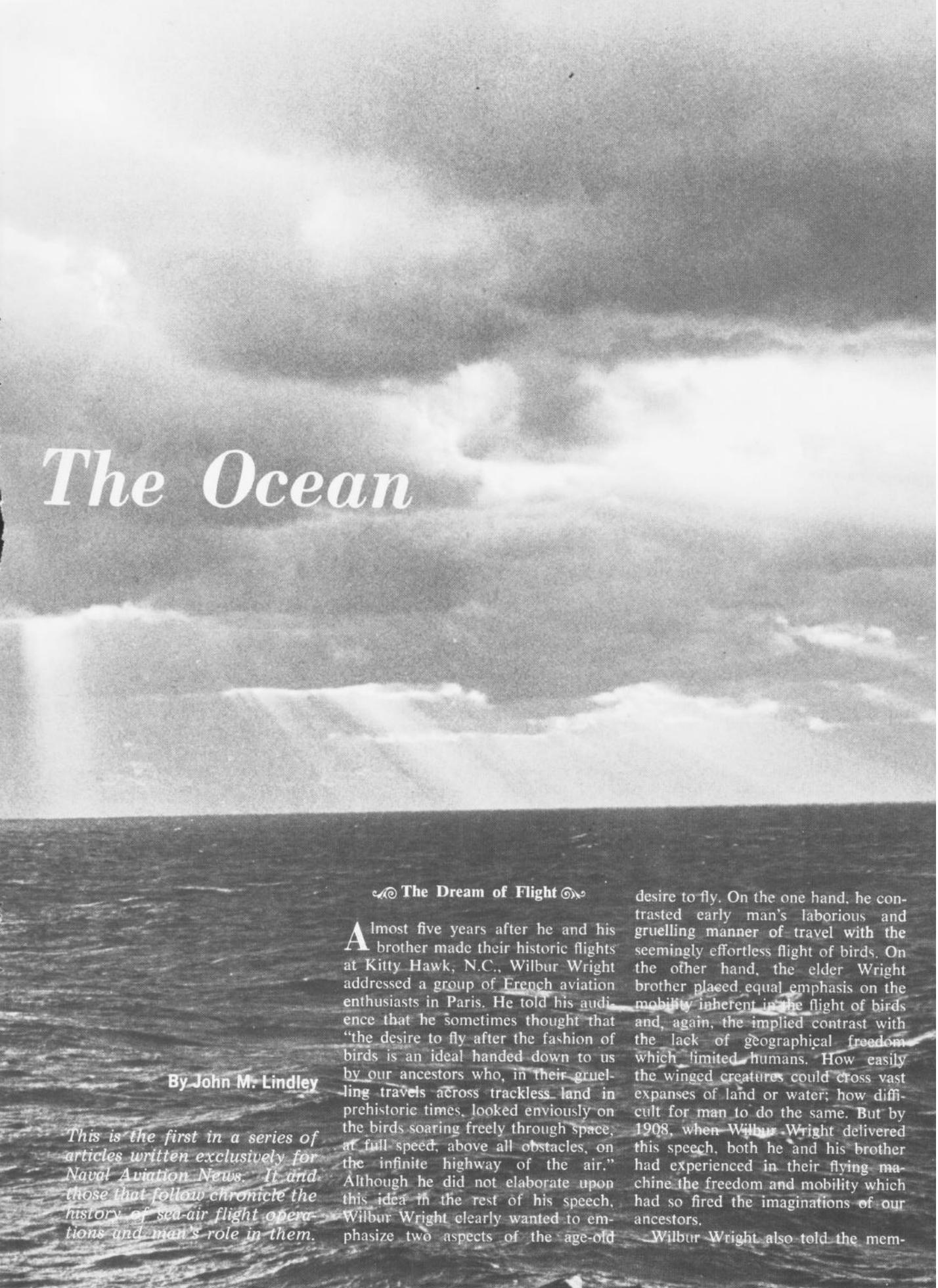


A History of Sea-Air Aviation

Wings Over





The Ocean

By John M. Lindley

This is the first in a series of articles written exclusively for Naval Aviation News. It and those that follow chronicle the history of sea-air flight operations and man's role in them.

☞ The Dream of Flight ☞

Almost five years after he and his brother made their historic flights at Kitty Hawk, N.C., Wilbur Wright addressed a group of French aviation enthusiasts in Paris. He told his audience that he sometimes thought that "the desire to fly after the fashion of birds is an ideal handed down to us by our ancestors who, in their grueling travels across trackless land in prehistoric times, looked enviously on the birds soaring freely through space, at full speed, above all obstacles, on the infinite highway of the air." Although he did not elaborate upon this idea in the rest of his speech, Wilbur Wright clearly wanted to emphasize two aspects of the age-old

desire to fly. On the one hand, he contrasted early man's laborious and gruelling manner of travel with the seemingly effortless flight of birds. On the other hand, the elder Wright brother placed equal emphasis on the mobility inherent in the flight of birds and, again, the implied contrast with the lack of geographical freedom which limited humans. How easily the winged creatures could cross vast expanses of land or water; how difficult for man to do the same. But by 1908, when Wilbur Wright delivered this speech, both he and his brother had experienced in their flying machine the freedom and mobility which had so fired the imaginations of our ancestors.

Wilbur Wright also told the mem-



Winged Griffen

escape from Crete, Icarus ignored his father's warnings not to fly too close to the sun, which indeed melted the wax on his wings, and he plunged into the sea. Daedalus could do nothing for his careless son; so, the grieving father flew on to Sicily where he made a new home and shared his knowledge of the plastic arts with the people of that country.

Regardless of whether the story of Daedalus and Icarus is just a Grecian "tall tale" or an imaginative account of some actual attempt at flight in ancient history, the myth carries a kernel of insight as to the meaning of sea-air aviation. Daedalus was an inventor who clearly understood the technological dimension of flight. In constructing the wings of feathers and wax he took the first practical steps toward mastering the highways of the air. His escape illustrates the desire for speed and mobility which Wilbur Wright articulated in 1908. Daedalus and his son were two men capable of speedy flight from an island prison from which other less technologically-minded persons could not have escaped. Not only did they escape, but they escaped across the sea, a vast trackless expanse which previously had limited ship traffic to coastal waters or narrow seas where sailors would never be long out of sight of land. Even without a modern map of the Mediterranean, the ancient Greeks probably knew that any flight from Crete to Sicily involved crossing the sea without the aid of land to help in navigation. In short, Daedalus accomplished what might be called the first flight of sea-air aviation.

In his reading Wilbur Wright had probably come across another Greek tale of flight relevant to the concept of sea-air aviation: the myth of Bellerophon and Pegasus. Bellerophon was a semi-divine youth from Corinth. He went to Lycia, whose king asked the youth to destroy the fire-breathing monster known as the Chimaera, a beast with a goat's head, the fore-quarters of a lion and the hind-quarters of a dragon. Despite the danger, Bellerophon agreed to accept the king's challenge. Fortunately, a soothsayer told Bellerophon that if he caught the winged horse Pegasus with a golden bridle, to be found in the temple of Athena, that he might vanquish the Chimaera. Following this advice, Bellerophon secured the bridle and easily captured Pegasus. He then

bers of the Aero-Club de France that the idea of flight was "an idea that has always impassioned mankind." He did not need to give examples or evidence of the accuracy of this observation, for the proof was there in the members of his audience. They shared this passion for flight. Had he felt compelled to justify his assertion, Wilbur Wright could have pointed to the winged gods and deities of ancient Egypt, Assyria, Greece and Rome. Or he could have mentioned Western religious art with its winged angels and cherubs. Since he was a widely-read man, particularly in the literature relating to aviation, Wilbur Wright might even have produced examples of the desire to fly in Oriental art and religions. But the intense and taciturn Mr. Wright did none of these things.

He assumed, instead, that his audience shared this ancient dream of flight.

Among many expressions of the dream of flight of which Wilbur Wright and his friends were surely aware, the myth of Daedalus and Icarus was probably the best-known. Daedalus was the universal inventor—a skilled architect, mechanic and sculptor. He had designed and constructed the famed labyrinth for King Minos of Crete, but when he lost favor with the king, the inventor and his son Icarus were cast into his own palace of complex corridors. Unable to find his way out of this prison, Daedalus fashioned two pairs of wings for himself and Icarus out of feathers and wax. They then strapped the wings on their arms and flew out of the labyrinth. In the course of their

mounted the winged horse and attacked the Chimaera from a great height. With the aid of his marvelous steed, Bellerophon quickly killed the dreadful monster.

The combat between a heroic Greek lad riding a winged horse and a fire-breathing monster evokes a dramatic image of aerial warfare. Both Bellerophon and Pegasus appear in the myth as creatures of supernatural power who are thereby able to destroy the evil Chimaera. The image of horse and rider flying through the air conveys another dimension of meaning. Man wants not only the means to fly but he must also be able to control that flight. Only by possessing the golden bridle could Bellerophon subdue the wild horse with wings, but once he had obtained the bridle, the youth had Pegasus completely under his control, and together they could engage the Chimaera in combat and kill it. Thus the story of Bellerophon and Pegasus captures all the elements of aerial warfare in an imaginative battle. The modern version of this timeless myth is, of course, the story of the World War I flying ace in his Sopwith *Camel* doing battle with the Red Baron.

Not surprisingly, the history of sea-air aviation has embodied the two images of flight illustrated by the tales of Daedalus and Icarus and of Bellerophon and Pegasus. Manned flight in the twentieth century has indeed provided the mobility over land and water that Daedalus first attempted and Wilbur Wright acknowledged. In addition, the Wrights themselves gave signal recognition to the possibilities for aerial warfare in modern flying machines. After Wilbur and Orville Wright made their historic flights at Kitty Hawk in December 1903 and perfected their invention during flight tests in a pasture near their home in Dayton, Ohio, in 1904, they then turned to the U.S. War Department and offered their flying machine for sale to the Army. They offered not only to sell their *Flyer* to the Army, but also to give the military a complete monopoly over its use. What a military advantage that might have been! The Wrights' efforts to sell their *Flyer* to the War Department stands as eloquent testimony to their awareness of the military potential of their practical flying machine.

In the years following Wilbur

Wright's 1908 speech to the French aviation club, the two dreams of flight illustrated by ancient Greek myths — the hope of over-ocean flight and the possibility of aerial warfare — became realities in the modern history of sea-air aviation; that is, in all types of flight operations from or over the oceans. Whether carrying people and goods for commercial profit or aircrews and weapons for warfare, the airplane of today is fundamentally a vehicle of transportation. In the early years of modern aviation the functional and technological distinction between sea-air aviation and flight operations overland was more apparent and clear-cut than it is today, largely because of the differing limitations in speed, range and carrying capacity between sea-based and land-based airplanes. Although there have been a few amphibian types of aircraft from the very early stages of airplane development, the vast majority of aircraft have been either land-based or sea-based. The former aircraft have relied upon wheeled undercarriages for takeoffs and landings; the latter have depended generally upon floats or pontoons. This distinction was never a problem with lighter-

than-air craft such as balloons, rigid airships or blimps. Whatever these lighter-than-air craft lacked in speed, relative to the airplanes of their day, they more than compensated with their substantially greater lifting power and their considerably greater range.

In the 1930s lighter-than-air craft reached their highest level of technological performance and economic feasibility with airships such as the German Zeppelin *Hindenburg* and the American rigids *Akron* and *Macon*. At the same time, however, technological changes and developments in land-based aviation were beginning to eliminate the differences in function between land and sea-based airplanes. Commercial land planes such as the Douglas DC-3 represented a genuine challenge to the dominance of seaplanes, flying boats and rigid airships in long over-ocean flight operations. In the military sphere, the performance improvements in carrier-based aircraft (which were superficially land planes modified for flight operations from a carrier deck) seriously encroached upon the military uses of the seaplane and the flying boat.

This trend toward the blurring of the differences between sea-based and



land-based aircraft continued into the 1940s and 1950s. With the introduction of practical jet aircraft after World War II, the military usefulness of the seaplane and flying boat became even more limited. In commercial air transport the flying boat gave way to larger and more economical land planes. The adoption of the jet transport for long-distance flights by the major airlines in the 1950s soon relegated the flying boat to the commercial aviation backwaters of the world and effectively obliterated the few remaining differences in commercial flight operations between strictly land and sea-air operations.

Although the distinctiveness of sea-air aviation in the commercial domain has largely disappeared today, the functional and technical differences between land and sea-based flight operations have survived the coming of the jet plane in Naval Aviation. As naval strategists pursue new and better ways of combining and coordinating naval air and surface forces in the future, the history of sea-air aviation will continue to provide a varied and changing face. Since the earliest days of aviation, naval commanders have wanted to take aircraft to sea with the fleet because they recognized that the airplane could provide auxiliary support to surface forces in a variety of ways. In World War I and the 1920s the major navies of the world experimented with various solutions to the problem of how to take aircraft to sea with the fleet. After trying many possible methods, they eventually settled upon the aircraft carrier as the most practical and most flexible means. Today the major navies of the world have strong air components and the aircraft carrier has replaced the battleship as the backbone of the surface fleet. Carrier-based aircraft include jets, propeller-driven aircraft, helicopters and vertical or short-take-off-and-landing aircraft, commonly known as V/STOL. Aircraft carriers range in size from the enormous nuclear-powered flat-tops *Enterprise* and *Nimitz* of the U.S. Navy to the smaller helicopter cruisers *Moskva* and *Leningrad* of the Soviet Navy. Rotary-winged aircraft now fly regularly from these big carriers as well as from smaller destroyer-sized warships. The introduction of the jet V/STOL airplane to the major fleets of the world in recent



de Rozier

years has further opened the technological door to all sorts of future possibilities in sea-air aviation.

All of the naval uses of these aircraft derive from the capability of the airplane to serve as a means of transportation. In wartime, navies need to attack land or naval targets which are far distant from a surface fleet; thus they have fitted aircraft with the weapons of war — bombs, guns, rockets or missiles — to extend the range of surface-borne weapons in an attack. Naval commanders have also needed reconnaissance or intelligence about the forces of the enemy. Consequently they have employed airplanes as aerial observation posts since the beginning of World War I. Today sophisticated reconnaissance aircraft carry elaborate electronic gear, radar and other intelligence equipment which can extend the range of the eyes and ears of the naval commander far ahead of his surface fleet. Whether as a weapons carrier or as an observation platform, the airplanes used in the fleet today are still basically vehicles of transportation that are capable of flying over the oceans of the world.

As the stories of Daedalus and Bellerophon show, from the earliest times those who have dreamed or schemed about man flying have recognized the dual potential of the airplane as either a peaceful commercial vehicle or a wartime aerial chariot. But neither the Greek mythmakers nor the pioneers of early aviation explicitly distinguished between flight operations over land and sea-air aviation. Nevertheless certain genuine differences in function and technical characteristics between the two types of flight operations did arise soon after the Wrights brought the success of their flying machine to the attention of the public. These differences were further emphasized with the subsequent development of Naval Aviation after 1910. Thus the history of sea-air aviation properly begins with those who prepared the way for the Wrights and their 1903 triumph.

☞ Pioneers of Aviation ☞

Although there were a number of attempts to imitate the flight of birds prior to the eighteenth century, the first successful work in aviation

came with lighter-than-air craft, particularly balloons, rather than with ornithopters (flapping-wing machines) designed to imitate the birds. Two Frenchmen, Joseph and Etienne Montgolfier, discovered in November 1782 that they could trap a quantity of hot air in an inverted paper bag which would then cause the bag to rise. After several private tests of their findings, they decided to demonstrate publicly this property of hot air. So on June 5, 1783, at Annonay in central France, they launched the first balloon filled with hot air. It rose to about 6,000 feet, according to their calculations, and landed a mile away.

News of the Montgolfier balloon spread rapidly and on August 27th another Frenchman, J. A. C. Charles, a physicist, assisted by the Robert brothers, sent aloft a hydrogen-filled balloon. Ballooning experiments became the rage. The next month Joseph Montgolfier sent a sheep, a duck and a cock up in one of his balloons. Since these farmyard creatures survived the ascent, two men, Jean Francois Pilatre de Rozier and the Marquis d'Arlandes, volunteered on November 21st to be the first human passengers in a balloon. During this first ascent, they were aloft over Paris for 25 minutes. Not to be outdone, Charles and one of the Roberts made the first ascent in a hydrogen-filled balloon on December 1st. They covered 27 miles in two hours. Thus by the end of the eighteenth century, regardless of whether these aeronauts, as early balloonists were called, used hot air or hydrogen to lift their craft, their efforts meant that mankind was no longer permanently limited to earthly travel.

In the nineteenth century, aeronauts continued experimenting with balloons. Because hot air or hydrogen-filled balloons tend to rise, the aeronaut carried ballast which he used to control the height of the ascent. The lighter the craft, the higher it went. To descend, the aeronaut would either wait for the hot air to grow cooler which would reduce its lifting power, or in the case of hydrogen, he would release some of the gas so that the balloon would lose part of its lifting capacity and begin to descend. If the balloon began to descend too rapidly, the aeronaut would hastily throw ballast, usually sandbags, over the side of the basket in which he rode so that

the craft would become lighter and thus descend more gradually.

The major problem with the balloon as an aerial vehicle is that it is difficult to control or steer because the winds carry the aeronaut and his craft in whatever direction they happen to be blowing. Consequently, inventive aeronauts searched for a way to propel or steer balloons. Usually they tried some combination of oars or rudders or even propellers. But since most of these imaginative efforts at balloon control depended upon manual power, they generally proved to be very ineffective.

Attempts to conquer the problem of control did, however, bear fruit in the development of the airship or dirigible. A French inventor named Henri Giffard built a 350-pound steam engine in 1857 which was capable of producing three horsepower. When Giffard mounted this engine on an airship 144 feet long and 40 feet in diameter, the following year, he found that it would drive a propeller 11 feet in diameter at 110 rpm. This engine and propeller combination subsequently amazed a curious crowd on September 24, 1852, by controlling the direction of Giffard's hydrogen-filled craft during a flight over Paris.

Other airship pioneers began to try different types of engines. Paul Haenlein, a German engineer, used a coal-gas engine in 1872. Since his airship was filled with coal gas, the engine consumed some of the gas which gave the craft its lifting power. Since there was no way to replace the gas lost in powering the engine, the airship was limited in the time that it could stay aloft. Some 11 years later, two

Frenchmen, Albert and Gaston Tissandier, propelled an airship with a 1.5-hp. electric motor; their first successful flight came on October 8, 1883. Almost a year later, Charles Renard and A. C. Krebs, also Frenchmen, flew an electrically powered dirigible in a circular flight around a five-mile course.

Although these flights, using steam, coal, gas or electric engines, had shown that an airship could be controlled in flight, all the engines were too heavy for practical aeronautics. Thus the advent of the practical airship was delayed until Karl Benz and Gottlieb Daimler built the first reliable gasoline engines in 1885. David Schwarz of Germany built the first airship powered by a gasoline engine in 1897. Others, such as the Brazilian Alberto Santos-Dumont, followed the pioneering efforts of Schwarz and made numerous flights, bringing fame to themselves and their airships. Probably Santos-Dumont's most famous exploit was piloting his dirigible around the Eiffel Tower in Paris in 1901.

At the same time that Santos-Dumont was making newspaper headlines, Paul and Pierre Lebaudy commissioned Henri Julliot to design an airship appropriately named the *Lebaudy*. It was a semi-rigid dirigible 190 feet long. Following its maiden flight on November 13, 1902, the *Lebaudy* made long distance flights in 1903 ranging from 23 to 63 miles at speeds over 25 mph. These flights signaled the beginning of genuine long distance travel in powered airships.

To be continued

Santos-Dumont in airship

