old men shall dream dreams, your young men shall see visions.”**

- Joel 2:28 (King James Version)

Giulio Douhet, Billy Mitchell, and Sir Hugh Trenchard are often considered to be visionaries and founding fathers of modern air strategy. Their musings, writings, and actions greatly influenced the concepts of modern air warfare. Simply, there was no one else to rely on for opinion or expertise.

There were only a privileged few who had experience in the application of “air power.” The age of modern air power was brand new; an open field of human endeavour, and these visionaries were attempting to place air power in the context of a world of rapidly evolving technological and scientific change. But were visionaries at the onset of air power's beginning useful or were they a hindrance? The answer to that question is likely both!

The experience of the early 20<sup>th</sup> century visionaries serves a cautionary tale, though, for those espousing “visions” in our time. General Giulio Douhet, author of the landmark work *The Command of the Air* and Colonel William (Billy) Mitchell's *Winged Defense* were instrumental in establishing the bounds of future air policy and strategy in the development of modern air forces. Douhet was one of the first proponents of the modern air force as an independent arm in a nation's defence and security paradigm. He saw that technology promised innovative solutions at a minimum dollar and human capital cost while

concomitantly maximizing a nation's security and power projection. Thus Douhet's and other visionaries' work set the modern foundation for making defence policy requirements based on the lowest common denominator of the "cheapest bang for the buck" and framing the funding debates amongst the needs of army, navy and air forces of the day.

Modern defence managers must have a sense of déjà vu as many defence arguments and requirements today are also framed from the lowest common denominator of the cheapest bang for the buck, that is, the lowest cost framework. So logically, the eventual employment of a weapon, system, or organization, must also be framed doctrinally on a lowest cost model if it is to have any meaningful application and success. The lowest cost framework ultimately required defence establishments to defend their positions—visions, if you will—in the public eye through annual defence appropriations and budgetary cycles. The public will be looking at a defence organization or procurement from that perspective, and thus, will be skeptical of any change if it requires additional investment or if it deviates from the promise of the cheapest bang for the buck, or requires any additional expense. Defence based on the cheapest bang for the buck is a reality.

## THE EVOLUTION OF A MODERN SPENDING FRAMEWORK

Douhet's *The Command of the Air* and Mitchell's *Winged Defense* provide some clues to the evolution of a modern spending framework. Both works were not only profound but were also controversial. Both authors fought passionately for the very existence of the modern air force as an independent arm at a time when defence resources were slim and not much was available to go around the table. Both felt that others were bound by tradition.<sup>4</sup> But many defence chiefs thought the air element was an inconsequential and indecisive tool on the battleground. The prevailing thought was that air power was an aberration of modern warfare. As such, air power, or more pointedly, an independent air force was an unnecessary adjunct to national defence.



**GENERAL GIULIO DOUHET**

Douhet's story is compelling. Surprisingly, he recognized early on in his studies the limitations of national budgets on defence funding. He deduced that resources were not limitless. But this deduction pitted him against his army and naval rivals in the coming trade-offs and budgetary fights for a share in the post-war economy. Douhet posited that defence requirements were choices that must be made as inputs to appropriate defence structures whose outcomes were outputs of national defence or security. Douhet structured his arguments for the creation of an independent air arm and the need for its separate funding in an already shrunken resource base. He strongly argued that auxiliary air power of other arms was superfluous, and if desired, auxiliary air power should be funded from within the existing budgets of the other arms. Thus he staked the ground for the establishment of an independent air arm at the expense of the army and naval chiefs of his day.<sup>5</sup> He was not a popular man, to say the least. Douhet had it right, though. The debate had to be focused on costs and resources, but he was wrong to conclude that air power alone



**COLONEL WILLIAM (BILLY)  
MITCHELL**

provided a nation with an all-encompassing cost solution to its leading defence requirements.

Mitchell's thesis in *Winged Defense* arrived at the same conclusion.<sup>6</sup> His arguments parallel Douhet's and some have suggested that Mitchell "borrowed" much from Douhet.<sup>7</sup> But the truth is many visionaries were not necessarily originators of original thought. The period following the Great War was an era where ideas were likely borrowed or shared amongst an international community of World War I veterans who sought to apply the grim lessons learned.<sup>8</sup> Their main contribution then was to be champions of air power and stimulators of an ongoing debate in the promotion of an independent air force.

## CONSEQUENCES & PROBLEMS

The problem was the bomber was being doctrinally positioned as the pre-eminent weapon of the modern air force. It was to operate in mass and the indigenous defensive armament of the bomber stream was to provide

a measure of protection. It was being positioned as a cheaper security option relative to other services. The bomber was touted as the weapon that "would always get through!" The perfect plane was the battle plane, one that would carry sufficient bomb load to dislocate an enemy while having sufficient weight of arms for its own self-protection. Pursuit aviation was considered a waste of resources. All these arguments had a certain appeal to a war-weary public and many a cash-strapped government with fragile economies in the wake of the Great War. Thus the "lowest cost framework" was driving the needs of a modern air force establishment that doctrinally set the bomber in the highest firmament at the outset of its birth.

So on the one hand it may be argued that the visionaries' position added value by focusing the discussion on resources and costs, but on the other hand, the conclusion leading to the preeminence of the bomber at the expense of pursuit aviation may have also led to undue future costs in the loss of human lives and treasure that were unknown until the next war. This suggests for all their effort, there is a very real problem with "visionaries." They did not have all the answers at the time when future long-term defence decisions were being made. Their conclusions were based on sparse data and minimal experience. The introduction of new technologies, their true costs, and the passion of leading change tended to blind side many. Vision tended to run interference with common sense. It seemed that it was more important to stake a service position and "duke it out" with other services, rather than taking a holistic approach to a nation's defence by placing it in proper perspective, working out the details and managing a defence portfolio cooperatively for all army, navy and air force requirements. There was certain arrogance amongst the services that tended to limit the discussion and set lines in the sand as each service maintained that it held the supreme role for a nation's defence.

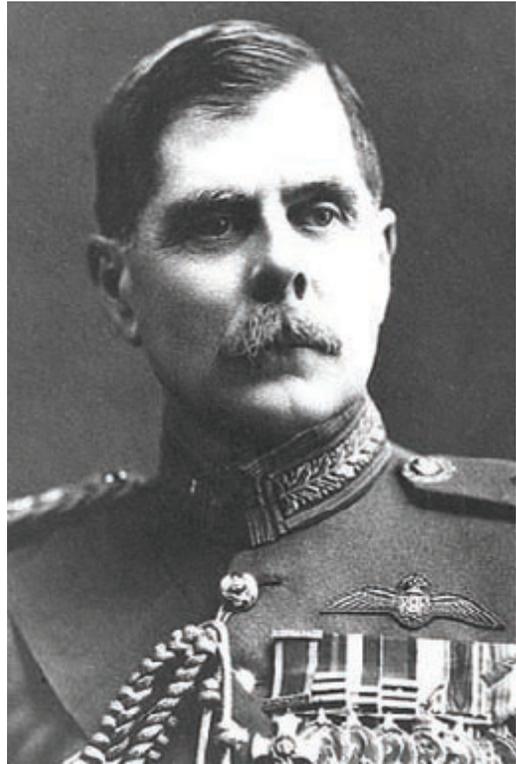
But Douhet, Mitchell and others saw the air as new and fertile ground in this milieu. The medium of the air was the grist for the

development of modern warfare where many visualized that decisive battle would indeed be fought. There were no other champions but they who had experience of air operations, and in their opinion, armies and navies were dinosaurs and should be relegated to secondary roles. This was a decisively revolutionary and provocative opinion being put forward to the defence establishment of the day, one that would place many at odds with their superiors and other defence chiefs, and one that would eventually lead to Douhet's and Mitchell's court martials.<sup>9</sup> It tended to raise the hackles of many and stiffened resistance to change.

The visionaries argued for the needs of an independent air force. But their arguments had to have a credible defence/security mission if they were to have any success. Douhet saw his mission as aerial artillery in a continental duel amongst the great European powers.<sup>10</sup> Mitchell fought for the creation of a balanced air force with a role in coastal defence.<sup>11</sup> Trenchard saw the role of aerial policing of the empire.<sup>12</sup> Regardless, many recognized the value of air power and many were willing to fall on their swords for its place in a nation's defence arsenal.

## LESSONS

The Great War, the war to end all wars, had a tremendous impact on national psyche. A whole generation was left scarred by the experience. That generation vowed never to repeat the process or endure such carnage on such a scale ever again; physically, mentally, spiritually or emotionally.<sup>13</sup> Consequently, the experience of the First World War transfixed national psyche on its horrors. Thus the mere threat of war had the potential for many social and economic ramifications.<sup>14</sup> Many nations were war weary and were in no mood for the wanderlust of creating or expanding defence establishments. But nations were open to arguments that limited their costs or sought opportunities that would either prevent war or diminish the duration of the unwanted horror. So there was a window of opportunity for air power "visionaries" to stake the claim for an independent air force. Governments were being corralled toward solutions for their defence requirements or face the attendant



**SIR HUGH TRENCHARD**

costs in social breakdown, social disorder, internal unrest, violence, or revolution. They were also being corralled in managing their defence spending from the lowest cost framework.

Technology was seen as the solution to man's problems. Mann states: "Technology and ideas have a dynamic relationship. Sometimes concepts of employment lead to new technologies; sometimes new technologies require different concepts of employment."<sup>15</sup> Mann's statement places Douhet's and his contemporaries' conundrum in the context of their times. They were leading change with little historical precedence to fall back on or guide them. They attempted to introduce a revolutionary concept concomitantly in a rapidly changing technological environment. The dynamic of change proceeded under the influence of the personalities of the reformers, the social and organizational culture of the visionaries, the military staff, and the domestic and political situations of various nations between the 1920s and 1930s. Combat systems and technology

from aircraft, armour, to armament, evolved and matured. The real debate was not whether they would ever be used but turned to “when and how” new innovations would be used. And there were many opportunities for testing them in the 1930s, particularly in Spain and Ethiopia.<sup>16</sup>

Air warfare was new indeed. Douhet in particular had developed concepts based on 20 years of the aeroplane’s existence, and with only five or six years of combat, to develop a theory on the practical application of air power. Douhet and his contemporaries thus tried to picture an entirely new way of waging war. Their strategic predecessors, Clausewitz and Jomini, had thousands of years of experience from which to draw upon in land war, while Mahan had a comparable range of experience for naval warfare. There was little case support for their views that often placed them at odds with their peers and the military establishment. But the value of the debate was that they staked out the strategic use of air power by itself as the argument for a theory of the command of the air.

Douhet considered the traditional view of a two dimensional nature of war as both obsolete and restrictive. The battlefield was no longer strictly defined by a forward or a flanking edge. There was a new and a third dimension to it: the air. This was the new dimension for the employment and use of air power. In Douhet’s view, the limitations of battles with lines on the ground could easily be overcome by air power. Air power provided a commander with a new and unexploited opportunity because there now existed a means to go over defensive positions rather than going through them. In his words, “Nothing man can do on the surface of the earth can interfere with a plane in flight, moving freely in a third dimension.”<sup>17</sup>

Because of the aeroplane, the battlefield was now extended beyond the frontier boundaries of the nations at war. Douhet concluded that all citizens would be combatants and that there was no longer a distinction between citizen and soldier. This would have a profound impact on the direction of political views and the consideration of the conduct of future

wars.<sup>18</sup> This was total war as Clausewitz and Jomini had envisaged it.<sup>19</sup>

Douhet hypothesized that the form of war depended upon the technical means available to conduct it.<sup>20</sup> It was the new technology of the airplane that he wanted to use as a lever for change. He deduced that increased firepower of firearms favoured the defensive.<sup>21</sup> In his mind, this meant that wars could be won by offensive operations.<sup>22</sup> In his view, war was prolonged by the failure to understand the nature and demands of modern war that was being shaped by the development of modern firearms.<sup>23</sup> He recommended that military thinkers stop and examine the questions of the right path in order to provide for an effective national defence.<sup>24</sup> These points were also being considered by his peers and colleagues in other service elements.

The theories that Douhet, Mitchell, Trenchard, and others put forward solidified the doctrine that “the bomber will always get through.” This sound bite influenced how governments viewed air power. It influenced how governments would spend their scarce defence resources from the end of the Great War to World War II.<sup>25</sup> This was to have unforeseen consequences that resulted in unnecessary wastage, crew fatalities, and aircraft lost during World War II. The hard lesson had to be learned that pursuit aircraft was a necessary adjunct to a modern air force and though the bomber would always get through, it would do so at a considerable cost in lives and aircraft if not adequately protected. This was learned later and early on in World War II.

Douhet’s influence was most likely felt in the immediate development of modern aircraft. He envisaged an aircraft suitable for both combat and bombing.<sup>26</sup> His perfect model was directed to the establishment of an air force consisting entirely of battle planes.<sup>27</sup> Under this concept, battle planes provided a means for full freedom of action of employing units in both bomber and combat roles.<sup>28</sup> Thus in Douhet’s view, the air arm was cheaper and more effective in waging war. He theorized that a thousand 6,000 horsepower planes costing approximately



Two Hurricanes and the Avro Lancaster fly over the the Battle of Britain parade, September 17, 2006.  
CF Photo by Master Corporal Jill Cooper

as much as 10 battleships, required an amount of material equivalent to the construction of one battle ship, and needed fewer inputs of labour in their employment compared to naval power.<sup>29</sup> He thus established an economic argument that air power was cheaper relative to the other arms. But he also established the parameters for the construction of ideal aircraft *that discounted speed and manoeuvrability* (italicized for emphasis). His argument—vision, if you will—set the framework for future defence and air power considerations. The downside of the vision based on “cheaper,” was the appealing argument to the politicians of the day. It would have a tremendous loss of life and aircraft in the next war.<sup>30</sup>

Douhet and others became convinced that mass concentration alone was sufficient as a means of aerial defence. Aircraft only had to move forward and mass over a target to overcome its opponent. There was no need for speed or mobility, as the attacking force would provide its own means of defence from its integral weaponry.<sup>31</sup> Thus the public and governments clung to the promise of the Douhetian conclusion that in the next war an air force would be made up entirely of a single aircraft type. This theory espoused economy and efficiency based

on standardization, thus limiting capital outlays to a few multipurpose models that appealed to the public’s and government’s imagination.<sup>32</sup> There was simply no need for speed, only mass. Therefore any deviation from the model had to be vigorously defended and that made justification of post-war spending and change increasingly difficult.

The arguments that Douhet, Mitchell, Trenchard and their contemporaries put forward appealed to an interested public. But they were cementing a doctrinal framework premised on the bomber from which the modern air force and establishments eventually evolved.<sup>33</sup> They were at odds with the needs of balanced defence spending and they set the precedent for future investment and development of an air force.

What likely made the deliberations much more difficult was the nature of the independent service establishments. Each service had its own ministry/department. What Douhet, Mitchell, Trenchard and others were asking of the existing establishment was the virtual creation of a new ministry at a time of reduced defence spending. Such a ministry would bring

with it an additional commitment to increase defence spending. Maintaining their share of the defence budget was an ongoing source of friction between the two senior services. Therefore, the army and navy of the day likely and rightly viewed the call for a new service as impudent, an upstart that had either to be quashed or defended against expeditiously.

The era likely demanded a need for quiet diplomacy and collegiality, but the players were not amenable or in a state of mind to that end. The bellicosity of many champions of air power did not help the cause.<sup>34</sup> Thus, service lines were strictly drawn and were being jealously guarded. The creation of a new service would mean sharing of the scant resources available. What was to be the *quid pro quo*? None was offered, in fact it was often suggested that if the services had air requirements, they would have to develop and pay for these from their own budgets. Certainly, this was not a great way to make inroads to the power structure or to help make friends to further the cause.

Victory during the Great War could be seen as a mixed blessing for the Allies. They had won the war but the peace left the defence establishment with little inclination, time or money to invest for the future. Peace fostered the seeds of retrenchment for the victors in old ways and doctrines. There were huge stocks of materiel and war surplus at hand. There was no incentive for change amongst the victors, whereas the conquered were faced with huge reparations and loss of materiel that left them little choice but for revolutionary change over the long term. Investments for doctrinal change were focused differently depending on whether you were a winner or loser. War surplus and materiel left the victors to contemplate their use that favoured the traditional “doctrines” of the past war that seemingly aided their success. The post-war struggle likely paved a different path for the vanquished as the early victories at the beginning of World War II tend to suggest. The vanquished had no choice but to invent new doctrine, as they had little surplus or materiel stock in the first place, and second, they were constrained by arms limitations imposed by the Treaty of Versailles.<sup>35</sup>

## YOUR OLD MEN SHALL DREAM DREAMS, YOUR YOUNG MEN SHALL SEE VISIONS

Visionaries kept the discussion at the forefront. That was their contribution in the early days, but the problem with visions is that they often are not tangible or real. Visions at best are nothing more than intellectual feelers, a strawman to test reality. They may provide a map for the way ahead, but that map can become obsolete very fast. A vision thus requires constant updating as experience and history are gained. It should only be a test crucible, not an article of faith. A vision should not become the quest for the Holy Grail, a proving point at the expense of truth. Visions unchallenged can inculcate a process or philosophy that must be continually proven to be true. Change in this milieu may be viewed as an admission of an error in judgment. So there may be little incentive for change if the change does not support the vision.

Often a visionary is on the horns of a dilemma; to pursue the vision in spite of setbacks or discard the vision if it does not pan out. However, if one truly believes in the vision, then there may be a place for strong leadership mixed with a liberal dose of guile, to force change especially in the face of accepted doctrine.

The experience of Douhet, Mitchell, Trenchard and their contemporaries was no different than that faced today by present day visionaries and dreamers. This is the cautionary tale for modern times. There is much debate on revolutions in military affairs, strategic lift, focused logistics, and communications amongst many topics that demand our attention in the management of chaos, war and conflict. All these are being argued concurrently and too often are in direct competition with one another for limited financial resources. Unlike our predecessors’ day, what may be lacking in our time is a sense of passion.

Today’s technology is ubiquitous but it fails to excite the imagination of nations. Buzz Aldrin, one of the first to reach beyond

our planet, put it this way recently: “We have remained, since our Apollo days, locked in Earth orbit. But five years ago, NASA was tasked with returning to the moon by 2020, rerunning the moon race that we won 40 years ago. Not surprisingly, this new race has failed to ignite the imagination of young Americans -- or their leaders.”<sup>36</sup> It may well be that in today’s world, many feel there is nothing left worth exploring or that it is too expensive to do so. It may also be that we have become inured to the quest for vision because of the accelerated pace of constant change that has led to technological obsolescence in the blink of an eye and the constant draw on taxpayers’ purse strings.

Visionaries and dreamers are still necessary today. We still need to get excited from time to time. Somebody needs to lead us out of chaos and lead us through the complexity of the defence budget. Somebody needs to give us focus on the way ahead. That increasingly difficult task falls to military leadership. Issues have to be brought to life and debated, but there must also be time to step back to take stock.

Visions are just that, visions. Sometimes course corrections are in order. Again that is

where leadership comes into play to provide direction. Necessary change, though, should not be viewed as an admission of failure. Yet change of direction is too often viewed as an admission of error. Change must be viewed as the substance that provides the muscle on the framework of our present and future defence policy if it is to prevent undue waste.

A true visionary is one who recognizes that a vision is not immutable and has the ability to communicate that fact to a wider public beyond the defence community. A true visionary is one capable of guiding change even at the expense of highly held precepts. Theoretical musings are just that, theoretical. Visionaries should not just be dreamers, they need to be practical guides to reality. So, just like visions, visionaries must change. And the daring do! ■

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## Notes

1. Stephan Budiansky, *Air Power – The Men, Machines, and Ideas that Revolutionized War, From Kittyhawk to Iraq* (New York: Penguin Books, 2004), 6-7.
2. Ibid., 46-47.
3. R. R. Palmer and J. Colton, *A History of the Modern World* (New York: Alfred A. Knopf, 1967), 672-73.
4. Budiansky, 147. See Mitchell’s tack in particular. He wanted a “decisive showdown of air power against sea power, the new against the old, innovation against tradition.”
5. Ibid., 138 and Giulio Douhet, *The Command Of the Air*, trans. Dino Ferrari (New York: Coward-McCann, Inc., 1942), 76. The organization and functioning of independent aviation must be free of outside control. Although it stemmed from the army and navy, aviation has reached maturity and should be emancipated.
6. William Mitchell, *Winged Defense – The Development and Possibilities of Modern Air Power Economic and Military*, (New York: Dover Publications, Inc., 1988; originally published in 1925 by G.P. Putnam’s Sons, New York and London), 215, 221-23.
7. Randy Kee, “Brig Gen Billy Mitchell’s Continuing Legacy to USAF Doctrine,” *Air & Space Power Journal - Chronicles Online Journal*, 8 July 1999. Available online at <http://www.airpower.maxwell.af.mil/airchronicles/cc/kee1.html> (accessed August 12, 2009).
8. Peter Paret, *Makers of Modern Strategy, Military Thought from Machiavelli to the Nuclear Age*, (Princeton, NJ: Princeton University Press, 1986), 631.

9. Kee, available online at <http://www.airpower.maxwell.af.mil/airchronicles/cc/kee1.html> (accessed August 12, 2009).
10. Douhet, 34-40.
11. Mitchell, 215.
12. National Archives, United Kingdom, "RAF in Iraq: Note to the Cabinet by the Chief of the Air Staff, Hugh Trenchard, regarding the use of air power in Iraq between 1920-22." Catalogue reference: AIR19/109 (Oct 1922). Available online at [http://www.nationalarchives.gov.uk/pathways/firstworldwar/aftermath/p\\_iraq.htm](http://www.nationalarchives.gov.uk/pathways/firstworldwar/aftermath/p_iraq.htm) (accessed August 12, 2009). This report by Hugh Trenchard, the RAF's chief of staff between 1919 and 1927, was submitted to the Cabinet shortly after the RAF had quelled Turkish-led unrest in the Kurdistan area of Iraq. As war secretary Winston Churchill argued, this striking demonstration of the potential of independent air power offered the prospect of upholding "our Imperial prestige ... with a minimum of expenditure both in lives and money." In the difficult economic conditions of the immediate post-war period, these were important considerations. The air campaign in Iraq thus helped to cement the RAF's position as a fully independent service.
13. Palmer and Colton, 818-20.
14. In support of this statement see D. Morton and G. Wright. *Winning the Second Battle. Canadian Veterans and the Return to Civilian Life 1915-1930*. (Toronto: The University of Toronto Press). See also Palmer and Colton, 689-94, 704-51.
15. Edward Mann "One Target, One Bomb – Is the Principle of Mass Dead?" *Airpower Journal* (Spring 1993). Available online at <http://www.airpower.au.af.mil/airchronicles/apj/apj93/spr93/mann.htm> (accessed August 12, 2009).
16. Palmer and Colton, 820-21.
17. Douhet, 9.
18. *Ibid.*, 10.
19. A. Baron de Jomini, "The Art of War," *Messenger* (London: Greenhill Books, 1992), and Carl von Clausewitz, *On War*, ed. and trans. M. Howard and P. Paret (Princeton: Princeton University Press, 1989), 87.
20. Douhet, 6.
21. *Ibid.*, 11-12.
22. *Ibid.*, 12.
23. *Ibid.*, 14-15.
24. *Ibid.*, 15.
25. Budiansky, 184. The bomber's ascent brought about the fighters' nadir.
26. Douhet, 115-17.
27. *Ibid.*, 117.
28. *Ibid.*, 118.
29. *Ibid.*, 199.
30. The author recommends Martin Caidin, *Black Thursday* (New York: Ballantine Books, 1960); Murray Peden, *A Thousand Shall Fall* (Toronto: Stoddart, 1988); and Spencer Dunmore and William Carter, *Reap The Whirlwind* (Toronto: McClelland & Stewart Inc., 1991).
31. Douhet, 36-40, 42, 44-45, 246, 257, 262.
32. *Ibid.*, 338, and Budiansky, 184-86.
33. Budiansky, 186.
34. *Ibid.*, 126-27.
35. Margaret MacMillan, *Paris, 1919 – Six Months That Changed The World* (New York: Random House Trade Paperbacks, 2002), 157-203.
36. Buzz Aldrin, "Commentary: Let's aim for Mars," CNN, (23 June 2009), available online at <http://www.cnn.com/2009/TECH/space/06/23/aldrin.mars/index.html> (accessed August 12, 2009).