

## Tribute to James S. McDonnell by John F. McDonnell

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James S. McDonnell often referred to himself as a plodder (namely, a person who works slowly, steadily, and unimaginatively). He did everything in life with meticulous attention to detail, to the point that it could be excruciatingly, maddeningly exasperating to those around him; but he also inspired those same people with a sense of important mission and high purpose. He had a unique ability to synthesize the details and see the whole picture and future evolution with an uncanny accuracy. And he had an insatiable, searching curiosity that enveloped everything about human existence from genetics and evolution through the interrelationship of the mind and brain, from the complexity and interconnectedness of everything on our spaceship Earth (his term) through the vastness of the cosmos, encompassing the fundamental philosophical questions of science and human existence.

In the next few pages or so I hope to give you some feel for the breadth and scope of the man who made these grants possible and how enthusiastic and knowledgeable he was about these five fields of discovery.

First let me say that it is a real honor and treat for all of us in my father's family to be here and be able to rub elbows with the many distinguished scientists and scholars present, in particular the ten fellowship winners. I look forward to the opportunity to hear your papers and try to understand at least some of what your exciting projects are all about.

Mr. Mac, as he was widely and affectionately known to his colleagues around the world, was born 100 years ago tomorrow, four years before

the Wright brothers achieved powered flight. His father, a graduate of the University of Alabama, had migrated to Arkansas in 1881 with \$3,000 of borrowed capital and successfully established a general store in the small town of Altheimer. His father believed his children should have a good education and should learn the hard facts of business as early in life – and as early in the morning – as possible. As a result, Mr. Mac had jobs throughout his upbringing and throughout his college years. In one instance, as a teenager delivering newspapers in a lightning storm (before dawn), the pony he was riding was electrocuted. But in the process of falling dead, his pony threw him far enough away that he was unharmed.

Mr. Mac's mother was a deeply devout Southern Methodist and a stern disciplinarian. The story is told that Mrs. McDonnell once took her seven-year old son to an evangelist and proudly announced, "My son, James, is dedicated to the ministry." It was a secret she had not previously shared with James. Despite that effort by his mother, Mr. Mac's propensities for science and engineering showed up early in his life, as he filled the upper floor of his family's house with wireless telegraphy equipment. Another family story is that one time when a minister (I don't know whether it was the same one as in the other story) came to visit, young James held on to a wire attached to a battery and capacitor behind his back so that when the minister reached out to shake his hand, a giant blue spark jumped the gap, startling the minister and mortifying his mother. Lost in the mists of time is what punishment his mother meted out to young James afterwards.

One memorable experience during his childhood was when his mother took the family to the St. Louis World's Fair of 1904. They lived in an inn on the fairgrounds for a full month, and Mr. Mac saw the exposition from corner to corner. This must have helped instill in him his later wide ranging curiosity. Fifty-five years afterwards he reminisced that "the only thing I missed at the Fair was the prizefight that my two older brothers sneaked off to one night without taking me. I was mad at them at the time, but I did not mind missing the licking which Mother gave them."

Mr. Mac headed off to his freshman year at Princeton in 1917, where he experienced a growing interest in aviation. His father had constantly urged all of his sons to become professional men, or at least to enter a business which had dignity and potential, unlike aviation. Mr. Mac's two older brothers followed their father's advice. One became a successful architect, the other an eminent banker. Mr. Mac, however, would strike off into the "wild blue yonder" of the fledgling and uncertain world of aviation, in which airplanes were made of wood, cloth, and baling wire, and pilots took their lives into their hands each time they climbed into the open cockpit.

At Princeton Mr. Mac majored in Physics; there was no aeronautical engineering department. New horizons opened up for him when he was introduced to the "Life History of Stars" in an astronomy course taught by Henry Norris Russell. In a philosophy course he wrote a major paper about an experiment conducted the previous summer by a British team led by Sir Arthur Eddington to measure the deflection of starlight by the Sun during a solar eclipse, which was the first experimental confirmation of Einstein's "General Theory of Relativity."

Also, at the end of his sophomore year he wrote a 32 page manuscript to himself about the mysteries of human existence. He concluded with a note: "I realize that the whole of this is very loosely reasoned. It is meant as simply a sketch, not a philosophical argument. I have written it as an experiment, without reading any philosophy except that required in the sophomore course, to see how the ideas I had in mind compared with those of the philosophers. This comparison is yet to be made." It is unclear whether he ever completed the comparison, but he did continue to ponder those subjects throughout his life.

While living in Chicago and working for Western Electric during the summer after his sophomore year, he spent every spare moment in the library reading the works of William James and Frederic W.H. Myers' book, Human Personality and It's Survival of Bodily Death. He became convinced that all mental and physical activity, including the so-called paranormal phenomena, had their basis in the performance of the underlying neuronal systems.

After graduating from Princeton with Honors in 1921, he entered the only graduate aeronautical engineering program in the country, at MIT, as one of only three civilians admitted, since the program was organized primarily for Army and Navy officers. Masters degree in hand, he was accepted as an aviation cadet with a commission as a 2nd Lieutenant in the Army Air Service Reserve in September 1923. He was one of only 6 ROTC graduates from across the country that the Army Air Service had enough money to accept for active duty that year.

The next four months he spent in flight training at Brooks Field in San Antonio, Texas. He had a glorious time imitating Jonathan Livingston Seagull, flying the WWI Curtiss Jennys only a few

feet over the mesquite, looping, zooming, trying out all the capabilities of flying.

He also was one of six volunteers who tested the new device known as a parachute. To perform the test he lay on the wing of an airplane as it took off and climbed to altitude. Then on a signal from the pilot he was supposed to let go. On his first try he could not unclench his fingers. Afterwards in his usual analytical style he marveled at the fact he could not command his fingers to let go. In any case on the second try, after the cadet on the other wing had successfully let loose, Mr. Mac let go and found "... such quiet, and mental isolation as never experienced on Earth -- ecstasy."

While others in his flight class went on to become the leaders of the U.S. Air Force after WWII, 2nd Lieutenant James S. McDonnell wanted to design and build aircraft. So he separated from the Army Air Service and (quoting from a 1973 speech of his), "after finding out he couldn't make a living at it in his native state of Arkansas, he went up amongst the damn Yankees where most of the tiny aircraft plants were, and made out as best he could."

For most of the next 15 years he worked at a series of aircraft companies, including Hamilton, Ford, and Martin. At one point he decided to strike out on his own with two other engineers to design and build what would now be called a short-takeoff and landing airplane. It was all metal, low wing and could land on rough fields in about 20 feet. Before it was even built, he entered it in the Guggenheim Safe Airplane Competition for a \$100,000 prize. Airplanes from around the world competed. To make a long story short, he flew it cross country to the competition after only one test flight, arriving just ahead of the qualification deadline. On the first day the Doodle-Bug, as he called it,

performed spectacularly, but on the second day the tail broke and Mr. Mac had to crash land it. Although he was among the five finalists, he could not get it repaired in time to continue in the competition.

He did not give up, however. For the next two years he barnstormed around the country, trying to get financial backing to produce the Doodle-Bug as the family flivver of the sky.

In an application for employment as a transport pilot in 1933, he wrote: ". . . in order to test the feasibility for general private flying of the 'Doodle-Bug,' a new type monoplane with slats and flaps, I flew it some 27,000 miles in 1929-1930 between the Atlantic and Rocky Mountains and Toronto and Miami, under all such conditions as might be unwittingly encountered by amateurs: a snow storm, a sleet storm, rainstorms, . . ., night flying, landing in open country without landing lights or landing flares on a dark 100% overcast night, several flights with a cloud ceiling of 200 feet cross country, and one flight with a 50 foot cloud ceiling down a double track railroad, terminated by landing in a visibility of 200 yards; . . . and landings and take-offs on private lawns and on practice fairways of golf courses."

Unfortunately, it was the early 1930's, and the country was in a deep depression. By the end of 1931 he was out of money and went back to work as an engineer while waiting for the opportunity to start his company.

Throughout this period he continued to search for greater meaning. In 1935 he wrote: "What I desire is to find some activity to which I can devote all of myself and which will lift me out of my small self and enable me to serve the creative evolution of life on earth as a whole."

But he recognized that to achieve that end he had to have financial independence. So he consciously rededicated himself to aviation as his full-time occupation, more convinced than ever that he must start his own company. Further, he wanted to build commercial transport aircraft because: "... swift transport is conducive to world travel and trade and therefore conducive to the gradual welding of the peoples of the earth into a more friendly and more harmonious and purposeful community." He further wrote in 1935, "I feel that a world of flying people will be a world of better people." We may not be better people today, but he was certainly right that the airplane has been instrumental in the globalization of trade and in making those of us who do travel a lot, broader in our thinking and actions.

His chance to start his own company finally came in the late 1930's, but it was based on a coming war, not on economic growth and prosperity. He left the Glenn L. Martin Company in late 1938, and after an intense eight months of fundraising and preparation, at age 40 he founded McDonnell Aircraft Corporation in St. Louis, Missouri on July 6, 1939, to build military aircraft.

In his usual methodical manner he had picked St. Louis, where he had never previously lived. Since the coming war could make both coasts vulnerable, he wanted a location in the middle of the country. Also, he wanted a good aviation labor market, which St. Louis had. And most importantly, he was able to attract a considerable number of investors in St. Louis since it had an aviation history, including financing Lindbergh's famous flight across the Atlantic in 1927.

During the first year sales were zero, losses \$3,892. At year's end shareholders' equity was \$218,498, and employment about 50 people.

Forty years later when he died, annual sales were \$6 billion, net earnings were \$145 million, dividends paid were \$34 million, firm backlog was \$8.8 billion, shareholders' equity was \$1.5 billion, and employment was 82,550 people. Furthermore, McDonnell Douglas was the second largest maker of commercial transport aircraft, second in defense contracts, fourth largest U.S. exporter, and 54th largest U.S. Industrial corporation. With he and his family owning about 20% of the stock, he had certainly achieved his goal of financial independence. In fact as soon as the company became successful, he began to expand his personal horizons and to become deeply involved both personally and financially in his lifelong interests outside of building aircraft.

Astronautics and the cosmos was an area that combined both business and pleasure for him. In the mid-1940's he became close friends with nuclear physicist and Nobel Laureate Arthur Holly Compton, who had just become the Chancellor of Washington University in St. Louis. He sought out other scientists such as James A. Van Allen, after whom the radiation belts surrounding Earth were named.

He could hardly contain his excitement when McDonnell Aircraft won the contract to design and build the first U.S. manned spacecraft, Mercury, in 1959. He loved interacting with the astronauts and attending the launches.

Although he was not comfortable making public speeches, whenever he did, he meticulously prepared them word by carefully chosen word. Usually they were about space. In 1957 in an address to the graduating class of the University of Missouri engineering school, he declared: "So Fellow Pilgrims, welcome to the wondrous Age of Astronautics. May serendipity be yours in the years to come as Man steps on the Earth as a

footstool, and reaches to the Moon, the planets, and the stars."

Mr. Mac put his money where his interests were. In 1963 the City of St. Louis ran out of funding to complete the construction and outfitting of a new planetarium. Mr. Mac donated the necessary funds. In 1963 he funded a Professorship in Space Sciences at Washington University, and in 1975 made a major gift to establish a center for Space Sciences.

In fact as early as 1950 he incorporated a private charitable Foundation, the McDonnell Foundation (now the James S. McDonnell Foundation), and contributed \$500,000 of McDonnell Aircraft stock to it. Adding later contributions and the tremendous increase of McDonnell Aircraft stock value, the Foundation's assets have grown to over \$300 million today despite the \$225 million of grants it has made during the 49 year period. The Centennial Fellowship Program is only the latest undertaking of the Foundation to carry on Mr. Mac's legacy of research and philanthropy.

From 1963 to 1966 Mr. Mac served as Chairman of Washington University's Board of Trustees. He used the opportunity to meet with many faculty members and probe with his usual thoroughness into their research. In this way he continued to educate himself in many fields of endeavor.

In the area of genetics he was greatly intrigued and excited when the molecular structure of DNA was discovered by Watson and Crick in the 1950's. He meticulously probed the scientists at Washington University to learn all he could. In 1966 he provided funds for construction of a new medical sciences building and, looking to the future he instructed that two extra floors, not needed at the time, be built. He then endowed a new Department of Genetics (to be housed in the extra space) and at the dedication

of the building lectured the audience on the importance of the study of genes for the future well-being of humanity.

In the area of global and complex systems he had two complementary, but seemingly contradictory, interests. He was a great supporter of both NATO, a military alliance, and the United Nations, a global institution to preserve peace. In a 1967 speech he reminded his audience: "As I have said many times, the waging of peace must be achieved from a Foundation of great strength. Our mission at McDonnell Aircraft is to contribute to the building and maintaining of that strength." NATO represented the Foundation of strength, and the United Nations represented "Man's most noble effort to achieve international peace." As a result, he was actively involved in both and headed the U.S. organization to support the United Nations.

Again, he put his money where his interests were. McDonnell Douglas was the only organization in the world where all employees had paid holidays each year on both NATO Day (April 4th) and U.N. Day (October 24th).

In 1965 he authored an article titled "Only The United Nations Can" in which he wrote: "The destiny of our Planet, the development of its human and material resources, the spread of scientific knowledge, the population-explosion and the evolving world community – these are the subjects which should make up the continuing dialog between heads of Governments..." He closed the article with the words: "If the United Nations is to fulfill the hopes of all men, the parochial concerns of the moment must be subdued in favor of the long-term universal concerns that ultimately will determine Humanity's future." Surely the interactions between humans is the most complex system of all.

Science and Human Responsibility was for Mr. Mac another very important theme. In 1957 he funded and participated in a major international meeting on the subject at Washington University. The objective was to examine "How the rapid technological changes in modern life can best be channeled to yield the highest human gains." He returned to the Science and Human Responsibility theme many times in his life, including a 1973 speech of the same title in which he stated: "... it is only during the past few decades that Man has achieved the science and technology whereby he can either ruin himself and all life on Earth, or he can consciously and responsibly try to help lead all life on Earth further along the path of creative evolution."

One of Mr. Mac's favorite artistic depictions of this philosophy was a statue by sculptor Albin Polasek, titled "Man Carving Out His Own Destiny." Mr. Mac kept a replica of the statue in his study at home, and he even had it printed on the McDonnell Douglas stock certificates. It symbolizes Mr. Mac's belief that humanity has the ability to carve out its own destiny – for better or for worse.

In the area of human cognition he had a lifelong fascination with the workings of the brain and the mind. When he learned of the new Positron Emission Tomography, developed by a team at Washington University, Mr. Mac immediately convened a meeting of Washington U's top researchers to discuss how neuronal activity underlies mental activity and behavior. He challenged the group to prepare a truly innovative research proposal for consideration by the McDonnell Foundation. By the time the proposal was presented in May 1980, Mr. Mac had already suffered the first of a series of strokes from which he died in August of that year. However, he rallied his faculties to further improve the proposal and made a \$5 million

grant to endow the Center for the Study of Higher Brain Function, which was one of his last acts before passing on to the next phase of existence (as he characteristically referred to death).

If he were here today, I know he would be tremendously excited by the opportunity to hear about each of the winners' research projects. In fact he would want the chance to discuss with each of you in great depth the details of your work, as well as your life's history, and your personal plan for the next 50 years. You are all very fortunate to be involved in research which to paraphrase his words, "will lift you out of your small self and enable you to serve the creative evolution of life on earth as a whole." Also, with this \$1 million grant from Mr. Mac's Foundation you now have the financial independence that he believed is so important for maximum creativity.

In closing, I believe what expressed Mr. Mac's philosophy and approach to life most succinctly and elegantly is a prayer he created and painstakingly improved throughout his lifetime.

"Universal Creative Spirit – We thank you for the gift of conscious life on Earth with the opportunity to explore, create, develop, and grow in spirit and the opportunity to nurture all living things and take charge of the creative evolution of same. Hallelujah!"