Metamorphosis

The Artistic Expressions of

Pamela Lewis

Published by:

Art Works Fine Art Publishing, inc.
Los Angeles, CA
323-550-1085

This document duplicates the text written within a book published in 2008 and distributed to family, friends and several scientific colleagues of Pam and Ed Lewis.

To make comments or to communicate with Pamela Lewis or for any information abut limited edition prints of any of the images in this website, please email: pam.lewis.book@comcast.net or contact the family through calling 360-676-5150, Pacific Time Zone, USA.

Acknowledgments—

With gratitude to all family members who contributed: Keith Lewis, who tirelessly arranged for all of the artwork to be photographed, Hugh Lewis, who collected and helped edit the narrative, and Lynn Peterson, who wrote selected portions and assembled the pieces. Special thanks to Blue Trimarchi, Ann Cutting, Brian Ross, Stephanie Canada and Joanne Plucy who were also instrumental in the production of this book.

Most of all, Pam wishes to thank the many individuals, colleagues, doctors and scientists, for their friendship and discoveries. They served as inspirations for her work.

About the Artist—Pamela Harrah Lewis

Pamela Harrah was born on October 31, 1925 in Tacoma, Washington.

Her Parents and Siblings
Pamela came into the world and into a family that was, by all accounts, intelligent, educated, well-read and worldly.

Her mother, Lyle Murray, had an adventurous upbringing as the daughter of an Army surgeon. Lyle and her family were occasionally stationed in remote and isolated places. In her later years, Lyle would share childhood memories about one such spot, Fort Egbert. Located close to the Arctic Circle in the interior of Alaska, one needed a ferry, a cogwheel train, a paddle wheel steamer (up the Yukon River) and a dog-sled ride to reach the fort. Educational institutions were almost nonexistent in these locations and Lyle's mother (who earlier had tutored students in Latin and Greek) insisted her children learn French and Latin. They did so by using a proper language dictionary and a foreign book, defining and learning to pronounce each word. This knowledge of languages would serve Lyle well. Much later in life, she acted as a University of Washington volunteer translator and librarian to physicians and researchers needing information from foreign scientific journals. Pam, her daughter, would also grow to learn and love languages.

Pam's father, Edward Harrah, passed the New York bar exam but never practiced. He collected books, played golf and always had pets in the house. English bulldogs were his favorite and the female dogs were always named for English queens or aristocrats.

Together, Lyle and Edward Harrah had four children with Pam being the elder daughter. There remains one living brother, David, Emeritus Professor of Philosophy at the University of California, Riverside. His research interests include logic and philosophy of language. He is another adventurous spirit who, at age 80, completed the Los Angeles marathon. This in itself is remarkable because all of his toes were lost to frostbite in the early 1950s when climbing Yerupaja (in the Andes Mountains) in Peru. At the time, it was the tallest unclimbed mountain in the western hemisphere.

Growing Up in the Northwest
Pamela received her education in a variety of settings. Her mother played the piano, and music became an essential part of her life. Pam was also a child of the Northwest. "I was a tomboy," she says, "collected arrowheads, raised tadpoles and caterpillars in my bedroom, and actively enjoyed the outdoors." An avid skier at Snoqualmie Pass (outside of Seattle), Pam also tells of visiting classmates in the summertime in the San Juan Islands (north of Seattle). They would explore the sand beaches and go fishing for salmon. However, she confessed that the salmon would often elude her and she would mostly catch ling cod. "I remember being so successful at catching ling cod on one trip that my host family, now tired of cooking and eating it three times a day, threatened to put me on a rowboat and set me afloat in Puget Sound!"

Pam's formal schooling was accomplished through the Bush Girls' School in Seattle and she started to incorporate nature's images within her artwork. Instead of conducting lab

experiments in biology classes, she recalls seeking permission to submit drawings and paintings of members of different phyla. Pamela would graduate from high school on June 15, 1942; coincidentally, the same day that Ed Lewis got his PhD under Dr. Alfred Sturtevant at Caltech. She briefly attended Vassar, studying English, German, history and biology, but after one year transferred back to the west coast and Stanford. There, Pam majored in biology but also adding Spanish to her list of languages. She also won the Women's Singles tennis championship. Throughout it all, she loved the science courses, eventually graduating with honors in pre-med. For a short time, she took post-graduate classes and worked as a teaching assistant for George Beadle. Beadle would ultimately invite her to follow him to Caltech. He also mentioned that he'd met a young scientist named Ed Lewis at Caltech. "Maybe you'll like him [Ed Lewis] so much you'll fall in love and decide to stay there at Caltech."

Her Family and Friends

Pamela Harrah married Edward B. Lewis in the garden of Alfred Sturtevant in 1946. Together, they had four children. Two survive today, Hugh and Keith Lewis. Edward was supportive of Pam's painting talents and, according to Pamela, "He was a bit fascinated by an intellectual style that was so different from his own." Early in their marriage, Pam received a gift from Ed. It was a copy of Winston Churchill's *Painting as a Pastime*. Ed had inscribed, "To Pamy on Hugh's first birthday with much love from Da Da."

After her children were older and in school, Pam would always accompany Ed to various research conferences. This would continue throughout Ed's career. She was very interested in the latest scientific developments and would attend most of the lectures. To this day, Pam takes pleasure in maintaining contact with many of the people she met in this fashion over the years. Her artwork was featured several times on posters promoting such meetings. She was again by his side when Edward Lewis went to Stockholm to receive the Nobel Prize in Physiology or Medicine in 1995, for discoveries concerning the genetic control of early embryonic development. When Edward died in 2004, Pamela and he had been married for 58 years.

Artistic Training

Pam's only training as an artist occurred in 1944 or 1945 when she took a class in scientific illustration at Stanford. Entomologist Gordon Floyd Ferris was the instructor and Pam loved it. Scientific illustrations were always done in pen and ink because of publication requirements. Pam produced several pen and ink drawings after leaving Stanford, but soon switched to watercolors, finding that color was indispensable to the expression of her art. Edith Wallace, who at the time was renowned geneticist Thomas Hunt Morgan's illustrator, showed Pam how to apply watercolor to paper. This was Pam's only instruction in watercolor technique. Perhaps it was the absence of formal instruction that allowed her unique style of painting to evolve so spectacularly.

Nature, Detail and Imagination
During their lives together, Ed and Pam brought odd bits of the natural world into their home. Since Ed was allergic to creatures with fur, household pets consisted of turtles, toads, fish, desert tortoises, tarantulas, praying mantises and other exotic creatures. Ed even captured several small octopi in tide pools near La Jolla, and managed to coax them to breed in captivity. An adult octopus escaped from its tank one night and avoided detection for several days before being found, sulking and covered with dust, under the sofa in the living room. It was returned to the aquarium and a more secure cover was utilized.

Pam nurtured her love of the outdoors and often used insects as a focus of her drawings and paintings. Referenced in some of the descriptions of her artwork is information from E. O. Essig's 1926 edition, *Insects of Western North America*. She described that text as her "*Bible*" for determining the background of many of her backyard subjects. When Pam painted moths or butterflies, she would examine an etherized specimen of the insect under a microscope. She would do so not only to locate major structures such as the veins in the wings and body segmentation, but also to identify all the individual scales on the wings. These scales contribute to the insect's overall color scheme. Her painting of the moth would include each and every scale she found on the insect.

Present Day
Pamela still resides in southern California. For the past ten years, she has concentrated her imaginative energies on creating a giant crossword puzzle focused on opera. It contains hundreds of opera names, places, characters and other terms in English and foreign languages. She affectionately calls it "the monster." Each letter within a word resides in a quarter inch square; the puzzle now extends more than three feet by four feet. Nearly every day, she announces its completion—only to be thrilled the next day to find another word to augment its masterful essence.

Pam's mind is sharp. Her imagination still sparkles and her sense of humor remains intact. She can be spotted occasionally in the presence of family and friends at her favorite restaurant, Kathleen's, in Pasadena. She's the one eating salmon, not ling cod.

Metamorphosis - *The Artistic Expressions of* **Pamela Lewis**

Foreword

By Lynn Peterson, Pamela's daughter-in-law

I married into the family in 1985. Of course, before being introduced to my husband Hugh's parents, Pamela and Edward Lewis, I had heard some of the family history, the inside stories, the accounting of life's events. When I recall that first meeting, I am still touched by the amount of energy and personal partnership that existed between Pam and Ed.

Edward, Eddie as she called him, was a scientist, a researcher who ultimately became a Nobel Laureate. As many of you know, Pam was his confidante and a constant companion at most of the scholarly conferences. She also laughed at all of his jokes and her laughter was genuine. Pam, too, has a sense of humor and is *still* a wonderful story-teller.

Eddie and Pamela shared more than a sense of humor. In her early years in the Caltech lab, she contributed to several scientific discoveries in genetics. In my mind, she also shared in the many personal sacrifices that accompanied his rise to achieve an honor such as the Nobel. Even with the long hours in the lab and time away from his family, she encouraged his work and sensed its importance. Pam admired Eddie's mind and understood his great talent.

Pam, in her own right, has quite the scientific mind. She graduated with honors in pre-med from Stanford. At the invitation of George Beadle, her mentor, Pam accepted a job in a CalTech lab. Then, there was Eddie. As was the custom of the day, she gave up her academic career to marry and stay home with children. I have never sensed in her any regrets about those choices.

Pam and Eddie raised three sons in their modest home in San Marino in the 1950s. Family photographs show that these were happy times. The 1960s, however, brought jolts of loss and grief. Among these were life-threatening medical conditions that took part of Pam's vision, followed by the death of Hugh's brother, Glenn. These two events could have permanently dampened her optimism and joy for living. However, in my frequent conversations with her, she is always having a "great" day and is delighted to hear about the escapades of her two "boys," Hugh and Keith. She greets friends' visits and invitations with anticipation and delight. Her spirit is very much engaged and present!

--Continued--

And indeed, throughout her life's chapters, Pamela Lewis has never lost her love of discovery…for science, language, music and for art. Her technical and creative imagery has evolved and changed over the years from pen and ink into imaginative and colorful interpretations of scientific theories and medical achievements. Mix in her visions and the magnificent, vivid details of moths, butterflies, family toys and Pam's connection with nature. Finally, add Pam's love of the many people she befriended and to whom she dedicated many of her paintings. Together, you will see within this book Pam's artistic expressions and descriptions that will intrigue and delight your senses of sight and humor.

Our family hopes you will enjoy what follows. One of Eddie's last wishes was that this book of Pam's artwork be published. It is not a secret. He sensed its importance, admired her mind and understood her great talent.

To Pam with Love, Lynn

List of Illustrations

The following are descriptions and quotes from Pam Lewis (and others) describing each individual pen-and-ink and watercolor painting.

"Our Front Porch"
30" x 21.5"
Watercolor, early 1950s
From the artist's collection

This painting was Pamela's first large watercolor work. It features moths hovering around the light fixture on the front porch of the family home. Moths were a recurrent feature of her paintings, and many moths and other insects were captured near this light fixture over the years.

"Moth Conducting a Pansy Symphony"
22" x 17"
Pen and Ink, late 1940s
From the collection of Keith Lewis

This drawing was created using a technique known as "stippling," in which shading is accomplished through the application of individual dots of ink to the paper, achieving darker shading by applying more dots per square inch. Pam used a magnifying glass to help apply the ink. This was the same technique used by the Pointillists in the early 20th century.

Pam then began to realize one day during a session of stippling, that she would "go crazy" if she were to permanently adopt this method of painting. "You can't have any distractions while stippling," she said. "And it took forever and a day to do this type of painting."

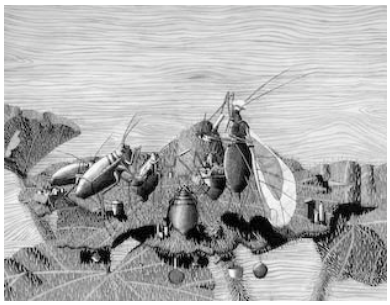
She continued to do some pen and ink creations and eventually shifted her focus into watercolor painting.

“Butterfly Conducting a Pansy Symphony”
21.5” x 30”
Watercolor, early 1950s
From the artist’s collection

In this watercolor version of the previous pen and ink drawing, the conductor is a now a swallowtail butterfly instead of a moth. The “audience” includes ladybird beetles, as does the earlier pen and ink drawing.

Many of Pamela’s images were of plants and insects commonly found in the family’s backyard.

“An Insect Picnic”
15” x 20”
Pen and Ink, late 1940s
From the collection of Keith Lewis



Pamela produced a few large pen and ink drawings to practice her stippling technique.
After graduating from Stanford, Pam stayed an extra year in Palo Alto. One reason for staying was that “the woods around Stanford were full of insects and ticks—wonderful subjects for drawing!”

This painting features a group of hungry aphids (*Aphidoidea*) preparing for a feast of leaves.

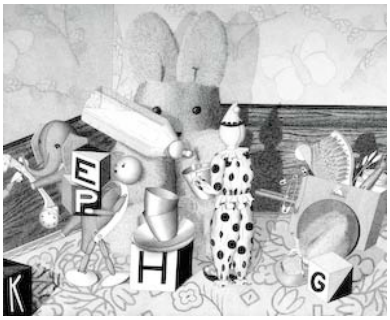
According to Pam, “Aphids eat just about anything.” Essig offers: *Aphids are small, delicate insects well known to all who are interested in plant life because of their abundance on, and injury to all types of vegetation. Aphids are injurious to all forms of plant life and may be found on the bark, leaves, blossoms, fruit and roots.**

* E. O. Essig, *Insects of Western North America*, (New York: The MacMillan Company, 1926) pages 223-224.

"California Ladybird Beetles"
18" x 23"
Pen and Ink, late 1940s
From the collection of Keith Lewis

The drawing depicts ladybird beetles (*Coccinella californica*) fancifully armed for battle, with a captured aphid in chains. Ladybird beetles are beneficial to gardens. They are insectivorous and devour many plant pests, including aphids.

"The Lewis Family"
18" x 27"
Pen and Ink, early 1950s. Final completion circa 1956
From the collection of Keith Lewis



This piece was painted for Pam's children. It was inspired by the many toys accumulating around the house. Each letter on a wooden block represents the first name of a family member. The letters on the toy blocks thus stand for Edward and Pamela Lewis, and their sons Hugh and Glenn. The block with the letter "K" was added later, after the birth of their son Keith.

"Huntington Medical Research Institute"
30" x 21.5"
Watercolor, late 1960s
From the collection of the Huntington Medical Research Institute

This painting was created for Velma K. Moore who was the personal secretary to Robert H. Pudenz, M.D. Pam and Edward continuously supported biomedical research at the Institute.

The painting features the seal of the Huntington Medical Research Institute, founded in 1950 by Dr. Pudenz and his colleague Dr. Hunter Shelden. Along with those physicians, Pamela always respected the great work done by their assistants, the secretaries. Some of the items in the painting represent those things (typewriters, files, etc.) that were important in completing their work. The painting is rounded out with depictions of roses and the nearby San Gabriel Mountains.

"The Buckeye Butterfly"
21" x 30"
Watercolor, circa 1967
From the collection of Rita C. Pudenz

This painting was created for Dr. Robert Pudenz who was a native of Cincinnati, Ohio, the Buckeye State. It features the buckeye butterfly (*Junonia coenia)*, which is found throughout the United States and is common in the west.*

In the background of the painting are two roses. One is in full bloom; the other has lost its petals. These are intended to symbolize Dr. Pudenz' love for humanity, both healthy and infirm.

* E. O. Essig*, Insects of Western North America*, (New York: The MacMillan Company, 1926) page 647.

"Pain"
30" x 21.5"
Watercolor, circa 1965
From the collection of Keith Lewis

This is another painting created for Dr. Pudenz, a renowned Pasadena neurosurgeon. Dr. Pudenz literally saved Pam's life in a difficult emergency neurological procedure in1962.

This is actually the first version of the painting; Pam painted a second, which she gave to the Pudenzes.

The scalpel, which represents medicine in this painting, is cutting through flames which represent pain and sickness.

"The Brain as an Instrument of the Mind"
30" x 21.5"
Watercolor, late 1960s
From the collection of Rita C. Pudenz

Another painting was created for Dr. Pudenz M.D. This one was inspired by a lecture of the same title that he delivered to the Newman Club in Los Angeles.

Pamela used a multitude of color and light in painting the brain, to symbolize the complexity and depth of the mind. The color blue, which was Dr. Pudenz' favorite color, dominates the color scheme. There is also an electroencephalogram (EEG) trace in the background.

"Bloom's Syndrome"
30" x 21.5"
Watercolor, circa 1986
From the collection of James German, M.D.
Cornell University Medical School Department of Pediatrics

Pam created this painting for Dr. James German, a family friend who made great contributions to the study of Bloom's Syndrome. Bloom's Syndrome is a genetic disorder in humans which results in small stature, mental retardation, and early death from various forms of cancer.

This painting is done in only two colors: pink for the normal, healthy state of a person without the syndrome, and grey for the morbid, diseased state. The large gray object, painted in the center, represents the abnormal cytological quadriradial configuration where two pairs of chromosomes appear in a distinct, abnormal shape. The comparable chromosomes of a healthy person are shown in light pink.

Pam explained: "The problem of artistically showing mental retardation in an abstract way was much harder, until a wise neurosurgeon friend advised me, 'Why not leave blank spaces in the picture because that might be the effect on the patient's life.' So, I asked myself if the blank spaces should be white, black or grey? Fortunately, Dr. German had published a paper on Bloom's Syndrome in which he described the patient's personality as, '…characteristically a sunny disposition which makes them a pleasure to deal with'…so I decided that the blank spaces would be white—the color of sunlight."

There are five children's faces in the picture: a young healthy child at the top of the quadriradial image. The other four are enlargements of patients' faces taken from a paper published by Dr. German.

There exist two versions of this painting. In the final version, the normal child's face is bolder than in this earlier version.

"For Lyle Harrah"
21.5" x 30"
Acrylic and watercolor, early 1980s
From the collection of Keith Lewis

This painting was created for Lyle Harrah, Pam's mother. Lyle volunteered at Children's Orthopedic Hospital in Seattle, translating articles from French medical journals into English. She often worked for the chief pediatrician at the hospital, Dr. David Smith, who was interested in genetic defects.

The painting depicts a "metaphase plate," a form of squash slide preparation designed to permit microscopic examination of chromosomes at the metaphase stage of cell division. This stage is best for more clearly observing genetic abnormalities.

A happy baby's face appears among the paired chromosomes.

"Metamorphosis Complete"
11" x 22"
Watercolor, circa 1960
From the collection of the artist

This painting depicts an omnivorous looper moth (*Sabulodes caberata*) that came one night to Pamela's front porch light. Essig describes these as "beautiful, delicate, fawn or terra-cotta colored moths"* that mimic their background in both major stages of their life history. The larval stage mimics tree twigs, while the adult mimics a dried geranium flower petal. Pam wanted to give the appearance that the moth was looking up at the moon and stars.

Feeling that the painting needed a splotch of color, Pam added the reddish mushrooms in the foreground.

This painting was reproduced in poster form for the 1st Lucille P. Markey Charitable Trust Symposium at the California Institute of Technology in 1987.

* E. O. Essig, *Insects of Western North America*, (New York: The MacMillan Company, 1926) page 701.

“Sphinx Moth”
11” x 14.5”
Watercolor, circa unknown
From the collection of the artist

This painting depicts a sphinx moth (*Celerio lineate*) that appeared one evening at her front porch light. White-lined sphinx moths have been “likened to night hummingbirds because of their swift flight from flower to flower.” *

Not all of Pam’s paintings carry a signature. The majority of paintings are signed on the lower right, while on this painting she chose the lower left.

* E. O. Essig, *Insects of Western North America*, (New York: The MacMillan Company, 1926) page 666.

“Lyle’s Butterfly”
8” x 11”
Watercolor, late 1950s
From the collection of the Keith D. Lewis

This painting was created as a gift for her mother, Lyle Harrah. It depicts a small blue butterfly commonly found in southern California, which appeared one day in Pam’s backyard.

“Hunter’s Butterfly”
4” x 8”
Watercolor, early 1970s
From the collection of the artist

This painting was painted for C. Hunter Sheldon, M.D., one of the co-founders of the Huntington Medical Research Institute in Pasadena, CA.

The painting depicts a butterfly commonly known as the painted beauty, but also known as “Hunter’s Butterfly” (*Pyrames huntera*), which was first described by an entomologist named Hunter. Pam found the butterfly in her backyard.

"The Snapdragon"
21.5" x 30"
Watercolor, late 1950s
From the collection of Keith Lewis

Pam wished to illustrate children's story books but found the writing more difficult and less rewarding than the painting. In this instance, only the painting survives. This whimsical scene depicts a smoke-snorting snapdragon *(Antirrhinum)* flower being warily observed by a swallowtail butterfly (*Papilionidae*).

This painting was reproduced in poster form for The Second Lucille P. Markey Charitable Trust Symposium at Caltech in 1988.

"For Glenn Lewis"
21.5" x 30"
Watercolor, late 1950s
From the collection of the artist

This painting was painted for her son Glenn. Glenn, even as a young child, enjoyed electronics and mathematics.

The contraption depicted in the painting resembles many of the items that could be found in Glenn's room in the family home…and looks complicated. However, in Rube Goldberg fashion, it does nothing more than water the lawn.

The tortoise in the foreground was a pet. Assorted and unusual pets were always present in the Lewis family and each child had his own pet desert tortoise.

This painting was reproduced in poster form for The 4th Lucille P. Markey Symposium in Developmental Biology at the California Institute of Technology 1990.

It also was featured on the cover of: *Systems Biology: Genomic Approaches to Transcriptional Regulation*—Abstracts of papers presented at the 2003 meeting at Cold Spring Harbor Laboratory, New York.

"For Hugh Lewis"
21.5" x 30"
Watercolor, late 1950s
From the collection of the artist

This painting was painted for her son Hugh. Hugh Lewis enjoyed building model ships and cars, as well as roller skating and generating minor explosions.

Hugh's Panda bear from early childhood and a favorite puppet are depicted. Also seen are postage stamps from an early collection.

The roller skate is causing paper roll caps to explode. To gain insight into the proper appearance of exploding caps, Pam laughed when she recalled, "I spent a couple of hours one day sitting in our driveway banging on caps with a hammer to see what the smoke looked like. Imagine seeing a middle-aged housewife just sitting there, in the hot sun…just banging on caps."

"For Edith Wallace"
21.5" x 30"
Watercolor, circa 1960
From the collection of the artist

This painting was painted for Edith M. Wallace, who was Dr. Thomas Hunt Morgan's scientific illustrator. T.H. Morgan was on the faculty of Caltech when Ed Lewis was a graduate student. Morgan won the Nobel Prize in Medicine in 1933 "for his discoveries concerning the role played by the chromosome in heredity."*

Ms. Wallace was a Lewis family friend who drew the first accurate pictures of several mutant strains of the fruit fly (*Drosophila melanogaster)*. The moth in the painting is holding aloft a book containing a picture of the *Drosophila* that she drew for Morgan.

Pamela quotes: "Edith often came to dinner on Sunday evenings and we always listened to classical music on the radio during those times." Images of musical notes capture those memories.

* *http://nobelprize.org/nobel_prizes/medicine/laureates/1933/index.html*

“Piano Dreams”
21.5” x 30”
Watercolor, 1970s
From the collection of Dr. Marguerite Vogt

This painting was painted for Marguerite Vogt, M.D., Ph.D., who for many years played piano and viola in a chamber music group in which Pamela’s husband, Ed, regularly played flute.

At the time of this painting, Dr. Vogt lived in a house built in a barren canyon outside of La Jolla, CA. She brought color to her home site by planting nasturtium seeds to encourage hummingbirds to feed at her balcony. She was the daughter of neuro-anatomists Oskar and Cecile Vogt, who drew the first detailed maps of the human brain locating regions involved with memory, speech, vision, etc.

The painting depicts a piano keyboard stretched around lab beakers, with nasturtiums in the foreground. Before her death in 2007, Dr. Vogt was a principal investigator at the Salk Institute for Biological Studies in San Diego, studying the relationship between viruses and cancer.

“For Keith Lewis”
30” x 21.5”
Watercolor, late 1970s
From the collection of Keith Lewis

This painting was painted for Pam’s son Keith.

It features a “Lewis’ moon snail” *(Polinices lewisii)*, surrounded by representations of the moon in its various phases. Keith found the moon snail in the Elkhorn Slough near Monterey, California, while on a field trip for a biology class at the University of California at Santa Cruz, where he was taking oceanography and astronomy classes.

“For Edward B. Lewis”
21.5” x 30”
Watercolor, circa 1961
From the collection of the artist

Pam created this powerful and complex painting for her husband Edward.

A silver flute, illuminated with the colors of the rainbow, is central to this picture. Chess pieces, some keys, and several moths and butterflies surround the flute. A stormy sky over a dark sea forms the background. The object holding the keys was modeled after "…just a pork chop bone and isn't that of an exotic desert creature," laughs Pam.

Aside from his science, the flute was central to Ed’s life. He played the instrument since his early childhood, and from the 1950s on continued to play with a chamber music group several times a year. He took flute lessons to improve his proficiency, and comforted himself by playing the instrument while fighting the cancer which ultimately took his life.

Ed also played chess and, although clearly brilliant, was somewhat absent-minded. The keys in the painting represent this forgetfulness, which occasionally caused him to misplace his car keys, eyeglasses and other important items.

The blue butterfly (*Morpho menelaus*) in the foreground is a specimen from South America given to Pam by family friend Dan Lindsley, a professor at University of California, San Diego.

“For Alfred H. Sturtevant”
21.5” x 30”
Watercolor, late 1950s
From the collection of the artist

Pam created this painting for Dr. Alfred H. Sturtevant, who was a professor of genetics at Caltech when Ed was working towards his Ph.D. “Sturt” was more than a mentor to Ed; he was also a father figure of sorts. Pam and Ed were married in 1946 in the garden of Sturtevant’s home across the street from the Caltech campus.

Sturtevant was interested in history as well as genetics. The moth which is central to the painting is seen writing on a vellum scroll. An old castle and the ruins of older structures appear in the background. Old coins lie among mushrooms in the foreground.

Pam later scolded herself for producing “lousy grammar” in this painting. The moth is writing in various languages, and one Latin phrase, “magnus et veritas,” is incorrect. Since veritas is feminine, the moth should have written “magna et veritas.” *

*http://www.olimu.com/Readings/MagnaEstVeritas.htm

In the Latin Vulgate Bible, the first Book of Esdras (equivalent to the book of Ezra in the King James Bible) contains the verse: *Magna est veritas et prævalet* — "Great is truth, and it prevails."

“For George Beadle”
30” x 21.5”
Watercolor, late 1950s
From the collection of Keith Lewis

This painting was painted for Dr. George W. Beadle who, with Edward L. Tatum, won the Nobel Prize in Physiology and Medicine in 1958 for their discovery that genes act by regulating definite chemical events. Pam first encountered Beadle at Stanford, where she took his undergraduate genetics class. She later worked as his teaching assistant, grading other students’ papers.

Beadle was ultimately responsible for Pam’s move to California and her marriage to Ed. Beadle had accepted an offer from Caltech to chair its Biology Department and asked Pam if she would like a summer job at Caltech after graduation. He also mentioned that he’d met a young scientist named Ed Lewis at Caltech. “Maybe you’ll like him [Ed Lewis] so much you’ll fall in love and decide to stay there at Caltech.”

Pam and Ed shared social time with Beadle and his wife. The outdoor evening scene in the painting reflects Beadle’s fondness for entertaining others, and of his personal tastes for red wine and tobacco. Some have said that the candle that illuminates the scene may be symbolic of Beadle himself, who brightened Pam’s life in so many ways.

“For George Beadle”
21.5” x 30”
Watercolor, late 1950s
From the collection of the Keith Lewis

This painting was the second in a series of two painted for Dr. George Beadle. Instead of moths, Pam painted beetles as a play on words. The large green one is a *scarabeid*, a common June beetle from Southern California

The other items in the painting symbolize aspects of Beadle’s scientific research. Beadle was from Nebraska and initially used corn as the organism of choice for his genetics research. Later, he used *neuorospora*, a slime mold grown in narrow glass vials. Still later, he used fruit flies (*Drosophila melanogaster*) which were grown in pint milk bottles.

The pea plants are a tribute to Mendel. Strands of DNA swirl in the sky in the background.

“The Origin of Life”
21.5” x 30”
Watercolor, late 1950s
From the collection of Professor Norman Horowitz

This painting was created for Dr. Norman Horowitz, Professor Emeritus, Biology, at Caltech. He was also Ed's colleague. Norm designed the search-for-life experiments aboard the Viking Missions to Mars in the 1970s. He wrote the book *To Utopia and Back: The Search for Life in the Solar System.**

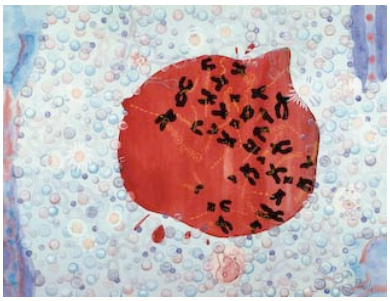
The painting depicts fanciful components of the “primordial soup” of complex organic molecules that were forming on earth billions of years ago.

Dr. Horowitz had theorized that ultraviolet light was a likely energy source for the chemical transformations in those molecules that were necessary for life to spring into being. Rays of ultraviolet light are seen illuminating the foreground, while a moth hovers in the center.

There is a symbol under the moth for "retro evolution." According to Pam, "The genes don't always mutate in a logical time frame. Sometimes the gene sits around for eons before it can express itself because the conditions are not right."

* W. H. Freeman and Company, 1986

“For Ray Owen”
21.5” x 30”
Watercolor, circa 1978
From the collection of Ray and June Owen



This was a painting done for Dr. Ray Owen, Professor Emeritus, Biology, at Caltech.

Pam's painting is an interpretation of subject manner in scientific articles published by Dr. Owen which dealt with “quantitative differences in cattle immunogenetics” and “in factors common to various breeds of cattle.” She chose the colors cobalt blue and alizarin crimson ("the color of arterial blood").

Along with his life's work in biology, Dr. Owen served as Caltech's Vice President of Student Affairs. Pam remembers him as "…always being concerned in seeing a subject from a student's point of view…always trying to include the student and make sure (s)he was interested."

“For Leroy Hood”
30" x 21.5"
Watercolor
From the collection of Lee Hood

This painting was painted for Dr. Leroy Hood. Lee was an undergraduate at Caltech and returned (after getting a medical degree at John's Hopkins University) to work towards a Ph.D. with Ray Owen.

The painting features some buildings on the Caltech campus. A favorite instructional slide of Lee’s is also incorporated into the picture, that of a double helix (*left side*), a strand of mRNA (*middle*), and a vertical stack of proteins (*right side*). A human brain and heart symbolize Lee’s application of molecular biology tools used to cure human disease.

To the Egyptians, the scarab beetle is a symbol of renewal. At the end of a hot summer, when most plants and animals in the desert are suffering, these beetles appear to thrive because of having an adequate food source in dung. Pam had an opportunity to view the Smithsonian Museum’s vast insect collection to find the scarab beetle (*Scarabaeidae*) specimen for this painting. Pam exclaimed, “It was like looking at the crown jewels!”

The “fairy ring” of mushrooms is also a symbol of life’s renewal. The painting also depicts leaves in the fall (although there are still a few leaves which have yet to turn from green to fall colors). Pam explains, “When most of the leaves are dying and changing color, some are still green promising the renewal of life in spring.”

This painting was reproduced in poster form for The Third Lucille P. Markey Symposium in Developmental Biology at the California Institute of Technology 1989.

“Yellow Rain”
Watercolor
From the collection of Dr. Matthew Meselson

Late in the 20th century, clouds of “yellow rain” were found in Southeast Asia. At that time, political tension was rising between the United States (U.S.) and then The Soviet Union.. The U.S. began to think that these globs were the result of Russian chemical warfare tests. Fortunately, Dr. Meselson, of Harvard, decided to investigate the “yellow rain.” He found that swarms of honeybees, after dining in a field of flowers, will take to the air for “cleansing flights” in which they discharge all of the end products of digestion of pollen and nectar. These cleansing flights result in the creation of good-sized clouds of small yellowish droplets, thus giving the phenomenon the name “yellow rain.”

In investigating the reports, it was found that the single most important fact about the clouds of yellow rain was their variability. Most of the drops had a golden tinge, but there would be regions in each cloud where the droplets had a tinge of another color, such as red-brown, or green. The variability depended on the color of the pollen grains consumed by the bees. If the cloud had been man-made, it would consist of droplets all of the same size, shape, and color as every other droplet.

The bee depicted in the painting was collected by Dr. Meselson in Thailand.

“Swallowtail Study”
30" x 21.5"
Watercolor
From the collection of Keith Lewis

This painting was created for Pam's youngest son, Keith Lewis, and was done to encourage him with his schoolwork. The scene is a representation of a good study area. The chalk blackboard is a reminder of days when lessons were taught without computers.

The western swallowtail butterfly (*Papilio rutulus)* is surrounded by books, lunch box, crayons, and math problems. Several people who have viewed this painting have tried to touch the blackboard to see if the chalk is real.

“For Hugh Lewis”
30" x 21.5"
Watercolor
From the collection of the artist

"Our front porch light fixture has evolved over time." The original fixture was showcased in Pam’s early painting (“Our Front Porch”). The old lamp was replaced at some point by Hugh, Pam's oldest son. Pam was impressed and "amazed he could do that himself,” and thus dedicated this painting to him.

The evening scene is mostly dark and cloudy. To include some color, Pam added the green streak. She instructed us, “The easiest way to identify a moth from a butterfly is to look at the antennae. All moths have antennae with a point at the tip, while all butterflies have antennae which end with a rounded tip.”

“**California Oak Moth”**
30" x 21.5"
Watercolor
From the collection of the artist

This moth (*Phryganidia californica*) was collected at the porch light, glued to a stiff paper and photographed. Pam was able to trace the wing structure from an enlargement. She also used a Zeiss compound microscope to view, in her words, “the feathery antennae at the most distal end.”

According to Essig, the caterpillars of this beautiful moth, *“…often completely defoliate the largest trees over extensive areas. All varieties of oaks and rarely, chestnuts, eucalyptus, and other trees are attacked.”* *****

* E. O. Essig, *Insects of Western North America*, (New York: The MacMillan Company, 1926) page 691.

"The Western Swallowtail Butterfly"
30" x 21.5"
Watercolor
From the collection of Keith Lewis

This butterfly (*Papilio danus*), according to Essig: "*…is the largest western species of swallowtail, [and] members of this family are seldom serious pests. The larvae feed on very many kinds of rosaceous plants…* *

Pam has the butterfly situated on a climbing rose, where it is preparing to sample nectar from the flower. Prior to metamorphosis, the larvae would have sought out the flower for a meal.

* E. O. Essig, *Insects of Western North America*, (New York: The MacMillan Company, 1926) page 631.

"The Giant Silk Moth"
30" x 21.5"
Watercolor
From the collection of Keith Lewis

To encourage Keith's studies (youngest son), Pam painted this piece for him which features one of her favorite books, *The American Heritage Dictionary*. It is underneath the large ceanothus silk moth (*Samia euryalus)*.

Keith was going to boarding school in Santa Barbara County at the time of this painting, and the trees in the background of the painting are Pam's vision of the eucalyptus trees on the Cate School campus.

“Moth Sketch”
30" x 21.5"
Pen and ink
From the collection of the artist

Moths belong to the order of insects called Lepidoptera (*Lepis*, scale; *pteron*, wing).

Although this was drawn for “fun,” Pam often used a scientific approach and a microscope to see even the most minuscule parts of her subject matter. A close-up view of this pen and ink sketch shows exquisite wing scale detail.

“The Invisible Man”
30" x 21.5"
Watercolor
From the collection of Rita C. Pudenz

This painting was painted for Robert H. Pudenz, M.D. Quoted Pam, “Fishing was his favorite hobby.” Dr. Pudenz was a recognized pioneer in the field of pediatric neurosurgery, research in cerebrospinal fluid physiology, and shunt technology for the treatment of hydrocephalus. He received wide recognition during his lifetime for his many clinical and scientific contributions to medical science.

Dr. Pudenz was very concerned for the physical health of his patients but equally interested in “the invisible person” whom he defined as the "hopes, dreams, ideals and standards which contribute to the person." Pam interpreted this to mean that “[the invisible man] doesn’t consist of bone, muscle and blood, so he cannot be studied by the usual quantitative measurements."

In this picture, the EEG and EKG are visible through the Invisible Man, the part of a person which, according to Pam, "…makes the famous physicist put away his slide rule and pick up his violin, or makes the distinguished neurosurgeon just trade his scalpel for his fishing pole and head for his favorite stream."

"The Invisible Man goes everywhere the flesh-and-blood man goes, shaping his character and personality. Dr. Pudenz always wanted to care for the Invisible Man in each patient and this was of utmost importance in his medical practice.” According to Pam, he once told a patient, “This painting is what your soul looks like.” His patient responded, “That’s not what my soul looks like!”

“Blood Center Picture”
30" x 21.5"
Watercolor, circa early 1970s
From The New York Blood Center

This picture hangs in the New York Blood Center in New York City. It was done for James German, M.D. (profiled in Bloom's Syndrome). Dr. German, a medical scientist, was also the director of the Blood Center which was instrumental in the doing early research in blood typing.

The greatly magnified drop of blood in the center represents the tremendous groundwork done by the Blood Center in understanding blood genetics. Parts of the bridges have been replaced by chromosomes since, according to Pamela, "Chromosomes are bridges between generations."

Dr. German has teased Pam about her rearrangement of the New York skyline. He also has indicated that he wants to use this picture in a book that he is writing on Bloom's Syndrome.

To someone on a sea of pain adrift,
From one cause or another,
Take just this humble crimson gift.
It says, "Though we never meet,
I love you, my unknown brother."

Pamela Lewis

"For the Niles's Children"
21.5" x 30"
Watercolor, circa early 1960s
From the collection of Grace and Henry B. Niles

Grace and Henry (Hank) Niles were neighbors who lived next door to the Lewis family. Their children were about the same ages as the Lewis's children, and Pam and Grace became close friends. To this day, Pam stays in touch with both Grace and Hank.

In this painting, Pam wanted to celebrate a "child's view of the world." She and Grace agreed, "that children should have fun and know happiness." To this end, Pam created a sailor who has come alive and dances amongst common everyday items. Note how she made bubbles that blend into musical notes.

Hank is the grandson of author L. Frank Baum. One of the books in the background of this painting is *The Wizard of Oz*. Keats and Henry Niles are also authors on the bookshelf.
