Wallace Stegner, John Wesley Powell, and the influence of scientific revolutions

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WALLACE STEGNER, JOHN WESLEY POWELL,
AND THE INFLUENCE OF SCIENTIFIC REVOLUTIONS

by

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CHAPTER 1

It is common to hear Wallace Stegner referred to as "the dean of American letters," or as someone who was "ahead of his time" in matters of western history and conservation. And it is recognized that much of what he accomplished in his life backs up these remarks. He had a diverse career as a novelist, biographer, essayist, historian, and teacher. He was director of the Stanford writing program for twenty-five years. He won the Pulitzer Prize, a National Book Award, three O. Henry awards, and was twice a Guggenheim Fellow. He was a member of both the National Institute for the Humanities and the National Academy of Arts and Sciences. But this reputation tends to cast him as an ultimate authority on the American West, and neglects the fact that he too inherits his ideas and values from those who came before him. What I would like to do in these two chapters is place Wallace Stegner in that continuum of human history. In this first chapter I will examine Stegner's connection to John Wesley Powell, whom I believe is an important figure in Stegner's life, and had a great influence on his views about the environment and about writing.

Many critics have made the connection between Powell's Report on the Lands of the Arid Region of the United States, and Stegner's own views on western land and conservation, pointing out where Stegner echoes many of the key observations about aridity, climate, and habitat that Powell had first made on his trip down the Colorado River. Others point to Stegner's extensive biography of Powell, Beyond the Hundredth Meridian, as proof of his interest in Powell's ideas. A few critics even suggest further associations between the two men. Forrest G. Robinson states that Stegner
turned to Powell in response to the wandering, thoughtless men, like his father, who explored the West; Powell became "the positive ideal of masculinity that was his father's opposite— the gentle, civilized, and civilizing man who is a reoccurring figure in his work" (30). In a few of Stegner's novels, such as *Angle of Repose* and *All the Little Live Things*, the narrators are portrayed as "civilizing men," containing a number of characteristics that seem borrowed from Powell's character. I believe that John Wesley Powell was a touchstone for Wallace Stegner. Not only did he provide Stegner with a working knowledge of the West, but he represents all that Stegner holds sacred in the "American character," the morals and values which constitute a model citizen.

Much of Powell's "character" comes directly from his life-long preoccupation with science. If one neglects this important connection, Stegner's attraction to Powell is only partially understood. Powell's career as a scientist caused him to look at the world with certain interests and insights, and to come to conclusions based on those interests and insights. If he had been a painter or musician, those conclusions would have been different. Because Stegner's writing, both fiction and non-fiction, draws heavily from Powell's life, an understanding of Powell's involvement with science is essential.

1. COMMON GROUND

There are a few key similarities in the character of both men, and these similarities, I believe, form the basis of Stegner's attraction to
Powell, and highlight Stegner's own concerns about writing and the environment.

Childhood was an important time in their developments, and the fact that they grew up under the shadow of dominating father figures had a direct influence in the shaping of their interests and personalities. John Wesley Powell was the son of Joseph Powell, an English Methodist Preacher who came to the United States in 1830. Joseph Powell was a tireless missionary, intent on spreading the gospel as far as he could, and this burden fell heavily on his son's shoulders. His early life was filled with dogma and strict routine; Donald Worster states that "John Wesley, was intended by his parents for the ministry too and by the age of five had committed all the New Testament gospels to memory" (Wealth of Nature, 190). The family moved often during his boyhood, and put him in touch with what was then the "frontier." By the time he was taken off to the Civil War, Powell had lived in St. Paul, New Orleans, Pittsburgh, St. Louis, and ventured across much of Michigan, Wisconsin, Missouri and up and down the Mississippi River.

Being constantly uprooted did not allow him much steady schooling, and because Powell was an eager and curious boy in the tradition of Abraham Lincoln and Mark Twain, he forged his own "homemade education." Although he acquired a strong foundation of reading and writing from his father and the Bible, he was constantly pulled in more secular directions. He devoured any book he could find and frequently took trips out into the landscape to explore its plants and animals. This turn toward the natural sciences was solidified when he met George Crookham, a farmer and abolitionist
active in the Underground Railroad. Crookham was himself a self-made scientist, with a private collection of specimens and a library of scientific works, and he took young Powell under his wing. The two had a brief but intense relationship, going out into the fields and woods to study botany, geology, zoology, ethnology, and to philosophize. Crookham's ideas took hold in Powell's mind and preoccupied him as he became an adult. Stegner states that Crookham was:

in the best tradition of the self-taught rural savant, and his life overflowed with scientific, political, agricultural, religious, and human interests . . . the few years of Crookham's company and instruction had a thousand times more immediate effect on the boy than all the years of his father's piety and orthodoxy (Hundredth Meridian, 14).

This growing love for the environment coupled with his father's evangelical temperament created a man who had "vitality, originality, and circumambient intelligence . . . alone in the variety of his interests and the indefatigability of his pursuits" (Reisner, 25).

The childhood of Wallace Stegner, although it follows a different but equally winding path, comes to some of the same conclusions. His father, George Stegner, was, as Forrest Robinson sums him up, "young, rangy, athletic, irresponsible, a gambler and therefore something of a fighter, resourceful, musical in a primitive sort of way, basically a drifter" (18). He was a man who was the product of his society's "get rich quick" mentality. He believed, as many did at the time, that the next opportunity lay farther westward, the mining, farming, gambling, or drinking schemes that would
allow him to make a fortune and live the rest of his life in luxury. While the Powells traveled from place to place with their missionary work, the Stegners wandered through the West in search of rainbows.

Wallace Stegner spent most of his boyhood in a small town in southern Saskatchewan, Canada known today as East End, a place which became the focal point of his history/memoir *Wolf Willow*. He grew up a "sensuous little savage," trapping muskrats, driving cows, shooting guns, or swimming in the river. It is this time out of doors that Stegner remembers. Exploring the landscape in which he lived fascinated him because it was the land that shaped the way he and his community worked and thought. In his conversations with historian Richard Etulain, he states, "the plains are so dominant and simple, so geometrical a world, that you feel yourself noticeable even when you're small" (*Conversations*, 1). Although he had a knack for school, the subjects he studied seemed to him odd and a bit confusing. For the most part his "education" was imported, the standard math, English, and history which all children in Canada were required to learn. What was taught as important or essential had little or no correlation to his life in East End:

> I read whatever books I could lay hands on, and almost everything I got from books was either at odds with what I knew from experience or irrelevant to it or remote from it. Books didn't enlarge me; they dispersed me. (*Wolf Willow*, 26)

One way Stegner's curiosity manifested itself was by exploring the town dump. Because East End was a "frontier" town, it considered itself new and ahistorical. The men and women who first farmed the land, and
built the town, and survived the first winters did not realize anything had come before them. Likewise, they did not consider themselves a part of any continuity within the history of the place. As a boy Stegner and his friends recognized, however vaguely, that the dump was a depository for the things that defined their community, all the secrets and relics that they would leave behind as a kind of record. He states:

The town dump was our poetry and our history. We took it home with us by the wagonload, bringing back into town the things the town had used and thrown away . . . for a community may be as well judged by what it throws away . . . for whole civilizations we sometimes have no more of the poetry and little more of the history than this. (Wolf Willow, 36)

Like Powell, Stegner was a child with a great deal of curiosity. Both were lucky because they were able to resist their "traditional educations" and follow what was truly important to them, for Powell it was the path of nature and science, and for Stegner it was a fascination with story and history.

In the second chapter of Wolf Willow, Stegner opens with a crucial observation about childhood:

Unless everything in a man's memory of childhood is misleading, there is a time somewhere between the ages of five and twelve which corresponds to the phase ethologists have isolated in the development of birds, when an impression lasting only a few seconds may be imprinted on the young bird for life. This is
the way a bird emerging from the darkness of the egg knows itself, the mechanism of its relating to the world. (21)

He goes on to describe the importance of those first "impressions," how they are inextricably tied to one's environment. A child carries with him or her the qualities of those years for the rest of his or her life, not only the shapes, smells, sights, and other physical properties of place, but the emotions, values, attitudes, and perceptions which bind the community to its surroundings. From this foundation, the child ventures out into life, adding to it as the years go by. Each person, or generation, or society, progresses in a linear or consecutive fashion; history is like a "pontoon bridge," as Stegner puts it, and children walk out on the pontoons of what came before them in order to keep building.

Those first impressions which captured the minds of John Wesley Powell and Wallace Stegner had immense impacts on the men they were to become. The similarities in their childhoods produced similarities in character. Both endured the rigors of "frontier" life and learned a certain kind of independence, stubbornness, and believed in the work ethic. Both had an unending curiosity which allowed them to look at life from a variety of angles, and master a number of disciplines later in life. And both had an intense love of the outdoors, a love that was strong enough to make them study and explore and fight for the environment all their lives. They both found themselves in opposition to popular beliefs, lone men against their societies' values. Because many of their ideas turned out to have merit, it has become fashionable to call them "prophetic," but they were not so much "ahead of their time" as they were stubborn enough and willing
enough to say what others didn't want to hear.

The figure of John Wesley Powell is important to Stegner for these reasons. I am not suggesting that Stegner mimicked Powell's life or blindly followed his ideas and research. I believe Stegner found in Powell the values and character traits that he himself identified with, and these traits exhibit themselves clearly in Powell's work as a scientist. I would now like to examine Powell's scientific career and his ideas about the environment as a way of explaining Stegner's own environmental concerns, and his reactions to the ecology movement of the 1960s.

2. A HORSE NAMED SCIENCE

In a volume of selected prose by John Wesley Powell, edited by George Crossette of the National Geographic Society, the frontispiece is a photograph of Major Powell in 1896. He stares back at the camera is steadily from behind his bushy eyebrows. He has scattered and thinning gray hair, a rangy beard, and an air of confidence that many photographs of old veterans exhibit. His rough left hand rests easily on the back of his chair while the empty sleeve of his right arm hangs stiffly at his side. On the opposite page is a poem by Paul Oehser entitled, "To John Wesley Powell." The first stanza reads:

In those days, there were giants in the earth,
And you, Wes Powell, were among the giants;
You had ideas, and you gave them birth;
You put your money on a horse named Science.
The poem goes on to describe that horse as an animal that is "dauntless, big hearted, blustering . . . self confident, ingenious . . . bewiskered," and one cannot help, by glancing back at the photograph, making the poet's intended connection between the man and his profession. Powell's personality and his approach to science were similar to the popular perceptions of the role of science in the late nineteenth century.

Given Powell's childhood and adolescent experiences, it is no surprise that he was a generalist. He studied and wrote on a wide variety of topics and disciplines, among them music, language, myth and folklore, and Native American cultures. Powell was familiar with Darwin's theory of natural selection and believed that the world operated on those principles of competition; the individuals and species best adapted to their surroundings survive while the weaker or less adapted move on to a different niche, or perish. "The whole universe of life is in a struggle," claimed Powell, "all living beings are engaged in a warfare one with another" (Selected, 69). However, it is the fecundity and abundance of species which interested him most. Competition was only a factor because of each species' intense desire to reproduce:

It is beyond the capacity of the human mind to comprehend the powers of biotic reproduction . . . if all the vegetation upon the surface of the earth were destroyed leaving but one young palm, one young oak, and one young pine . . . in a succession of generations this palm, oak, and pine might live to see their progeny covering the whole earth. . . . The life which teems upon the earth is thus crowded into every
available spot; and yet the fountains of life never fail.

Every spring sends its stream into the flooded world. There is life for all the earth, and more life and still more life; forever and forever it comes. (Selected, 68, 69)

All this abundance and vitality is not without some purpose. Powell allows that along with reproduction, species undergo a growth of sentiency, a sensation of feeling or consciousness. Animals not only feel pain and pleasure, but they are in pursuit of happiness. "More vitality is evolved than is needed for the stern purposes of bare existence," he states, so that animals play; "the cubs of the bear dance on the greensward; the swallow floats on the air with lilting wings of joy" (Selected, 70).

The evolution of humans follows these same principles: multiply and pursue happiness. But because of our relatively oversized brains, we have slowly distanced ourselves from animals by the development of language, the arts, institutions, and reason. Powell states that we are no longer dependent, for the most part, on the natural environment to survive. We can shape the world around us with our imaginations and technology, and live independent of natural "rules." As Powell puts it:

An aerial variety of man is not discovered, but he uses the winds to propel his machinery and to drive his sails; and, indeed, he can ride upon the air with wings of his own invention. (Selected, 72)

John Wesley Powell was by no means an environmentalist in the way we think of environmentalism today. His preoccupation with a natural world that abounds with life was a predictable offshoot of his society's views.
At that time, much of the land beyond the hundredth meridian was unknown, uncharted, full of promise. Rumors circulated. Myths flourished, describing a land where the hills were filled with gold, where crops thrived because "rain followed the plow." He believed, just as William Gilpin and many other "boosters" for western expansion believed, that it was proper to use and dominate the new landscapes before them. In an address to the American Philosophical Society in Washington in 1883, Powell proclaimed that Man "has organized a new kingdom of matter, over which he rules," and "the powers of nature are his servants, and the granite earth his throne" (Selected, 72). However, the crucial difference between Powell and the rest of the western expansionists was that he understood the limits and the qualities of the West. Although he believed in domination and use, if settlers did not inhabit the West thoughtfully, with careful use of its resources, he predicted that both the settlers and the land would be ruined.

Powell's understanding and intimacy with the West would never have occurred without that horse named Science. In many ways, the horse/Science metaphor is an accurate one. Unlike more modern research techniques, where experiments are conducted in controlled, sterile laboratories or carried out theoretically with mathematics and computers, science in the late nineteenth century was still a physical endeavor. Much of the land, plants, and animals were still unknown and knowledge required that scientists go out and observe them. So the image of the scientist became similar to the image of the journeyman, an adventurous laborer. A scientist had to be tough, strong, versatile, dependable, not unlike a good horse, and
tenacious enough to bring back data from wherever he found it. Consider this passage from Stegner's *Beyond the Hundredth Meridian*, where Powell's men are on a scientific exploration of the Green and Colorado Rivers. The action and tension of the journey make the scene read like pages from an adventure novel:

Powell saw the boat hang for a breath at the head of the rapid and then sweep into it. . . . He saw it strike a boulder and heave up like a bucking horse. All three men were thrown out, but when the boat jammed briefly against the rocks they managed to grab the gunwale, and as she slipped off and started down again Powell watched the dripping boatmen frantically haul themselves in. The boat was full of water. . . . She wallowed down through the rapid, pounded into the tail waves and on two hundred yards to a second rapid as wild as the first. There she struck solidly, broadside, and broke completely in two. For a moment the tiny dark heads of the swimming men were visible in the foam, and then the water swept them out of sight. (63)

Powell certainly lived up to this "adventuring scientist" reputation. He was strong, trustworthy, and competent, and possibly thought of as more competent because he accomplished what he did with only one arm. He led two expeditions, in 1867 and 1868, into the Rocky Mountains to gather botanical, zoological, and geological information, and during the second trip they wintered along the White River in western Colorado. In 1869 he led the first party to successfully navigate the Green and Colorado
Rivers. Although the rivers were trecherous and unpredictable, the party not only survived but was able to record valuable data along the way. Powell studied and described geologic forms, different types of drainages and sediments. He determined latitude, longitude, and altitude along the rivers, estimating their rate of descent toward sea level. He encountered Native Americans and wrote about their cultures, habitats, and language.

Many of these findings were refined and included in his Report on the Lands of the Arid Region of the United States of 1878. The overriding message of the Arid Region report was that beyond the hundredth meridian the average annual rainfall drops off to less than 10 inches a year, an amount insufficient to support the conventional agricultural methods practiced in the East. Powell synthesized his findings and came up with a number of suggestions and warnings about how the West was being settled. He dismissed the standard 160 acre settlement as being inappropriate, too many acres for a single family to work and irrigate and too few to supply enough range for cattle. Since the arid regions depended on bodies of water and not rainfall, he suggested that state boundaries should follow drainages and watersheds instead of political lines so that these states could regulate water rights effectively.

Powell's Arid Regions report is a very thorough and convincing document, and it benefits greatly from those diverse interests he cultivated as a young man. The report mingles different types of knowledge in order to form a more complex and realistic vision of the region. He supplies hard data on the mean annual rainfalls, rates of flow in a number of streams and rivers, seasonal temperatures, location and quantity of timbered land,
and compares these findings between the different western states. He outlines the history of irrigation practices that took place decades beforehand, Mexican and Native American techniques in California and the Southwest, the Mormons with their communal water works in Utah, and discusses their practical applications. He recognizes the political power at work in settling the western states and describes the monopolies and inadequate laws at work in the West. In a discussion on water and land rights he states:

The hardy pioneers engage in a multiplicity of industrial enterprises surprising to the people of long established habits and institutions. Under the impetus of this spirit irrigation companies are organized and capital invested in irrigating canals, and but little heed is given to philosophic considerations of political economy or to the ultimate condition of affairs in which their present enterprises will result . . . . Every man who turns his attention to this department of industry is considered a public benefactor. But if in the eagerness for present development a land and water system shall grow up in which the practical control of agriculture shall fall into the hands of water companies, evils will result therefrom that generations may not be able to correct, and the very men who are now lauded as benefactors to the country will, in the ungovernable reaction which is sure to come, be denounced as oppressors of the people. (Arid Regions, 53, 54)

All in all, Powell's report is more than a simple compilation of facts. It engages in a number of "philosophical considerations" for the benefit
of the land and people. At its heart, Powell's report is revolutionary. It attempts to say something at once hopeful and reproachable. Using science as its primary vehicle, it attempts to change people's minds.

In his book, The Structure of Scientific Revolutions, Thomas Kuhn argues that science shapes the community it serves, defining what the world means to its members through observation and experimentation. A society functions because of its paradigms, that "set of recurrent and quasi-standard illustrations . . . and instrumental applications" (43). Paradigms form the series of "rules" that a society believes and adheres to, and are found in its textbooks, laboratory exercises, stories and myths, social values and mores. The thrust of Kuhn's argument is that paradigms are not static. Revolutions occur in the scientific community that have profound effects on how that community conducts itself, and in turn, these changes effect the larger population in how they view the world around them. He states that:

during revolutions scientists see new and different things when looking with familiar instruments in places they have looked before . . . familiar objects are seen in a different light and are joined by unfamiliar ones as well. . . . Neverthe­less, paradigm changes do cause scientists to see the world of their research-engagement differently. In so far as their only recourse to that world is through what they see and do, we may want to say that after a revolution scientists are responding to a different world. (I I I)
New paradigms do not gain a foothold in the scientific community and in society easily. If a paradigm is to survive, it must have supporters which are curious and persistent, willing to challenge those new views from a number of angles in order to strengthen and elaborate on its principles. If these arguments are sound the new paradigm will gain attention and old practices will be replaced by newer methods and ways of thinking. "Convinced of the new view's fruitfulness," says Kuhn, scientists "will adopt the new mode of practicing normal science, until at last only a few elderly hold-outs remain" (159).

What Powell was attempting in 1878, when he presented his **Arid Regions** report, was to shift the country's presiding paradigm. Whether the western boosters were powerful bureaucrats, unscrupulous railroad tycoons, or average homesteaders, they all were looking toward the West with eastern eyes. Everything their culture taught them about inhabiting a place was inappropriate when applied to a western landscape. Powell and a few others knew this, but the majority of the population was either getting rich off promoting the West as the "paradise" it was not, or they refused to believe in anything other than the illusions they were handed. The paradigm Powell proposed, although viable, perished from lack of interest and faith.

Wallace Stegner not only took up Powell's data and statistics, but his plight as well. Powell relied on his science. He believed it showed him the proper path to take regarding western expansion. Stegner also relied on Powell's science, but more importantly, Powell became an historical example for him, a warning from the past. I would now like to examine Stegner's own battles with conservation and the environmental movement.
of the 1960s, and how he used Powell as a tool in his argument for change.

3. BLACK HOLES AND THE END OF HISTORY

In charting the development of Stegner's ecological views, one can see them coincide with his involvement with the Powell biography. As he states in his conversations with Richard Etulain, "I'd been interested in conservation-- because I was interested in Powell-- long before I came to California. I started being interested in Powell when I was still teaching at the University of Utah way back in the 1930s" (168). Stegner was well aware of Powell's influence on him. Through the 40s and into the mid 50s when *Hundredth Meridian* was published, his interests and knowledge about environmental policies and problems grew. He had encouragement and advice from Bernard Devoto and David Brower, and this led to a scattering of essays on the environment and his position as editor of a book *This is Dinosaur: Echo Park Country and Its Magic Rivers*, a collection of essays designed to stop dams from being built in Dinosaur National Monument. But no matter the current political battles, Stegner continually sought evidence and information from the history of the region, those explorers who were first to recognize the difficulties of the West. "Certainly Powell taught Webb," says Stegner, referring to Walter Prescott Webb, and the fact of aridity of the West, " and Powell and Webb, between them, taught Benny Devoto; and they all taught me" (*Conversations*, 182).

years after the publication of the Powell biography, and another collection, *Where the Bluebird Sings to the Lemonade Springs*, followed much later in 1992, a year before his death. Most of the essays in *Mountain Water* read like travelogues, interspersed with comments and reflections on the Bureau of Reclamation or the Forest Service. *Lemonade Springs* seems much more confident and thorough, combining personal memory and environmental history in order to talk about the current problems of living in the West. But what they share is an attitude of concern, an argument which emphasizes the preservation of land that will not be "used."

More than merely a recreational arena, wilderness is important as a "spiritual resource," as Stegner puts it, "a place that is important to us... because it is there-- important, that is, simply as an idea" (*Mountain Water*, 147). The "spiritual" benefit Stegner talks about is what recent evolutionary ecologists have called biophilia. Biophilia is defined as an inherent love for the diversity of nature. In fact, some biologists suggest that it is a requirement for us to be healthy physically and psychologically. Biophilia is dependent on a varied global ecology, a planet composed of many different species and habitats. Without this diversity there is no "spiritual" connection, or as Edward O. Wilson puts it, no "multiple strands of emotional responses" with the world around us. We lose connections with the world and our lives suffer. Wilson states:

The significance of biophilia (loving nature) in human biology is potentially profound... it is relevent to our thinking about nature, about the landscape, the arts... and it invites us to take a new look at environmental ethics (*Biophilia*
This idea runs counter to the workings of many modern societies, where the emphasis is on "growth" and "progress," and where mining, timber harvests, agriculture, etc., have destroyed a number of different habitats. Destruction of this kind has been particularly apparent in the West due to its aridity, and in an attempt to change the land into cities, "we have acted upon the western landscape with the force of a geological agent" (Lemonade Springs, 47).

Stegner therefore, looks at the West with eyes that have seen considerably more environmental abuse than Powell's. So ignoring Powell's sentiments to expand and conquer nature, Stegner instead focuses on Powell's scientific inquiries and how they called for a more thoughtful, less destructive way to inhabit the West. Powell set out into the West, searching and testing, and he came back with a kind of truth, or verifiable data, about the region. Stegner calls him:

A revolutionary. He might have spared the West the dust bowls of the 1890s, 1930s, and 1950s, as well as the worst consequences of river floods. He might have saved the lives and hopes of all the innocents who put their straddlebugs on dryland homesteads in the Dakotas, Kansas, Nebraska, and Montana . . . but habitat, politics, and real estate boosterism won out over experience and good sense. (Lemonade Springs, 51)

What Stegner learned most from Powell was that western living would be unduly hard and intensely destructive without a new paradigm. People would not only have to change their living practices, but also the way
they thought about their landscape. "You have to get over the color green," says Stegner, "you have to quit associating beauty with gardens and lawns; you have to get used to an inhuman scale" (Lemonade Springs, 45). As an example of the resistance people feel toward this type of change, he tells the story of his Aunt who was visiting from Iowa. They were driving to Stegner's cabin outside Salt Lake City when she saw Seiver Plateau, a mile-high, cliff-like mountain. When asked what she thought of it, she could not accept or comprehend its size, and so coped with it by comparing it to the small river bluffs, which were only 40ft. tall, of her own home country.

The difference between Powell's dilemma and the one Stegner was facing is that Powell was warning his culture before they moved into the West; Stegner's call to change was directed at people who were established in western regions, people who for generations still lived by ideas which were necessarily eastern in origin (maintaining a lawn, as an example). Stegner used Powell's data as a backbone of facts which supported the claims he made for other changes that needed to take place in the minds of the people inhabiting the West. Where Powell used science, Stegner realized that adapting was a sociological problem. Changes in color, scale, space, and annual rainfall, must be accepted if we are to understand the western places in which we live. "I really only want to say that we may love a place and still be dangerous to it," says Stegner, "that may be the last stage of our adaptation to the western landscape, and it may come too late" (Lemonade Springs, 56).
But the 1960s were undergoing drastic changes of their own. Einstein's work on the theory of relativity in the 30s and 40s, and the blossoming of quantum mechanics, were having profound effects on the way scientists looked at the world.

Puzzled by the way new experiments showed that light seemed to move independent of velocities, Einstein set about an investigation which eventually led to a re-defining of the concepts of Space and Time. Space had previously been thought of as an absolute framework, an area in which everything, the sun, planets, light, could be measured. Time, on the other hand, lacked description. We knew what it was, and that it had "directions" (past and future), but we could not see into these directions or move about in them freely. By experimenting with the way light moved, Einstein was able to prove that these two concepts were not separate, and that there was no existence of an ultimate referent (like Space was previously thought to be). Space and Time moved together, as Spacetime, and eventually this led him to believe that the Universe was not static, as Newton had believed, but was instead expanding. Astronomers, with the aid of high-powered telescopes, confirmed this. Planets moved away from each other in this expanding Spacetime, and as Michael White and John Gribben explain:

You can see this by imagining two spots of paint on a strip of elastic, or on a rubber band. When you pull on the ends of the strip, it stretches, and the two paint spots move apart, but they do not move through the material the strip is made of. (Stephen Hawking, 82)

The movement of light itself also came under question. In certain
circumstances, light behaved like a wave, in others it moved as if it were made up of particles. These experiments led to further questions about movement at the subatomic level and it was found that electrons act in much the same way. So in the quantum world (atomic world) waves and particles are the same thing; their movement is at once pinned down and spread out, so that we cannot ever be sure where, precisely, an electron is. This is called the "uncertainty principle," and is the foundation of quantum physics. It means that two identical electrons under identical conditions will not necessarily act in the same way. Therefore, at the quantum level experiments are also unpredictable; all we are able to do is assign probabilities.

The 1960s also saw the rise of Stephen Hawking's work on black holes. Working theoretically from observations noted by astronomers, Hawking proved that there were objects out in space over three times as dense as our Sun, and they ended their lives by imploding, or collapsing in on themselves. These objects were so dense, the electrons and protons so compressed, that they became "black holes," areas that distorted Spacetime so much that light could not escape from them. Because nothing travels faster than light, this meant they acted like a bottomless pits in which nothing could ever escape.

Although the phenomena that Hawking and others discovered do not directly affect us, their repercussions have had a profound effect on the way we view the world. At base these findings challenged the stability of our belief in the natural world, and even challenged the belief in a "divine plan" or the existence of God. As White and Gribbin state:
By introducing uncertainty and probability into the equations, quantum physics does away once and for all with the predictive clockwork of Newtonian determinism. If the Universe operates, at the deepest level, in a genuinely unpredictable and indeterministic way, then we are given back our free will, and we can after all make our own decisions and our own mistakes. (Stephen Hawking, 38)

The 1960s marked a time in which free will was a major preoccupation throughout American society. The revolutions happening in science, the breaking down of old dogmas and ways of working and experimenting, were having an effect on social structures, politics, gender issues, the arts, and concerns about the environment. Men and women questioned and abandoned the stereotypical sex roles they had inherited from the previous decades. Mass demonstrations condemned our involvement in Viet Nam. The Beat Movement, with Gary Snyder, Jack Kerouac, and Allen Ginsberg, did away with traditional metrical forms in poetry, and wrote poems within a structure called "free verse." Everywhere old conventions were being replaced or abandoned altogether in order to make room for what was "new."

The new paradigm that dominated society was one that reflected the new science of the time. If the foundation of our world, the movement of electrons, was random and unpredictable, and if the universe was not set but instead moving away from itself, how could anything that came before be certain? Uncertainty undercut the traditions that were established on a previously stable or "Newtonian" universe. With the presence of black holes, nothing was exempt from being caught in the void, not Spacetime,
not light, not history.

All of this was tremendously upsetting to Wallace Stegner. The new generation's attitude was something Stegner called "the antihistorical pose of the young." He said, "they didn't give a damn what happened up to two minutes ago . . . they themselves were so imprisoned in the present that they had no notion of how various humanity and human customs can be" (Conversations, 88). To Stegner, throwing away what had come before was the worst thing one could do. It meant doing away with all the lessons of childhood, and therefore, all the elements of who we have become. Some of those elements were bad, but some were indespensible. Stegner believed in a world that moved in a linear fashion. As in his example from Wolf Willow, history is an indespensible foundation, a pontoon bridge. Without the pontoons that came before us we would be adrift and alone, directionless.

To the new generation, science was not a horse; it was elusive and sometimes contradictory, and with its talk about probabilities and uncertainty it had a touch of mysticism. Powell's world, which Stegner subscribed to, was one based on cause and effect, a stable Newtonian model of relationships. He had only to observe the land with care and patience, and it would give him answers to the questions he asked. Einstein's models and theories did not abolish history, but it did question it, and this led to a number of upheavals in the scientific community as well as society as a whole.

As a result, Stegner continually stressed the importance of the past when writing about the environment and the fate of the West:

True or false, observant or blind, impartial or interested,
factual or fanciful, it has all gone into the hopper and influenced our understanding and response at least as much as first hand acquaintance has. But it took a long time. Even learning the basic facts— extents, boundaries, animals, ranges, tribes of men— took a long time. (Lemonade Springs, 49)

Stegner believed just as the 60s generation did that changes had to take place in order to save the environment and ourselves. But he believed the keys to those changes were found in our own mistakes and blunders.

One practical example of this was his insistence on continued government involvement in protecting public lands, from parks to wilderness areas. Stegner admits that much has gone wrong with some of the bureaus in charge of regulating both land and water. The National Forest Service, originally designed to promote "wise use" of our forests, became an ally of the timber industry in the first years of the Eisenhower administration, and has since paid more attention to harvesting board feet of timber than other uses, such as recreation, wildlife protection, and preservation. Now the Sierra Club and others look upon the National Forest Service as the enemy, something to be stopped or abolished. But Stegner stressed that federal bureaus were started by, and maintained by, people who rose up against those who would exploit wild lands. Yellowstone, Sequoia, Yosemite, and others were "saved" from local/state interests which would have developed them. Stegner believed that the history of the federal presence in the West was one in which there was an interest in preserving the environment for the future. If effective change is going to take place in the West, those agencies should be restructured, not abolished:
In the West I suspect there is a heavier-than-elsewhere proportion of people in federal jobs. If you took all the federal employees out of Denver, you'd depopulate the town . . . . I'm sure we're going to have to plan more and cooperate more and the first stage of that is to acknowledge the fact that the federal government is not only a permanent partner in that collaboration, but a very essential one, absolutely essential. (Conversations, 178)

Just as Powell found himself alone, confronting the boosterism of the turn of the century, so Stegner found himself against the 60s with its habit of questioning everything that came before it. His message was no less urgent. For Stegner, the attitudes and actions of the new generation were just as "uninformed" as the society Powell had encountered, and he feared continued mistakes from a public that was too "liberated" to act responsibly. Stegner's position was unique because he stood somewhere between paradigms; he found himself emotionally and ideologically tied to Powell's time, a time which drastically needed to incorporate change into its values, but he lived in a society that reached beyond him, abandoning the traditions which came before it.

These concerns were not limited to Stegner's non-fiction. The novel was another genre in which he tried to work out the problems of our society interacting with the environment. How to make sense of the past, the struggle between new and old generations, and how we, as modern western Americans, should inhabit our landscapes, are all issues that form the foundation of Stegner's fiction. In the next chapter, I would like to examine how
these concerns, which are heavily influenced by Powell, work their way into the thoughts and actions of Stegner's characters.
When asked about the importance of personal experience in his writing, Wallace Stegner once responded, "you draw on it all the time. I don't suppose you can do anything else but draw on your own experience, in the same way that you can imagine only what you have seen" (Conversations, 42). This is certainly true for Stegner's non-fiction. His books and essays dealing with conservation or history rely heavily on what he had already known through first-hand experience:

I wouldn't have written Powell if I hadn't known the Southern Utah plateaus, and I wouldn't have written Benny DeVoto's biography unless I had known him. All the history and biography that I've done has been an offshoot of personal experiences and personal acquaintances. (Conversations, 166)

In much the same way, Stegner's fiction bases itself on this same principle; the stories and novels were constructed out of his own life. Many critics have noted the autobiographical nature of his books, such as The Big Rock Candy Mountain, and their interpretations have been guided by the belief that the events in these books have "really happened." In his later and more successful novels, the lines between fiction, history, and personal experience become even more blurred, and meet with a variety of critical responses.

One recurring argument is the extent to which many of Stegner's narrators become "mouthpieces," characters which spend most of their time airing Stegner's own ideas and concerns. Especially on the topics of conservation and history, his characters often "ruminate" at length, trying
to convince themselves, and the reader, of what they are saying. Russell Burrows points out the character of Oliver Hutchens, in the novel A Shooting Star, and argues that this character is little more than a stereotype of the typical contractor, ready to take advantage of any open land in order to build condos or strip malls. Burrows believes that Oliver is portrayed this way in order for the narrator (Stegner loosely veiled) to attack and criticize him. He states:

We might imagine how difficult it must have been for Stegner to stay within the conventional bounds of the novel when on every side, in the post-World War II boom, people were ruining the land. Indeed, the wonder may be that Stegner did not lapse more often from his novel to take jabs at the worst offenders.

(Burrows, 18)

On the other hand, there are critics who warn that we should not read Stegner into these characters too much. They stress that the books are indeed fiction, and the characters, with their traits and flaws, are constructed in order to enhance the tensions within the story. The result is a book with a variety of interpretations, not a "soap box" from which Stegner can preach. As Audrey Peterson says about Lyman Ward, the narrator of Angle of Repose, "the reader is clearly intended to see Ward as a dramatized character, subject to human frailty . . . embittered by personal loss" (182).

Whether he compromised the art of fiction or not, Stegner definitely imbued his novels with his own feelings and agendas. "I sometimes let a character take some of my own tendencies to an extreme," said Stegner,
because what he was after was something larger, a "perception of truth, the attempt to get at the concerns of the human heart" (Conversations, 171,172). Stegner's concerns, in both fiction and non-fiction, were nearly always the same: how can we learn from what has already happened and apply it to the present? This is clearly seen in his biography on Powell, and I believe that much of the scientific and historical knowledge he gleaned from Powell became a cornerstone for many of his best novels. I would now like to examine two of his books, Angle of Repose, and All the Little Live Things, exploring how Stegner incorporated those same elements he discovered in Powell into his characters and plots.

1. SCIENTISTS AS SUPPORTING CHARACTERS

As Richard Etulain points out, Wallace Stegner, along with other western writers, explores or challenges a number of elements which seem to be "western" by nature. His novels are land-oriented, call into question the "cowboy myth" that has shaped western regions, and stress the fact, either by setting or discription, that the West is an arid place. But most importantly, Etulain says western writers "have a hangup" with history; there is a "noticable tendency among many western novelists to search for a useful or usable past. . . . At the center of their work is a concern for understanding the western past and for communication the connections or continuities between past and present" (148).

Not surprisingly, the plots of Stegner's novels are not that different from the historical and environmental realities that inspired them. In
some cases, there are direct correlations. The Big Rock Candy Mountain recreates many of Stegner's childhood places and memories of his roaming, unpredictable father in order to drive the story forward. Angle of Repose is almost entirely based on the real-life writings of Mary Hallock Foote, a pioneering woman artist and writer who moved West with her husband in the 1860s. Similarly, the "story" of John Wesley Powell contains a number of elements that fit into Stegner's own agenda. He studied aridity. His writings dealt primarily with the western landscape. He tried to challenge the manifest destinarian myths his society was living by. I am not suggesting that Stegner used Powell's life in the way he used Mary Hallock Foote's life, but I believe there are a number of Powell's qualities, in his position as a scientist and in his personality, that Stegner borrowed and incorporated into his novels.

In both Angle of Repose and All the Little Live Things, we find supporting characters that are either in line with or against Stegner's views about history and the environment. They become opposites, dichotomies of time and temperament, and are juxtaposed beside one another in order to illustrate the tensions that Stegner felt were going on between his generation and the youth of the 1960s.

Stegner's Angle of Repose, which won the Pulitzer Prize, is above all a novel about reconciliation. Critics have called it a "novel within a novel," pointing out that two stories are being told simultaneously, one in the present and one in the past. Lyman Ward, a retired history professor and victim of a crippling bone disease, secludes himself in his
house in Grass Valley, California in order to write the biography of his grandmother, a famous early western artist. As Lyman's writing progresses, it becomes clear that the biography is jaded. His portrayal of his grandparents (Susan and Oliver) and their awkward and stressed marital relationship takes a more personal turn, and we see that their story is a way for Lyman to come to terms with the fact that his own wife has left him. Though Lyman and Susan Ward are the primary characters, the character of Oliver Ward is crucial to Lyman's understanding of himself and the outcome of the novel.

Oliver Ward has a number of "Powell-like" characteristics which sets him apart from the other characters of the novel. He is an easterner drawn West, a geologist who works as a mining engineer, pursuing a number of jobs which take him farther and farther into harsh and remote western landscapes. But he is not merely out in the West for adventure; he is an accomplished and trusted engineer. He works overtime with plumb lines and other instruments, the only engineer capable of surveying and measuring the construction of mine shafts. Any errors in his calculations could mean disaster, costing workers their lives. Later in the novel, between mining jobs, he spends months experimenting with different mixtures of rocks and minerals in order to discover cement; (he does eventually discover it, but fails to patent it, and so loses all claim to his creation). Oliver also has other "unexpected capacities," as his wife notices. He can fix almost anything around the house, from knife handles to tanning and sewing wildcat skins together for a rug for their first child to play on. Susan Ward finds that her husband:
revealed the most unexpected sensibility. His suggestions about the decoration of the house astonished her, they were so often right. Without making anything of it, even being a little embarrassed by it, he could assemble a bouquet of wildflowers with a careless effectiveness that put her own most painstaking arrangements to shame. He had a touch with plants: everything he brought home from the woods grew as if it had only been awaiting the opportunity of their yard. (Angle of Repose, 122)

Like Powell's seemingly natural ability to excel in a number of disciplines, such as geology, biology, and ethnology, Oliver is able to achieve almost anything with a "careless effectiveness." His talents range from the practical to the purely aesthetic. Throughout their marriage, Susan continually discovers that her husband is more than what she had previously thought. His intelligence and sensitivity seem to expand as the novel progresses.

Oliver is also capable of quick, selfless, and heroic deeds. Twice, once in New Almaden and another time in Leadville, he saved the life of someone down in the mines who was being careless. And in a similar situation, when he and Susan were driving their wagon to Leadville, they encountered a runaway coach coming the opposite direction on a steep and narrow mountain pass. In a scene that is reminiscent of a western adventure novel, Oliver once more diverts certain disaster:

Oliver's whip cracked on the rump of the black horse, then the bay, the black again. Susan grabbed for the dash. They jerked wildly in toward the cliff, among the blocks of
stone . . . and there was not room, she knew it with a certainty that froze her mind . . . the buggy tilted so steeply that she hung on in frantic fear of sliding straight off under the hoofs and wheels. Oliver's hand shot out and grabbed her . . . the stage passed so close that if she had had her arm extended it might have been torn off . . . the noise of the stage diminished behind and below them. They turned to watch it go. (233)

As if this weren't enough, Oliver also possesses a morality superior to many other characters in the novel. During his time in New Almaden, he has a conflict with his overbearing supervisor who enjoys making life difficult for the hired men. After one incident, where the supervisor unfairly fires Tregoning, one of the best mine shaft operators, Oliver causes a scene and quits in protest. In a futile but sincere gesture he gives Tregoning's family some money: "I hope you don't mind," he says to Susan that night, "I gave them all the money I had, twenty dollars or so" (155). Later in the novel, when he turns from mining to ideas about irrigation, Oliver confronts more frustrations. Three separate times his investors deny him funds to start building a system of canals on the drainage outside Boise, Idaho, and Oliver's plans to make that barren, waterless place flourish are finally ruined.

Consistent with the mentality of the time, Oliver is preoccupied with making society thrive in the West. All of his mining and irrigation schemes work toward that end. But unlike the unscrupulous advertisers and railroad tycoons, Oliver truly believes, as Powell did, that he does what is best for society. Lyman the historian sums it up nicely:
As a practicioner of hindsight I know that Grandfather was trying to do, by personal initiative and with the financial resources of a small and struggling corporation, what only the immense power of the federal government ultimately proved able to do. That doesn't mean he was foolish or mistaken. He was premature. His clock was set on pioneer time . . . Hope was always out ahead of fact, possibility obscured the outlines of reality. (382)

In many ways, Oliver Ward has the same qualities as that early twentieth-century horse named Science. He is rugged, practical, intelligent, serious about his work, and has a sturdy moral character. He is the type of scientist that Powell surrounded himself with, and his character would have been an asset to Powell's surveys and expeditions.

However, Stegner ultimately makes him a tragic character in the novel. Because he is alone in his interests and qualities, he has broken from his "proper" eastern background, and therefore is not accepted by Susan's friends and family, and in many cases, by Susan herself. In a letter she wrote to her friend Augusta during her honeymoon, Susan tries to "prove" Oliver as being worthy and a wise choice as a husband:

I haven't an anxiety in the world at present, except perhaps lest you may not like my boy when you finally meet him . . .
I shall have to be very weak and praise him to you, for he does not "exploit" himself. . . . I am sure Thomas was a little disappointed, and so will you be at first. (67)

Oliver feels alienated from Susan's eastern world, and is only appreciated
in the West. But even this backfires on him. One of his employees and close friends, Frank Sargent, finds himself unavoidably attracted to Susan, and the two of them (it is never completely clear) have an "affair" of sorts. At one of their meetings, Frank and Susan are preoccupied, while Susan's youngest child wanders off to the river and is drowned. This causes a separation between Oliver and Susan before they are once again joined at the Zodiac cottage in Grass Valley. It is at this point in the biography that Lyman realizes he has been identifying himself with his grandfather. Seeing his own marital problems in those of his grandparents, he is quick to side with Oliver, and describe his life as if he were a martyr. As Russell Burrows points out, Lyman's "beliefs about Susan have more to do with his recurrent worry that his own wife, Ellen, never valued him. In his private moments, he wonders . . . what drove Ellen away" (288).

At the end of the novel, the past and present come together in Lyman's realization that his biography has not only been about history. He states he is "writing about something else. A marriage, I guess" (186). Finally, Lyman realizes that in order for him to put away his pain and anger, and come to terms with the life that has been left him, he must confront his wife and work things out. "I lie wondering," he says at the close of the novel, "if I am man enough to be a bigger man than my grandfather" (569).

In contrast to Oliver Ward, Shelly Rasmussen's character is contemporary and more problematic. Shelly is the daughter of Ed and Ada Hawke, who are Lyman Ward's caretakers as he is working on his grandmother's biography. She is, as Lyman puts it, "a card-carrying member of this liberated generation," caught up in the fervor of the 60s, searching for new ways
of thinking and living (163). She is having trouble with her "husband," whom she met at the University of California at Berkeley, a philosophy major who slept around at different communes but now wants her back. As a result, Shelly moves in with Lyman, not only to avoid her husband, but to be his secretary as well.

Unlike many people who come in contact with Lyman, Shelly does not shy away from his grotesque appearance. Along with being Lyman's secretary, she "acts as if she had been employed as confidential adviser, keeper, critic, teaching assistant, and lay psychiatrist," and Lyman constantly complains that he "can see her 'studying' me and drawing conclusions" (266). Shelly, like Lyman's son Rodman, is preoccupied with the social sciences. She continually questions and criticizes the methods that Lyman uses in order to create his grandmother's biography. She believes that he is being inconsistent in his portrayal of her and often incorporates his own views into her story. In a discussion about Susan Ward's sex life, Shelly accuses Lyman of "covering up" the love scenes between Oliver and Susan because he cannot deal with their intimacy. She says:

It's your inhibitions that are showing, not hers. I suppose she did have them but that's no reason you have to, in 1970 ... be honest about the way we are. We don't need those purely cultural patterns of convention. (268)

What ensues throughout the book is an ongoing argument about the importance of history in our lives. Shelly confronts Lyman one day with the proposal for a new commune she is thinking of joining. She hands him a sheet of paper which begins:
MANIFESTO

We hold these truths to be self evident to everybody except generals, industrialists, politicians, professors, and other dinosaurs. (513)

The document goes on to list a number of goals the commune will try to achieve, among them meditation, a Communist economy, and free love. It attempts to set up a dichotomy between those with knowledge and those without. Ironically, the "dinosaurs" listed are the ones who should be in touch with some sort of "truth," since they are in key positions in society and wield all the power. The powerless masses, according to Shelly and the manifesto, are the ones who understand what we need in order to live wholly and peacefully. They will "create the new sane healthy world within the shell of the old," and will achieve this by breaking from the dominant culture; "to cop out," it says, "is the first act in the cleansing of the spirit" (514).

Shelly may be portrayed as a confused and misdirected character, but she is certainly not stupid. She sees into Lyman's biography and picks out the prejudices and inconsistancies he has placed there, feelings Lyman himself is slow to admit to. In defending her manifesto, she draws connections between herself and Oliver Ward, challenging Lyman to make a distiction between them:

All that big dream of his (Oliver's) was dubious ecology, and sort of greedy when you look at it, just another piece of American continent-busting. But you admire your grandfather more than anybody, even though the civilization he was trying
to build was this cruddy one we've got. Here's a bunch of people willing to put their lives on the line to try to make a better one. Why put them down? (518)

Lyman responds like a true historian:

Why? Because their soft-headedness irritates me. Because their beautiful thinking ignores both history and human nature . . . . Because I don't think any of them is wise enough to play God and create a human society. . . . I want a distinction between civilization and wild life. I want a society that will protect the wild life without confusing itself with it. (518)

Lyman's point (which is one of Stegner's major concerns) is that it is impossible to break with the society you belong to. Everything we use, argue with, or think about has its origin in our past. The difference, Lyman argues, between Oliver and Shelly, is that Oliver worked within the framework of his society's goals in order to inhabit the West, while Shelly and her generation err by not taking the past into account.

Turning to All the Little Live Things, published four years before Angle of Repose, we find another supporting character who is the antithesis of Oliver Ward. The novel centers, as did Angle of Repose, on two main characters, in this case Joe Alston, a retired literary agent who has moved from the East coast to California with his wife, and Marian Catlin, their attractive young neighbor who lives next door with her husband and daughter, and who is dying of cancer. Peripheral, but crucial to the plot, is Jim Peck, a sometimes student at the local university, a "hippie" who miraculously
convinces Joe Alston to let him "camp" on his land. Throughout the novel, Joe and Marian debate Peck's lifestyle, and he becomes a point of departure for many of their conversations.

Unlike Lyman, who identifies and sides with Oliver, Joe Alston dislikes the presence of Jim Peck. Even at the first few minutes of their first meeting there is tension between them. Peck is part of the "new generation," a young man at odds with everything that Joe Alston believes and stands for. His appearance appalls Joe, and he describes Jim in terms that are always less than human:

Caliban... He was young, no more than twenty-two or -three. His hair was long and tousled, even matted where the helmet, now hung on the handle bar, had crushed it down. It crawled over his collar, and was pushed forward on his forehead, hiding his horns. His brown eyes... gleamed out of that excessive hair, and his teeth, badly spaced, the eyeteeth long and pointed, were bared in a hanging, watchful, half-crazy grin. (Little Live Things, 21)

In other moments, Joe likens him to a devil, a bacchant, and a kind of mongrel American figure, made up of the odds and ends of different philosophies and cultures. During one of Joe's particularly nasty tirades, he describes Peck's smile, noting how he "tilted his head and puckered his lips into the semblance of a turkey's behind" (27).

Describing the reasons for Peck's character, Stegner offers this explanation:

The hippie is only a kind of dumb bystander. That was my
feeling about hippies in general at that point. I've changed
to some extent since, but the ones that I knew then were dumb
bystanders who didn't have any notion of what went on but
thought they did. So I make him a dumb bystander just standing
out there with his mouth open, helpless. (Conversations, 75)

The portrayal of Jim Peck was intended to be ludicrous, but if we examine
the novel closely, Peck is anything but a "dumb bystander." Peck's attempts
at changing his lifestyle and trying to break with the dominant society's
norms are described explicitly and criticized at every turn. Though the
reader knows that Alston's view of life contains serious flaws and
contradictions, the reader also knows it holds a degree of integrity and
understanding. Peck's life, on the other hand, comes across as a mistake,
and has no redeeming value.

Where Stegner portrayed Oliver Ward's intelligence and abilities
in a positive, almost heroic light, he treats Jim Peck's attempts at learning
and action as a parody. Peck first starts by reading Kierkegaard, Jaspers,
and an autobiography by Woody Guthrie, but soon abandons them and turns
to meditation. He sits for hours on the porch of his tree house, cross-
legged then suddenly springs into a handstand. His life on Joe Alston's
property is described as an "experiment," a way for him to explore new
ways of existing. His methods are varied and self-directed:

He believed in ahimsa, nonviolence, harmlessness. . . . the
eating of meat had a bad effect on the clarity of his mind.
He wanted to keep his mind crystal-clear. He was trying to
think his way below all the surfaces, past all the boundaries
... He was writing a book, keeping very full notes on himself as he projected his consciousness farther and farther into unknown or half-known states. ... He had hundreds of pages already, he worked sometimes all night, it came freer and freer, like automatic writing. Things he was discovering were so exciting he didn't sleep more than an hour or two. (106)

Eventually, he creates a kind of school, the "University of the Free Mind," which attracts a number of other "students" who come together at Peck's tree house in order to exchange ideas, philosophize, and conduct other experiments about the reality they live in. Their final experiment (the one that gets them kicked off Alston's land) is portrayed as a kind of out-of-body experience induced by deafening noises. Someone from Peck's group steals a section of culvert; one by one, they take turns climbing inside of it while the others surround the culvert, chanting and beating on the metal with wooden clubs. The result is a dizzying and unstable state, or as one of the participants describes it; "Holy shit, I was in orbit. I still am. Jesus, that drives you right out of your skull" (258).

Joe Alston confronts them, thinking they are engaged in some perverted sexual or drug-related experience, or at the very least, partying too loudly, but Peck explains it as another step in the process of self-discovery. "This isn't really a party," he says, "we're not just putting on a blast. We've got an experiment going, we're getting close to something very important psychologically" (263).

On the surface it appears that Jim Peck and Shelly Rasmussen are pursuing the same things that Oliver Ward is pursuing: knowledge and a
"better" life. But the nature of Jim and Shelly's exploration is always completely personal. Oliver, like Powell, is a strong, independent scientist. He sets out for remote places, gathering experience along the way, not unlike Peck's desire to gain experience by living in a tree house, or the probing of Rasmussen's psychological rap sessions with Lyman. But although Oliver and Powell are independent, they do not neglect their societies. Oliver's mining and irrigation projects have the same intentions as Powell's Arid Lands report; they are concerned with the futures of the societies they live in, and at heart want to make the world a "better place." In contrast, Jim and Shelly's approach is "self-directed" to the point of excluding the world at large. Even the "University of the Free Mind," seems a contradiction in terms since the goal is not to learn from each other. The "students" are busy exploring themselves. The group experiment with the culvert is intended to achieve a new reality which effects the individual only.

What really infuriates Joe Alston, is not the noise or the long hair, but the earnestness with which Peck abandons everything around himself. Alston's insistence on history (which, once again, takes Stegner's own "tendencies to an extreme") clashes with a generation disillusioned with their society and desperately seeking something new. For Alston, their behavior is worse than apathy; it is a regression, and ultimately very dangerous:

It's his temperament I don't like-- that True-Believer stance and his faith in the emancipated individual. The whole history of mankind is social, not individual . . . Outside the Establishment
he hasn't got language, character, art, ideas, anything, that didn't come to him from society ... As for the bomb
... if anybody ever pushes the button, it'll be some nut like Peck, some wild-eyed enthusiast with no sense of history. (164)

Peck's opposite is John Catlin, Marian's husband, a marine biologist who is often off at the laboratory in Monterey studying marine vertebrates. Alston describes John Catlin as a strong, good-looking, nearly perfect scientist and husband. Not only is he knowledgeable about marine animals, and birds, and can identify plants "with the infalliability of a botany book" (127), but also he is an outstanding parent, spending hours playing or exploring with their daughter, Debbie. He is a loving and understanding husband, and deals admirably and respectfully with his wife's impending death. John Catlin is yet another, more modern version of the Powell-like scientist. He is nearly perfect in his expertise and goodness. Alston sums him up as an:

active, strong, clean, easy-smiling, well-educated young American ... a doer, a hunter of new knowledge and a believer in the future ... who could conceive an important problem and devise the system of research that might solve it, this scientist whose science was life, and who was as tender and intense about life as anybody. (299)

Because the supporting characters in both novels adhere completely to their "roles," they tend to come across as two-dimensional. Stegner portrays them as types: the western scientist, the hippie. They have no
contradictions in their personalities, no surprising characteristics to make them deviate from their intended parts in the narrative. Clearly, Stegner casts them in this way to emphasize the difference between past and present approaches to knowledge, and judges those approaches in the process. As Bruce Ronda states in his discussion of the characters in Angle of Repose, Stegner is among other things, showing his preference for more "Victorian" values, "portraying them as stronger, healthier, more mature than those of the present" (222). Oliver Ward and John Catlin are models of proper behavior and living, while Shelly Rasmussen and Jim Peck become caricatures, ridiculed for the ways in which they think and live.

What becomes the focal point for this distinction is the way in which the characters explore their lives. Oliver Ward and John Catlin are shown as upholding a rigorous set of scientific and moral standards, attributes they acquired from John Wesley Powell. Their "scientific methodology" is the standard by which other characters are compared. Jim Peck and Shelly Rasmussen are seen as "inferior" characters because they do not subscribe to the implied standards in the novels.

Similarly, the narrators of both novels are involved in their own "scientific" inquiries, but Stegner makes them complex and engaging, not merely "types" or caricatures. He imbues them with the inconsistancies and contradictions that make them convincing and human. I would now like to turn attention to Lyman Ward and Joe Alston, and examine how they are in the process of scientific research, and how Stegner uses them to portray the difficulty of bridging the past and the present.
2. THE UNCERTAIN NARRATOR

In 1968, at the meetings of the American Philosophical Society, Sir Peter Medawar, who won the Nobel Prize in Medicine in 1960, delivered a lecture entitled "Induction and Intuition in Scientific Thought." The lecture was designed to shed some light on "scientific methodology," since most scientists, if pressed to define how they go about their work, are more apt to shrug their shoulders than give a straight answer. Medawar's argument does much to dispel some of the misconceptions about scientists. Contrary to popular belief, one discovery does not necessarily follow another. There is no systematic or rigid progression from one experiment to the next. Scientists do not spend all their time compiling facts and data (although there is a fair amount of that) in order to add one more brick to the Wall of Knowledge. Medawar states that modern science has functioned by inductive reasoning. Induction is a way of arguing from the specific to the general, "a scheme or formulary of reasoning which somehow empowers us to pass from statements expressing particular 'facts' to general statements which comprehend them" (23). But induction, he goes on to say, is not a logically rigorous process. If we gather certain evidence to prove that a certain statement is true, and the statement turns out to be false, where have we gone wrong? The problem is with hypotheses that try to verify the outcome of an experiment. Medawar (who borrows the word from Karl Popper, the great scientific philosopher) says that the more realistic, more scientific, hypothesis is one that includes "falsifiability," or the notion that the hypothesis could possibly be true.
Simply stated, the best hypotheses take into account what is variable and unknown. Getting to this point involves intuition, the second element of Medawar's argument. He states:

Scientific reasoning is an exploratory dialogue that can always be resolved into two voices . . . imaginative and critical, which alternate and interact. In the imaginative episode we form an opinion, take a view, make an informed guess, which might explain the phenomena under investigation. . . . The process by which we come to formulate a hypothesis is not illogical but non-logical, i.e. outside logic. (46)

This reasoning stresses the fact that scientific discoveries cannot be premeditated, and that science, like literature, the arts, and other human disciplines is at base a creative process. It depends on analogies, leaps in association, and as Medawar puts it, "any scientist who is not a hypocrite will admit the important part that luck plays in scientific discovery" (Fields of Writing, 734).

I mention the process of scientific methodology because it has some important similarities with the process of writing history. History, like science, is surrounded by a few misconceptions. Historians do not simply catalogue the "facts" of the past, set them up chronologically, and let them speak for themselves. They use historiography to examine the past, which employs a number of different disciplines to view history from different angles. Richard Etulain says that in recent years, historians:

have been urged to employ more of the research techniques of the social sciences. They are told that the use of statistics,
demography, and social psychology, for example, will enhance the specificity of their studies . . . essays in historical journals evidence an increasing use of social-science methods. (159)

Along with the variety of research methods, historians are also exploring new ways of interpreting the past. By looking at literature and the social sciences, historians can make new associations, or as Medawar suggests, create a dialogue between the "imaginative and critical" as they go about their investigations. The creative element that is necessary in the sciences and the arts is also essential in the writing of good history, and allows for a more diverse and accurate portrait of the past.

I would argue that Lyman Ward and Joe Alston are in the process of writing this kind of history. Their personal lives are so entwined with the "histories" they are writing, that they cannot see the past in an single way. Therefore, there is nothing "objective" about their writing. Both narrators come to important conclusions about the past and themselves by exploring history on a number of levels.

It is clear from the beginning of *Angle of Repose* that Lyman Ward is involved in a serious research project dealing with his grandparents' lives. At his disposal he has a tape recorder, old photographs, the letters, journals, articles and stories his grandmother wrote, her sketch books, and Shelly Rasmussen, a young and difficult woman who sometimes acts as his secretary. And because Ward is a retired history professor, he has the background and sensibilities to place his grandparents' lives in the
context of turn-of-the-century western America. He is also aware, to a large extent, of the connections he has with the material, not only professionally but personally. At the very beginning of the novel he claims that history:

is composed of parts that imitate and repeat each other.
Am or was, I am cumulative, too. I am everything I ever was . . . I am much of what my parents and especially my grandparents were— inherited stature, coloring, brains . . . plus transmitted prejudices, culture, scruples, likings, moralities, and moral errors that I defend as if they were personal and not familial.
(15)

The novel's unusual structure constantly switches from first person narration (Ward's comments on his grandparents' "story," and his own personal problems) to a third person omniscient narrator (which describes the life of Susan and Oliver Ward). Novels such as Thomas Berger's Little Big Man employ the use of a first person narrator, but that narrator sets up a kind of editorial framework where he comments at the beginning and end of the story and disappears from the bulk of the text. Lyman Ward, however, is not restricted in this way. He is present throughout the novel, as he comments, criticizes, and interprets Susan Ward's life as well as his own. As an example, consider this scene from Susan and Oliver's first courting back East in Fishkill Landing:

Susan guided him upstairs to his room, the one they called Grandmother's room. There he set his carpetbag inside the door and shook himself out of the ulster, and she watched him lay
on the dresser, which had never seen anything rougher than a Quaker bonnet or a book of poems in limp leather, a curved pipe, and a great, wooden-handled revolver.

Was he showing off? I suppose so. God knows why else a man would bring a pistol to his courting. His character and his role were already Western, and he had only that way of asserting himself against the literary gentility with which her house was associated in his mind. (60)

Lyman Ward is at turns sarcastic, questioning, approving, and bitter. As Audrey Peterson believes, Ward's commentary perfectly suited for a confrontation between values of the past and present. Without Ward's comments, Susan's story would be compelling but distant (179).

Joe Alston is equally present in the narration his story. He is writing his memoir, but it becomes evident from the beginning of the novel that he is preoccupied with other matters:

But the last thing I want to think about is what a retired literary agent used to do before he retired. . . . I am concerned with gloomier matters: the condition of being flesh, susceptible to pain, infected with consciousness and the consciousness of consciousness, doomed to death and the awareness of death. . . . I am a tea bag left too long in the cup, and my steepings grow darker and bitterer. (4)

What starts out as a memoir about his work and life becomes a rumination on death and the ways in which he will be able to cope with it.

One reason Lyman Ward and Joe Alston are so compelling is because
they are flawed characters. For all their insight and knowledge, they fumble from day to day with their emotions and are near-sighted at best when it comes to interpreting their own part in the history of their families. As Kerry Ahearn states in his discussion of Lyman's biography "project," the outcome is not at all confident. Ward attempts objectivity but produces nothing more than speculation and pre-judgments, and as a reader "we are witnessing the construction of a rough draft" (119). Both Ward and Alston are in the process of interpreting their lives by using the past; for Ward it means exploring his grandparents' marriage in order to come to terms with his own ruined familial relationships, and for Alston the arguing with Marian Catlin and Jim Peck is a way of getting at what it means to live "properly," and how to come to terms with his son's death. The interpretations they make are not necessarily sound, and like good hypotheses, they may or may not be true.

Often, in both novels, the narrators' discoveries are tied to the sciences, either biological or geological. They use this scientific knowledge as evidence or a foundation from which they build their own ideas about the way the world works. And sometimes with surprising accuracy, both Ward and Alston spout jargon and theories to make a point. Looking at the following passage from All the Little Live Things, we find Alston having an argument with Marian Catlin about the future of the human race. He has almost worked himself up into a rant, and sums up our "progress" as follows:

"Wait," I said. "Hear me out. Everything's blasted, not so much as a virus left. There is a gap of geological time—
geological? Astronomical, cosmic— and then patient old
Mother Nature will start over, assuming we've left any nitrogen
and other elements around, rolling her Sisyphus stone upward
from the atom to the molecule to the polymer to the cell, and
from the single cell to colonies of cells, and from colonies
to forms with specialized organs, and through millions of
experimental forms until she stumbles on something that will
work for the Higher Tinkering— in our case it was a brain
and an opposable thumb, but something else might work as well.
Then consciousness comes into the world again . . . inventions
languages, arts . . . and history begins . . . and science begins
to add one law to another . . . and things get competitive and
hostile, and somebody pushes the button, and boom goes the
stone to the bottom of the hill again. That's what I think
about the human race." (167,168)

Alston has an impressive command of the natural sciences. For a literary
agent he knows a great deal about the process of evolution, the stages
from molecule to polymer to cell that scientists have speculated on as
the beginnings of life. His brief tirade not only outlines our evolution
as a species, but is aware of the geologic time frame it takes place in,
the "astronomical gap" of millions of years between each stage of development.
Alston's grasp of our development is so multi-faceted that he mixes metaphors
in order to make his points; he combines Greek mythology and particle physics,
Sisyphus rolling the atom toward greater and greater progress.

But upon close examination of his prediction for the human race,
the bitter and contradictory nature of his argument becomes apparent. Alston calls our species' behavior "Higher Tinkering." Tinkering implies that we are not at all serious, a half-interested attempt at best. Our institutions, arts, history, and science all become the product of this lack of interest and not necessarily designed in the best way. Alston says that our brain and opposable thumb are responsible for our actions, "but something else might work as well." Although he admits to the incredible fecundity and adaptability of life, he undercuts this with his pessimism. In Alston's plan we are doomed to an evolution that is eventually self-destructive. There are echoes here of Powell's interpretation of Darwin, that perpetual state of "warfare" between all the living creatures on the planet. Except in Alston's version, we are fighting ourselves until the end. He believes someone will push the button, and the nuclear destruction that follows will send us back to our beginnings. Like cruel Sisyphus in Hades, we roll our society to the top of the hill, only to kill ourselves in the process, and roll back down again.

Alston's bleak outlook on our future is a direct result of the tragedies that have befallen his own life. His son's death weighs heavily on his mind (it is one of the reasons he and his wife have moved to California, to distance themselves from the event) and he feels a certain degree of guilt, having judged, criticized, and alienated his son from him. Alston also feels helpless in the face of Marian Catlin's impending death due to cancer. Her almost serene acceptance of her fate unnerves him, and he cannot tolerate the pain and suffering her husband and daughter will endure. Alston wants to "resign" from the hardships around him,
something that he is constantly criticizing Jim Peck for doing. However ludicrous and misdirected Peck's attempts at change are, they are at least attempts, and as Marian argues, "I have to believe in search too, even if it seems as silly as Jim Peck's. . . . So we have to risk disorder to keep the order of the universe expanding and consciousness growing" (168). Clearly, Joe Alston projects his view of society, and his own sorrows, onto the world around him. He describes our lives as a futile cycle, a pointless movement toward death because he has no control over his physical or emotional life. The only way for him to come to terms with his problems is to write about them. His memoir, then, is the only tool available to him, a way out of depression, a place from where he can come to terms with his loss. Because much of what he writes about has already happened, we can see the process by which he has come to his conclusions. At the beginning of the novel, we find a Joe Alston who has weathered much and come to some not too pleasant conclusions about himself:

    Sympathy I have failed in, stoicism I have barely passed.
    But I have made straight A in irony— that curse, that evasion, that armor, that way of staying safe while seeming wise. One thing I have learned hard, if indeed I have learned it now: it is a reduction of our humanity to hide from pain, our own or others'. (12)

So why does Stegner create two problematic narrators? And how are we to trust the story they tell if their motives are unreliable? A partial answer to these questions is that the story, like our lives, has no single
interpretation. Lyman and Alston are doing their best to make sense of their worlds; whether physically or emotionally, they are trying to adjust, to change, to continue living. As Kerry Ahearn remarks about Lyman Ward:

it does not matter that Lyman cannot unravel the full truth; history is by definition inexact, and he (Stegner) refuses to undercut his narrator by providing external authority to detail how and where Lyman might have guessed wrong. Much of the reading enjoyment, in fact, comes from speculating. (122)

The task of making sense of the past and applying it to the present is not an easy one. Ward and Alston blunder, make mistakes, confuse what they are experiencing with a number of past incidents and emotions. But what we, as readers, are made aware of is that we are implicated in this process. We are caught up in the alternation between the "imaginative and critical" components of research, as Peter Medawar suggests, trying to make sense of the "data" around us. Audrey Peterson says of Lyman Ward, he is "himself so believable that the reader comes to accept whatever conventions he dictates" (176). Stegner has created narrators that are convincingly human, and their shortcomings and problems are also our own.

In conclusion I would like to emphasize that the concerns of Lyman Ward and Joe Alston were the concerns of Wallace Stegner, and in turn, were also the concerns of John Wesley Powell. Stegner imbued his characters with science and scientific methodology, all the "tools" that Powell had when he first went down the Colorado River. For Wallace Stegner, science was above all a social endeavor. He believed in the process Powell had taught him, the importance of first-hand experience, of going out into
the land and coming back with the "truth." He believed in the power of late nineteenth-century induction; scientists, if they studied a thing long enough and carefully enough, could apply what they learned to the world at large. Stegner discovered in Powell's *Arid Lands* report a viable way to approach the problem of properly inhabiting the West. That he borrowed nearly all of his "facts" from Powell is of little consequence. What mattered was that people might believe those observations and apply them to their own lives, and in this way, he could work toward promoting a paradigm that recognized the variety of habitats that exist in the West. Perhaps Marian Catlin says it best when she tells Joe Alston that "if I believe in order," (meaning an order or system in which people live fully within their environment), "I have to believe in search too" (168). The search that science undertakes has the ability to shape and enrich our lives. This is what Wallace Stegner learned from Powell. And this is what we, as contemporary readers, can learn from them both.


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