An Interview with Henry Wilhelm of Wilhelm Imaging Research

Pioneer into permanence research shares history of photography and preservation

by **Paul Schranz**

It's hard to imagine someone involved in traditional or digital photography who hasn't heard of, or quoted, Henry Wilhelm. Since the 1970's, when the serious collecting of fine art photography began, photographers have been preoccupied with the conceptual goals of "archival processing" and "archival storage." Special black-and-white fiber base papers, special processing procedures, special archival print washers and drying racks, special mounting, framing, and storage materials—a whole new industry started in the black-and-white photographic processing and printing field, then spread into color photography.

Now, as photography moves rapidly to digital capture and printing, concern over the lasting properties of images continues to grow. Wilhelm, based in Grinnell, Iowa, has been researching the topic of image permanence and long-term preservation of photography for nearly 40 years. He began with conventional archival processing and later expanded to digital inkjet output. As part of his mission, he founded East Street Gallery in 1967, ran Preservation Publishing Company from 1981 to 1995, and now heads Wilhelm Imaging Research, Inc. Throughout, Wilhelm has been at the center of image-permanence testing and information dissemination. It's almost impossible to find a printer, ink, or paper from any of the major manufacturers that has not been rated for permanence by Wilhelm Imaging Research, or that does not have "Wilhelm Numbers" for how long it will last. Wilhelm is the consumer advocate who supplies us with objective data, as opposed to manufacturers' market hype.

I recently had the opportunity to interview Henry Wilhelm and his partner and wife, Carol Brower Wilhelm.

Henry Wilhelm and Carol Brower Wilhelm of Wilhelm Imaging Research. Photo by Elmo Sapwater

Paul Schranz (PS): ***How did you get started in photography and especially your interest in image longevity?***

Henry Wilhelm (HW): Between high school and college, I joined the Peace Corps and went to Bolivia. I did a lot of photography there. That was a pivotal experience for me, in terms of image preservation. The Bolivian people I lived and worked with, by and large, did not own cameras, but everyone had photographs, generally portraits taken by traveling photographers.

It was very warm in the lush Alto Beni region, where we lived in a small village in an extremely humid rain forest environment. It was immediately apparent to me just how important these pictures were to them, just like photographs are to people here in the United States—but also the rapid deterioration of prints: fading, unstable color, fungus growth, you name it. In most cases they didn't have the negatives. For me it was a crystal-clear lesson—the importance of the intrinsic permanence in the photographic prints.

PS: ***The word "archival" has been bantered around since the mid-1960s. In fact, much of what it meant was due to your writing. What does it mean today?***

HW: "Archival" is a word we don't use anymore. Its original definition was generally interpreted to mean "lasting longer than 100 years." And it really lost its meaning in the computer age where the term "archival storage" came to mean simply "data storage off-line." Now we are more concerned with something called "noticeable fading" or "noticeable change" with black-and-white or color images. That is, after how many years or display or storage in the dark will the image have "noticeably" changed.

I've been involved in ANSI and ISO Standards development in the permanence and preservation field since 1978. However, I'm sad to say that this international effort has not yet produced useful standards for determining the permanence of either traditional or digital photographic images.

PS: You were involved with the study of RC papers and problems they had when they were exposed to light during display, especially when framed under glass?

HW: Yes, the discoloration of black-and-white RC was first discussed in detail in our book, *The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures*. And photographer and author Ctein has published important additional information about this since then.

The traditional fiber-base black-and-white paper uses barium sulfate as the whitening agent in the baryta layer on the top side of the paper—and barium sulfate is not photo-reactive in any sense. But with RC papers, barium sulfate wasn't opaque enough as a whitening agent to be mixed into the very thin topside polyethylene waterproofing layer—Kodak

and the other manufacturers of black-and-white RC papers had to use titanium dioxide instead. And it, unfortunately, is reactive to light. When black-and-white prints are displayed under glass over time—and it doesn't take a very high light level to do this—the paper itself slowly produces low-level peroxides that attack the silver image. The displayed print self-destructs! Fiber-base papers don't have this serious flaw. But RC papers do. The introduction of RC papers is a very unfortunate ending to the traditional black-and-white era.

That's why I mentioned earlier that the fiber-base black-and-white print, when reasonably well processed and washed—and especially if it's selenium toned—can be considered the high water mark of photography in terms of permanence. And it's a very useful comparison, because the silver image itself—the image appears black because of its very finely divided, filamentary structure—is essentially pure silver that is simply not affected by exposure to light, unlike color dyes or even color pigment.

Henry Wilhelm (left) and Mark McCormick-Goodhart in Wilhelm Imaging Research's sub-zero cold storage vault, designed to preserve archival materials. The vault's "Sealed-Cabinet" cold storage technology (developed under a three-year project funded by the Smithsonian) eliminates the need for expensive, maintenance-intensive dry desiccant dehumidifiers to control relative humidity, and greatly reduces the costs of construction and electricity.

PS: ***The value of image permanence came to a head in the early 1970s with the renaissance of photography as a valued and collected art.***

HW: Ansel Adams was the first well-known photographer to systematically process his negatives and prints using procedures such as two-bath fixation, extended washing, and protective treatment with selenium toner—what came to be called archival processing. And I think that everyone accepted at face value that his work was very important, and it was legitimate, and there was both a desire and expectation that it would last a very long time.

We were the first to publish "apples to apples" comparisons of the image permanence of color prints, negatives, and transparencies. I have a lot of faith in the marketplace to produce better things. I know that when given a clearly explained choice, and when price, convenience, and other factors are reasonably similar, consumers will almost always choose the longest lasting product. But to motivate the market, there has to be a competitive framework going on, and we have provided a very critical element to make this an issue—and to provide recognition for improvements in image permanence.

What we now provide is a testing method with stated criteria for fading, changes in color balance, Dmin yellowish stain formation, and lighting conditions to allow predictions to be made so that the permanence of one product can be compared to another. Accelerated aging tests can get very complicated, and it's getting more so with inkjet materials than was the case with traditional silver-halide color photography. Our work has expanded into new areas, including thermal (dark) aging, resistance to the effects of ozone, exposure to high humidity, etc.

A great deal of the work we do comes from major manufacturers such Epson, HP, Canon, and Lexmark, and it's primarily testing prototypes of the new products. We always follow-up these prototype tests by going out and buying the printer, ink, and paper over the counter and testing it again. We spend a great deal of time and money on testing things we think are important in the marketplace, and we publish the results. We also devote tremendous effort to developing improved test methods. We operate a rather unconventional, research-driven business in that regard.

PS: ***And your testing is absolutely objective. Do you get paid by the companies?***

HW: Yes, to independently test their products. But all of our customers understand that, regardless of any testing contracts we may have, Wilhelm Imaging Research maintains the right to test and publish data for all commercially available products. We absolutely have to maintain our neutrality. We really act as consumer advocates.

PS: ***The Wilhelm Research permanence numbers are all over the manufacturers' web sites, on the boxes of their printers, papers, and inks.***

HW: I think the industry as a whole has actually been very responsive. If we look back to 1984, Konica was the first company to market a product addressing this concern when it introduced its high dark-stability silver-halide "Century Paper." Then Fuji made a tremendous advance with its now historic introduction of Crystal Archive silver-halide color negative paper with its greatly improved light stability. This paper has also served as the benchmark for comparing the overall permanence of inkjet and other digital printing systems. It's wonderful that inkjet manufacturers are now taking the subject very seriously. To a great extent, Epson, HP, Canon, and Lexmark all view themselves as inheriting photography. So very early on, once we started publishing data, the manufacturers realized that good image permanence was an essential part of their being able to succeed. They understood that the emotional driving force behind the reason that people take pictures is the desire to preserve memories. Prints should last as long as possible.

PS: ***So the goal of Wilhelm Imaging Research is the dissemination of objective image permanence information?***

HW: Yes, that's the goal here, and it has been since we started, and we are developing all of this information and improved, standardized test methods in order to do that. Our web site, www.wilhelm-research.com, is our most important vehicle for making the results of our ongoing research readily available to people around the world.

PS: Who is Wilhelm Imaging Research?

HW: Carol and I are the owners of the company.

Carol Brower Wilhelm (CBW): There are now 10 other people working for us, including three people who come in as consultants in specialized areas. To us, it's a pretty big operation. We all feel the work is quite exciting.

HW: We do what we have to do to maintain our independence, and actually it turned out that even in terms of our clients, who are understandably concerned about the confidentiality of their new products, that they are happy there is no board of directors, nobody that we have to answer to or to share information with. And that has actually helped our business. We didn't perceive that at the outset.

PS: ***But at the same time, if you somehow violate neutrality, you're out of business.***

CBW: That's true. It's part of the trust that's built up over a long period of time. We have to be objective and not beholden to anyone, including our customers.

PS: ***Your research techniques and methodologies have been sought by major museums and organizations.***

HW: We also do consulting on sub-zero cold storage (minus 20°C or minus 4°F). In 1998, we started a three-year research project with Mark McCormick-Goodhart for the Smithsonian Institution—a study of low-cost walk-in, modular, sub-zero cold storage units.

Some of our most interesting work with cold storage has been with the Corbis-Bettmann Archive collection. A front-page story in *The New York Times* published in April 2001 described how the collection was being moved out of New York City so that high-security, sub-zero cold storage could be provided to preserve this historically priceless collection for thousands of years into the future. We were the lead consultants on this project. The Corbis-Bettmann Archive collection consists of more than 11 million photographs, and is first and foremost an historical collection, for which, in most cases, the print itself is not the primary object. It's the negatives or the transparencies. Corbis is personally owned by Bill Gates, and this is one of the reasons a lot a attention has been focused on it. But even before Bill Gates acquired the Bettmann Archive in 1995, it was already the world's best-known collection of historical photographs.

The biggest problem of this collection was the deterioration of acetate-base negatives, with a significant percentage, probably approaching 8–10%, already lost. We were confronted with how to preserve this for the long-term future, and we had to move quickly. Time was not on our side. What no one wanted to see happen was the idea that, well, we'll just digitize it and toss the originals or let them continue to deteriorate. The objective was to preserve the collection in its original form, and digitize the work over time for access and distribution worldwide through the Corbis web site at www.corbis.com. It includes the United Press International collection and its coverage of the Vietnam War in color, almost all of which was shot with 35mm Ektachrome transparency films. In those days, they didn't use color negative films for photojournalism. And you see the transparencies and realize that they are the original pieces of film that were in the cameras on the battlefield, and which have tremendous artifact value in themselves.

Of the 11 million images in the Corbis-Bettmann Archive collection, approximately 250,000 have already been digitized in an ongoing scanning project. So, what they've done—and it's really a model for museums, archives, and other institutions—is to place the originals in a very secure and very cold underground facility, and at the same time provide worldwide digital access and distribution of the images. Cold storage stops the deterioration of everything, including film, negative envelopes with important historical inscriptions, improperly-processed fiber-base prints, unstable RC prints, etc. And based on accelerated aging extrapolations, this collection will remain essentially unchanged for thousands of years into the future. Corbis has on-site digitization capability, because it's very risky from a preservation point of view to ship originals out for scanning.

It's not only a very important collection in and of itself, but it's a model of how all this should be done. It's also actually, in an interesting way, getting to the next preservation challenge, which is the long-term digital archiving and access of the digital files themselves, the scan files, and migrating them forward through changes in file formats and digital storage technology. If you're like us, and essentially everyone shooting with digital cameras, and making prints of a relatively small fraction of what you photograph, preserving digital photography for the long term presents a formidable challenge.

PS: I want to talk a little about your predictions for the future. Photography is changing toward digital output. What do you see happening to traditional photography?

HW: I think it will continue its steady decline in virtually every segment of the field. But look at it this way: digital photography is just another form of photography, like color photography is just another form of photography when compared with black-and-white. What has changed, and what is so exciting to me, is that it's now possible for everyone—even school children—to make exceedingly good prints with full control of the image in terms of curve shape, contrast, color saturation, and so on. This simply has not existed before. Frankly, every computer sold now is imaging-capable and every desktop inkjet printer can now print visually good-quality photographs.

In the digital age, people will still be making prints. I think it's always been true in photography that people select, print, and display their most important pictures, and they display them the longest. I don't see the print going away. People love prints!

Even the average person is concerned about the lasting qualities of the inks and papers they use to record their personal and family histories, and to preserve the works of art they create. The choice is there, explained in very simple terms using Wilhelm Imaging Research "numbers." And, suddenly, a consumer who's probably never even thought about this "invisible" aspect of the products, thinks, "Oh, this one says it will last longer." And then some very interesting things happen in the marketplace. Permanence is never a bad thing and, given a choice, almost everybody will pick the longest-lasting product, all other things being equal. This simply gets to the core of what photography has always been about—and always will be. Capturing and preserving special moments in time. ■

Paul Schranz is consulting and contributing editor at PHOTO Techniques. *Check www.wilhelm-research.com for information on the lasting properties of various printers, papers and inks.*

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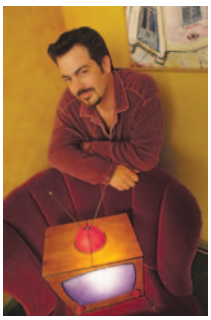

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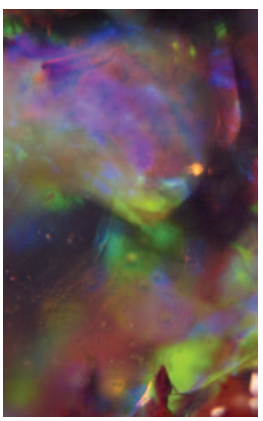

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