

THE HISTORY OF WOMEN IN NASA

Sylvia D. Fries

Women's History Week

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Back in the bad old days, history was all about the doings of great and famous men. Feminists responded with another variety of history I'll characterize as "now let us praise famous women." I could do likewise, and send us back to our desks with warm, fuzzy feelings and new inspiration. Goodness knows, we can all use more warm, fuzzy feelings and inspiration. Instead, I would like to offer some historical reflections on where we are today, how we got here, and what the future might bring.

Women's work life prior to this century was, of course, largely in the home. Like their brothers and sons and husbands, women worked long, hard hours--the women at farm as well as domestic labor. Then came the industrial revolution of the last century with its textile factories, sewing machines, and typewriters. Women could, and especially if they were single, did begin to work outside the home. Their little children often went out to work too, in the fields and in factories--and sometimes in the mines as well.

Toward the end of the last century, the rise of big business created a whole new career opportunity for women: the secretary. Equipped with her typewriter, and a demure, discrete demeanor, she began to do what she has been doing ever since: making it

possible for her boss--until recently usually a male--to pretend he was a manager. It was she who kept order in the midst of bureaucratic chaos while her boss cut his deals and figured out the best angle to his next promotion.

Thus it was that until World War II the occupation of secretary, along with the traditional occupations of nursing and teaching--which were, like waiting tables, mostly extensions of women's domestic sphere--was added to the ways women could support themselves, if not their families, and hope for some independence.

Great social crises often beget profound social changes. During the Great Depression of the 1930s, in the midst of widespread unemployment, many women went to work at whatever jobs they could find to make ends meet. Middle class wives of unemployed insurance salesmen went to work as chambermaids in the resort hotels of the rich. During World War II, women drove trucks and worked in factories wielding blow torches and riveting guns.

This change was reflected at Langley Research Center in the 1940s. Langley, by the way, was then the lead center for the National Advisory Committee for Aeronautics, the agency from which NASA was created in 1958. In 1940, Langley had only about 100 women employees, mostly working as secretaries, mail sorters, payroll clerks, and stenographers. By 1945, the last year of World War II, 1,000 women were working at Langley. In addition to the usual office work, women began working in technical

support jobs--operating spray guns and welding irons, setting rivets and polishing wind tunnels.

An exception was Pearl Young, the NACA's first woman professional. Young had earned a degree in physics from the University of North Dakota, and began working at Langley in 1922. A Phi Beta Kappa, this outstanding woman worked side-by-side with Henry Reid, who would later head Langley.

Technology has been important to the outcome of every war in history, ever since the invention of the chariot and the stirrup. This was never more true than in World War II, when the federal government, in order to assure an adequate supply of engineers, gave draft deferments to young men in engineering school. Draft deferments, the military's ROTC programs, and GI Bill benefits, which veterans used to return to college after the War, together assured that engineering careers would become overwhelmingly the preserve of hundreds of thousands of young American men.

At the beginning of the twentieth century engineers were portrayed in magazines and popular novels as the Paul Bunyans of the new industrial age. Engineering thus acquired an aura of machismo which was reinforced by federal policies in the 1940s and 1950s that assured that engineering would remain a man's occupation. The same generation of engineers that shaped this agency after 1958 would preserve the fantasy that men were uniquely gifted to be engineers. In truth, the only thing that was unique about them was that never before and never since has the federal government done so much to guarantee that one

profession would be dominated by a single group in American society.

Another field that would become largely closed to women as a result of World War II was high-performance aircraft flying. Because women were precluded from combat flying, and most of the high-performance aircraft developed during the 1940s and 1950s were developed for military use, the career of test pilot would become imbued with a machismo almost as great as that which pervaded engineering.

Now, you may ask, what does this have to do with NASA? Well, just about everything. When NASA was created in 1958 in the heat of our national eagerness to prove that we could surpass the Soviets in the conquest of space, engineers and astronauts came to personify all that was vigorous, creative, and new. The future of the nation rested on their shoulders. And they were men, full of 'the right stuff.'

Though there were many accomplished women pilots, some of whom had flown as test pilots in industry, and though women were earning degrees in engineering and physics, there was no place for them in the astronaut corps. Thirteen women applied for the astronaut corps in 1960 and passed the grueling physical tests. That women were as [✓]pysiologically and psychologically capable of space flight as men was affirmed in tests again in the 1970s.

These adventuresome women included Jerrie Cobb, who had flown 63 types of aircraft including a jet, and had logged 5,000

more flying hours than John Glenn, the first man in orbit. Needless to say, none of the thirteen was selected.

Throughout the 1960s incensed women would protest NASA's failure to select women for the astronaut corps, and notwithstanding a congressional investigation in 1962, it was not until 1979 that NASA would designate any women to actually fly in space. Spokesmen said some pretty silly things to justify the masculine idolatry of the space program. For example, here speaks a US Air Force spokesman in 1959:

To expose women...to the known as well as incalculable dangers of pioneer space flight would be like employing women as riveters, truck drivers, steel workers, or coal miners...

Here is Skylab astronaut Robert Parker in 1974: "I don't foresee any problem about men and women getting along together on space missions. We're not talking about dizzy blonde secretaries, but reputable women scientists." This is what I'll call the "double whammy:" just in case you couldn't require women to be test pilots, you could require them to be "reputable scientists," knowing that "reputable scientists" formed as much of a fraternity as the men with the 'right stuff.'

So what did young women with an interest in the physical sciences do in the 1940s, 1950s, and 1960s? Believe it or not, some were very, very brave and risked social isolation by going into engineering. The rest went into physics, biology, chemistry, astronomy, and above all, mathematics.

Mathematics was, at first, the best avenue to a technical career in NASA, though for many it wasn't much of a career. NASA had a great need then, as it still does, for computational skills for computer programming, simulation, trajectory computation, and analysis of tracking and communications data. At first the women computers--the first computers anywhere were people--were segregated with their slide rules and Friden calculators into female computer pools well into the 1960s. The black women computers at Langley worked in a segregated area "on the other side" of the laboratory.

Just as the federal government so deeply tipped the scales in favor of men in the 1940s and 1950s, it was the federal government which, in the 1960s and 1970s, began to tip the scales the other way. The successful launch of the Soviets' Sputnik in October, 1957 created a national panic over the number of young Americans receiving higher and graduate education. One result was the National Defense Education Act which enabled me, and thousands of other young women, as well as men, to attend graduate school and begin professional careers.

The civil rights movement of the 1960s stimulated further changes. The first significant civil rights legislation since Reconstruction, the Civil Rights Act of 1964, prohibited sex discrimination in employment. By 1972 all private employers of 15 or more persons were required to develop affirmative action plans. Beginning in 1973 even the government itself was required to implement affirmative action programs.

The percentage of women scientists and engineers in NASA rose from the roughly 3% level of the 1960s to around 5% in 1981 and then about 8% last year. But the percentage of women scientists and engineers in NASA continues to lag behind the percentage of women scientists and engineers in the country. While it's good for us to recognize women achievers like NASA scientists Nancy Roman or Marcia Neugebauer, or first American spacewoman Sally Ride, the mere fact they would be looked upon as special, because they are women, tells us what a hard, long road it still is.

The largest number of women in NASA, or about a fourth of all of NASA's employees, have been working in professional and administrative jobs. So long as NASA thinks of itself as a research and development organization, most professional and administrative positions will be perceived--at least by NASA's engineers and managers, who are mostly former engineers--as simply a more exalted form of polishing the wind tunnel and sorting the mail--that is, as support for the truly important work of the agency, handling the hardware.

Woman is expected to remain the loyal, dedicated, help-mate. The truth of the matter, of course, is that handling the hardware has become less and less what this agency does; instead, we develop budgets, we process procurements, we plan and program and program and plan, and for all of this, administrative work is the backbone without which the whole agency would collapse.

So is there anything useful we can we learn from the history of women in NASA? I think so. We can learn that the opportunities available to us are often shaped by trends beyond our control; and that the persistence of outdated stereotypes of women in largely masculine organizations is one of those trends. NASA's heritage as an engineering organization and standard bearer for the masculine romance of flight are other trends.

Changes in these trends mean some changes for us, as well. While federal laws can't guarantee opportunities for talented women, since 1973 it has forced the good old boys to think twice before they talk about "dizzy blonde secretaries." Where once the men could look around, above, and through a capable woman, now they must take her seriously. The effect, however incremental, is apparent in the statistics. Moreover, federal manpower policy for scientists and engineers no longer has a built in favor of men, as it did in the 1940s and '50s.

Secondly, as the agency becomes less and less a research and development organization--the most recent, major trend--and more and more an operations and management organization, the notion that only men can run NASA will have a harder time surviving.

Finally, we are in the midst of an important generational change. The generation of men arriving at positions of influence in this agency is more likely than the previous generation to have mothers and sisters and wives and daughters who attended college and who have career interests themselves. They're no strangers to "uppity women," and they've discovered that while

"uppity women" can be a bit scary at times, prolonged exposure is rarely fatal.

THE HISTORY OF WOMEN IN NASA

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Women's Equality Day
Marshall Space Flight Center
August 23, 1991

A little over three years ago my friends in the Federal Women's Program at NASA Headquarters asked me to give a talk during Women's History Week on the history of women at NASA. This I did, and we had a good bit of fun talking about the circumstances that faced working women in decades past, about changes that have taken place, and changes that have not taken place.

Your nice invitation to be with you today prompted me to pull that talk out of my file drawer and to see if my views on woman's condition in NASA, and outside NASA for that matter, had changed. I am happy to report that there have been indications of change--small change, gradual change, but real change nonetheless--during the past three years. So, I'm somewhat more optimistic now than I was a few years ago.

Once upon a time, when we studied history we studied the doings of famous or notorious men. In those days you read or heard little about people like you or me. History has since changed, not because life has changed--the essentials of ordinary living are pretty much the same today as they were centuries ago, with the important exception that the nature of work has changed enormously. Rather, history has changed because our ideas about what is worth remembering have changed. As different groups have acquired stronger political voices, what has survived as history worth remembering has changed as well.

Thus it was that not long after the French and American Revolutions, historians became more curious about the experiences of ordinary people. And, more recently, non-dominant populations have insisted that their story be told, and that their story be told as part of a more critical rendering of the history of dominant populations. History is not, as we were told in grade school, a collection of facts about the dead. History is a mirror we hold before the living, and as we change, history changes.

Notice also that I have replaced the usual term "minority" with "non-dominant" and "dominant." To speak of women as a minority is inaccurate. And the continuing use of the term "minority" perpetuates a subtle presumption of lesser significance among certain groups at the very same time that we are working toward equality. But all this is an argument for another time. Back to history:

Women's work life prior to this century was, of course, largely in the home. Like their brothers and sons and husbands, women worked long, hard hours--the women at farm as well as domestic labor. Then came the industrial revolution of the last century with its textile factories, sewing machines, and typewriters. Women could, and especially if they were single, did begin to work outside the home. Their little children often

went out to work too, in the fields and in factories--and sometimes in the mines as well.

Toward the end of the last century, the rise of big business created a whole new career opportunity for women: the secretary. Equipped with her typewriter and a well-developed repertoire of deferential behaviors, she began to do what she has been doing ever since: making it possible for her boss--until recently usually a male--to succeed. His success was visible; her service was too often invisible.

Thus it was that until World War II the occupation of secretary, along with the traditional occupations of nursing and teaching--which were, like waiting tables, mostly extensions of women's domestic sphere--was added to the ways women could support themselves, if not their families, and hope for some independence.

Great social crises often beget profound social changes. During the Great Depression of the 1930s, in the midst of widespread unemployment, many women went to work at whatever jobs they could find to make ends meet. Middle-class wives of unemployed insurance salesmen went to work as chambermaids in the resort hotels of the rich. During World War II, women drove trucks and worked in factories wielding blow torches and riveting guns.

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become overwhelmingly the preserve of hundreds of thousands of young American men.

At the beginning of the twentieth century engineers were portrayed in magazines and popular novels as the Paul Bunyans of the new industrial age. Building the Panama Canal, for example--the pet project of rough riding president Theodore Roosevelt--was not mere women's work. Engineering thus acquired a machismo which was reinforced by federal policies in the 1940s and 1950s that assured that engineering would remain a man's occupation. The same generation of engineers that shaped this agency after 1958 would preserve the fantasy that men were uniquely gifted to be engineers. In truth, the only thing that was unique about them was that never before and never since has the federal government done so much to guarantee that one profession would be dominated by a single group in American society.

Another field that would become largely closed to women as a result of World War II was high-performance aircraft flying. Because women have been excluded from combat flying, and most high-performance aircraft have been developed for military use, the career of test pilot would become imbued with a machismo as great as can be found in any other field. If you have any doubt about it, rent the

videotape of the movie Top Gun and contemplate the roles played by the male and female leads.

Now, you may ask, what does this have to do with NASA? Well, this bit of history has a great deal to do with NASA. When our agency was created in 1958 in the heat of our nation's eagerness to prove that we could surpass the Soviets in the conquest of space, engineers and astronauts came to personify all that was vigorous, creative, and new. The future of the nation rested on their shoulders--the shoulders of MEN, men full of 'the right stuff.'

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To expose women...to the known as well as incalculable dangers of pioneer space flight would be like employing women as riveters, truck drivers, steel workers, or coal miners...

Or, here speaks a NASA astronaut in 1974: "I don't foresee any problem about men and women getting along together on space missions. We're not talking about dizzy blonde secretaries, but reputable women scientists." This remark reveals double trouble: those secretaries, without whom NASA would be at a total loss, are dismissed as "dizzy blondes." For those of you too young to remember, when this astronaut was growing up Hollywood was turning out "dizzy" and dumb "blonde" movie sirens celebrating the nadir, or rock bottom, of our media portrayals of white women. Poor Marilyn Monroe was one of many victims of this unhappy chapter in our past. Black women were typically portrayed as domestic workers, Aunt Jemimas of the middle-class American kitchen.

But that's not the whole of it. Eager to assure us that astronauts wouldn't want to be lost in space with "dizzy blondes," this fellow goes to the other extreme: she must be a reputable scientist. No ordinary, hard working women in engineering, let's say, or medicine, let's say, or aviation, for this astronaut who thus narrowed the field for women down to the width of the eye of a needle.

So if you were a young woman in the 1940s, 1950s, or 1960s with an interest in the physical sciences, what did you do with yourself? Believe it or not, some such women were very, very brave and went into engineering where their careers could be very lonely. Among the loneliest hours were spent at engineers' professional meetings, where the men gathered for beer, conviviality and networking while the women retired to their hotel rooms. Many women biologists, physicists, and chemists who were disinclined to spend the rest of their careers assisting male scientists claim research discoveries, went into teaching.

But it was mathematics that, at first, provided women the best avenue to a technical career in NASA. NASA had a great need then, as it still does, for computational skills for computer programming, simulation, trajectory computation, and analysis of tracking and communications data. At first the women computers--the first computers anywhere were people--were segregated with their slide rules and Friden calculators into female

computer pools well into the 1960s. At Langley Research Center black women working as computers were assigned to a segregated area "on the other side" of the laboratory.

Just as the federal government so deeply tipped the scales in favor of men in the 1940s and 1950s, it was the federal government which, in the 1960s and 1970s, began to tip the scales the other way. The successful launch of the Soviets' first Sputnik in October, 1957 created a national panic over the number of young Americans receiving higher and graduate education. One result was the National Defense Education Act which enabled thousands of young women--myself included--along with men, to attend graduate school and begin professional careers.

The civil rights movement of the 1960s stimulated further changes. The Civil Rights Act of 1964, the first significant civil rights legislation since Reconstruction, prohibited sex discrimination in employment. By 1972 all private employers of 15 or more persons were required to develop affirmative action plans. Beginning in 1973 even the government itself was required to implement affirmative action programs.

The percentage of women scientists and engineers¹ in NASA rose from the roughly 3% level of the 1960s to around 5% in 1981 and then about 8% in 1987. Currently the percentage of non-minority females in

¹ Occupational Codes 200, 700, 900.

NASA's science and engineering corps is about 11.4%. (The percentage of all minorities in NASA science and engineering occupations, which rose to 13.5% this year, also includes some minority women.) In your own Center the number of women in science and engineering occupations has increased five-fold during the last decade.

Changing percentages may suggest progress, but statistics are debatable tools by which to prove it. For one thing, statistics--when used to measure social change--can be easily manipulated and usually are. For another, the use of numerical affirmative action goals are now highly debated, as much by the intended beneficiaries of such goals as by the opponents of affirmative action as a strategy for integrating the workforce.

Far more meaningful, in my judgment, are indications that organizations are increasing the number of women and persons from other non-dominant groups at all levels, thus ensuring eligibility for promotion to higher ranks within an organization. The key here is to achieve an objective demonstration that the dynamics of upward mobility are at work in an organization for everybody, not just white men. And here, again, your own Center is making real, and in some cases dramatic, progress.

In the last decade at Marshall the number of women in GS/GM-13 positions has increased ten-fold; this year there are almost ten times as

many women in GS/GM-14 positions at Marshall than there were ten years ago. Breaking through to GS/GM-15 appears to be a little tougher, but still more possible than it was a decade ago: in 1981 there were 3 women in this high GS/GM position and now there are six. Entry into the Senior Executive Service is still a high barrier, but not impossible to cross. Ten years ago there were no women in the SES at Marshall and now there are three: Susan McQuire Smith, Carolyn S. Griner, and Susan L. Cloud.

It was a real pleasure for me to get to know Susan Cloud when she was at Headquarters serving as Assistant Executive Officer to Deputy Administrator Dale Myers. Attractive, gracious, so clearly intelligent, and thoroughly unflappable, Susan Cloud is a credit to us all. I know comparable things can be said of Susan Smith and Carolyn Griner.

The springs that feed the talent pools from which women are drawn for significant career paths begin in our schools and colleges. As important as the changes reflected here at Marshall is the fact that more and more women who have enrolled in college and graduate engineering programs are staying to graduate. As one who can testify personally how little social or moral support there was for a woman struggling through graduate school during the 1960s, this is one of the most encouraging developments.

The important thing is not simply to appoint a woman, or a black, to a high position; but to make sure that she or he succeeds once there. If she or he is drawn from a strong, vigorous pool of middle-managers, that success is more likely and the consequences for others, through the positive influence of good role models, will be worth much more than faceless statistics. Happily, this is happening.

You know your own role models here at Marshall. At NASA Headquarters we now have in the 2nd tier of top management 4 women whereas two years ago we had only one. The newest is Darleen Druyan, NASA's Assistant Administrator for Procurement. Druyan came to NASA as the highest ranking woman executive in Air Force contracting. Considering that 9 out of every 10 NASA dollars goes into procurement, Druyan is easily one of the most important people--man or woman--in NASA.

None of the top four women at NASA headquarters heads a scientific or technical organization. In this they reflect the somewhat disconcerting fact that the largest number of women in NASA, or about a fourth of all of NASA's employees, have been working not in science or engineering, but in professional and administrative jobs. So long as NASA thinks of itself as a research and development organization, most professional and administrative positions will be perceived--at least by the

men who still run NASA, men who are mostly former engineers--as simply as support for the truly important work of the agency, handling the hardware. The truth of the matter, of course, is that handling the hardware has become less and less what this agency does; instead, we develop budgets, we process procurements, we manage contracts, we plan and program and program and plan, and for all of this, administrative work is the backbone without which the whole agency would collapse.

So is there anything useful we can we learn from the history of women in NASA? I think so. We can learn that the opportunities available to us are often shaped by cultural factors that are difficult to change; and that the persistence of outdated stereotypes of women in largely masculine organizations is one of those factors. NASA's heritage as an engineering organization and standard bearer for the masculine romance of flight are two other such factors. Cultural change cannot be made to happen overnight, but change can be worked at incrementally and persistently. I recommend patience--not the passive patience of the acquiescent, but the active patience of those who act with both conviction and endurance.

While federal laws can't guarantee opportunities for talented women, since 1973 they have forced the "good old boys" to think twice before they talk about "dizzy blonde secretaries." Where once the men

could look around, above, and through a capable woman, more now take her seriously. The effect, however incremental, is reflected, if not proven, in the statistics. Moreover, federal manpower policy for scientists and engineers no longer has a built in bias toward men, as it did in the 1940s and '50s.

Finally, we are in the midst of an important generational change. The men arriving at positions of influence in this agency now are more likely than their fathers to have mothers and sisters and wives and daughters who attended college and who have career interests themselves. They're no strangers to "uppity women," and they've discovered that while "uppity women" can be a bit scary at times, prolonged exposure to them is rarely fatal.

Thank you for allowing me to share with you today's commemoration of the women, and men, who are intent on ensuring that all of our talents are given an opportunity to participate in this, our, great journey into Space.
