PaulingBlog

Roger Hayward (1899-1979): The Western Years, Part 1

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(https://paulingblog.files.wordpress.com/2008/04/12zodiac1.jpg)
Figure 12. Zodiac watercolor by Roger Hayward.

[This is the second of four installments of the PaulingBlog's Roger Hayward biographical series. The text that follows was compiled by Dr. J.R. Kramer, Miriam Kramer and John Benjamin, who may be reached at jkramer2[at]cogeco.ca]

At the prodding of S.E. Lunden, a classmate and colleague at Cram and Ferguson, Roger left Boston for Los Angeles for work as an associate and chief designer for Lunden and Associates. Lunden had landed two major jobs, the USC Doheny Library and the LA stock exchange. Much of the exterior of the Doheny library (see http://www.publicartinla.com/USCArt/Doheny/hayward/ (http://www.publicartinla.com/USCArt/Doheny/hayward/)) and the stock exchange (see http://www.you-are-here.com/downtown/stock_exchange.html (http://www.you-are-here.com/downtown/stock_exchange.html)) were designed by Roger. In particular, he was honored for the art work over the main entrance to Doheny (http://www.publicartinla.com/USCArt/Doheny/). The glass mosaic of the Zodiac over the entry to the library is from his watercolor. In 1933 he received an award from the American Institute of Architects for this design. The massive and well-balanced entry doors to the exchange were his ideas as well.

The architecture in these two buildings has a majesty and strength similar to many Gothic creations, but the style and design is definitely modern and "West coast." One interesting aspect of the Doheny building are the chairs in the reading room. These were designed mostly by Roger and specially constructed out of walnut by a Buffalo, New York shop. As one observer noted, "students need to concentrate on the work in front of them and not on their uncomfortable seats."

As the 1930s moved forward, the Depression hit the region hard and there was no new architectural work for some time. As a result, Roger became a "jack-of-all-trades" in order to stay afloat. He, Betty and his brother, Julian, started making puppets and putting on puppet shows under the name BEROJU (Betty, Roger, Julian) both at their house and at Caltech's new Athenaeum club. Puppetry was an extension of Roger's early days back in New Hampshire when his family would create plays by making masks and acting out different roles.

Pasadena Life

 (https://paulingblog.files.wordpress.com/2008/04/13elizabeth1.jpg)
Figure 13. Elizabeth in 1935.

Roger and Betty lived on East Walnut St., about 8 blocks from Caltech, and it was natural to make contact and become friends with faculty. Roger developed numerous associations with the professors in his neighborhood, including John Strong of the Physics department and architect/astronomer Russell Porter. Benefiting from their introductions, Roger negotiated a contract for a moon model at the Griffith Planetarium on a scale of 50 feet to the diameter of the moon. This work attracted international press for Roger as the "man in the moon." Later he was commissioned to make a smaller (6 feet) but complete model at the Adler planetarium in Chicago.

 (https://paulingblog.files.wordpress.com/2008/04/14moonscape1.jpg)
Figure 14. Roger working on the Griffith model of the moon. (Los Angeles Public Library photograph, Security National Bank Collection).

Through Caltech people, Roger also made contact with scientists at Mount Wilson Observatory. Likewise, blessed with strong three-dimensional and arts & craft skills, Roger was hired as a "technician" who both drew and constructed a variety of molecular structures for Linus Pauling. (The relationship between Hayward and Pauling will be the subject of Part 4 of our blog series) As he increasingly involved himself in scientific work, Roger came to realize that he did not properly understand the basics of atomic theory necessary to "artistically and accurately draw atomic structures". Roger began to chart a new path for himself

> "Was I going to live in this age and be ignorant of all of this [science] and also regard myself as an intelligent man? And therefore I gave myself (with the help of these new friends) a course in atomic theory and molecular structure."

To assist, he swapped a watercolor painting with physicist R.M. Langer in exchange for tutorials on atomic theory.

In the mid-1930s, Roger also studied, designed and built three weaving looms for Betty who had taken up original weaving for sale, specializing in modifications of Navajo patterns. Roger had also become interested in the variety of California woods, and started designing and carving jewelry. The Haywards would take these to local Pasadena craft shops and exhibitions for sale. As a result, they met and made friends with many more Caltech faculty.

Many other activities occupied Roger during the down times of the Depression. He designed a nut cracker machine for the California Walnut Growers Association; he served as a consultant for the Unbreakable Lens Company of America; and he measuring basic physical properties of plastics. This all helped to keep food on the table during a difficult economic era.

Roger also became a member of the Leslie Briggs Discussion Club, a study group founded in the 1930s to consider social and ethical issues including the impact of the Depression on the structure and well-being of families. This club featured a broad base of members — interestingly enough, many of them were from New England. The club's membership strongly influenced on Roger's thinking on a variety of socio-economic and metaphysical issues.


(https://paulingblog.files.wordpress.com/2008/04/15loom1.jpg)

Figure 15. One of the looms designed and made by Roger for Betty.

Another group with which Roger was intimately involved was the "100:1 Shot" or "10-2 Club." This group, consisting again of a broadly-based membership (many from Caltech), delighted in the consideration of ideas that had only a small chance of actually becoming reality. Members of this group included G. Potapenko, G.A. Mitchell, R.M.Langer, H.V.Neher, John McMorris, John Strong, J.A. Anderson, M.L. Humason, J.T. Barkelew and R.W. Porter. The group met at a member's home, and each member accepted the responsibility of setting the agenda on a suitable topic. A social hour normally ensued during which individual discussions on the topics at hand could be developed.

Roger's association with Caltech's John Strong on the 1938 book, *Procedures in Experimental Physics* was both an education and an opening to an enduring friendship, and to new projects, for Roger. This, in turn, strengthened his relationship with the Mt. Wilson Observatory and probably resulted in Roger becoming a consultant for A. O. Beckman and National Technical Labs (i.e. Beckman Industries) for most of 1941. One result of this relationship was Roger's development of a monochromator for a spectroscope that would serve as the basis of the Beckman DU spectrophotometer. "The instrument is merely a development of the spectrograph which I built for myself," Roger would note. "It is a little simpler in that it uses one half prism. In my own device I use a full prism with a half speed mirror to back it up and thus gain a factor of two in resolving power." (See also *Anal. Chem.* v. 49, 280A-296A, 1977)

In 1938, Roger became the basic designer for the University of Southern California's Allen Hancock Biology Laboratories (Johnson, architect). This was a complex structure as it included an "aquarium, a stack for tons of specimens in alcohol, cold rooms, hot rooms, research labs, a music hall, a broadcasting studio, and three rooms from an old house." During this time, Roger continued to be tutored in atomic theory by R.M. Langer and made a prism from a two-inch chunk of quartz. He mounted this prism in a

spectrograph "making all the optics, patterns etc. and doing the machine work." He also acquired a copy of Conrady's *Applied Optics and Optical Design* and "gave myself a short course in geometrical optics, at least, I learned how to trace."

In 1941, Betty and Roger moved to 920 Linda Vista in Pasadena, which would be their home until 1973. They planted special trees to produce stock for making jewelry and, more importantly, converted a two-car garage into their "hobbery," containing a shop, looms, lathes and, of course, books and a drafting area. This "joint operations center" allowed Betty and Roger to work together on many different projects. Often one would read to the other from a classic novel while working in this environment. Obviously many ideas were conceived jointly in this setting.

The War Years

With the outbreak of World War II, Roger started work at the Mt. Wilson Observatory as an optical engineer. Here he developed the Schmidt-Cassegrain optical arrangement for telescopes, used for distant sighting of enemy planes. This work resulted in Roger's attainment of four patents once secrecy restrictions were lifted at the end of the war (See *Sky and Telescope*, v. 114, no 3, p. 30-37) though, as it turned out, improvements in distant radar resulted in only limited application of the distant optical package.

Roger also used his 3-D and optics knowledge to develop tools for air-to-air defensive gunnery, resulting in a number of practical publications for the Air Force on improvements in gunsight optics and the use of the Magnin mirror for gun sighting. As he said in 1943, "if the enemy had not run out of airplanes, we would have been on to a good thing." Finally, Roger also was sent to North Africa to work directly with combat groups, where he developed an interest in North African art and archeology.

The year 1946 marked the end of World War II and the start of new ventures. Roger continued as on in his role as an artist-consultant to the Division of Chemistry and Chemical Engineering at Caltech. He also collaborated with Linus Pauling in illustrating his *General Chemistry*, a project discussed between the two as early as the late 1930's. In 1948, he illustrated Frantz's *Laboratory Study of Chemical Principles* and Beadle's *Genes of Men and Molds*.

Scientific American

Roger also started to do more illustrations for *Scientific American* and, crucially, developed an association with the journal's Amateur Scientist section. *Scientific American* emphasized the publishing of quality articles from well-know scientists, to which Roger contributed his considerable imagination and artistic skill. He also frequently contributed articles himself often on items that he had built himself in the hobbery.

(A long series of humorous communications — spanning the years 1956-1959 — between Amateur Scientist editor C.L. Stong ("Red") and Roger Hayward ("Rajah") are incredible. The "Rajah" probably came naturally from Roger's New England accent which made the "er" sound like"ah".)

The quality of the column was so good that many academics and other professionals followed it very closely. Charles Newton, Assistant to the President of Caltech, referring to a winner of the National Science Fair in 1953 wrote to Roger that "...it had been the articles and illustrations on astronomy in the *Scientific American*" that had awakened the winner's interest in science. Clearly the smooth and successful working of *Scientific American* and the Amateur Scientist column arose, at least in part, out of the publisher's and editor's understanding and appreciation of the artful illustrations that appeared in

the magazine. In a December 18, 1973 letter wherein Roger is informed of the official termination of his employment on the Amateur Scientist column due to his deteriorating eyesight, editor Dennis Flanagan wrote:

> "I want you to know that I am profoundly grateful for you having stuck it out for so long, and for the tremendous contribution you have made over the years. You know that you have contributed more than the illustrations themselves. You have set the whole style for this kind of illustration."

Indeed, Roger made sure that his scientific illustrations were not only beautiful but clear and correct, a point which will be considered further in our discussion (Parts 3 and 4) of the development of *The Architecture of Molecules*. In all of the above, it is important to realize that Roger did not illustrate anything until he understood the basic workings — so much so, in fact, that he built an opium pipe prior to creating the illustrations for Peter Fay's *The Opium War*.

For more on Roger Hayward, click here (https://paulingblog.wordpress.com/category/roger-hayward/).

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« Roger Hayward (1899-1979): Architect, Artist, Illustrator, Inventor, Scientist Roger Hayward (1899-1979): The Western Years, Part 2 »

One Response

leslie davis, on April 11, 2009 at 7:45 pm said:
it was my great pleasure to become a little more than just acquainted with the haywards in the early 70's
what a truly fun,childlike and adventurous couple they were
thank you for allowing me to remember our short time together
leslie

WP Designer.