

ART TO ZOO

News for Schools from the Smithsonian Institution, Office of Elementary and Secondary Education, Washington, D.C. 20560
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Old Photographs: Windows to the Past

by ANN BAY and THOMAS LOWDERBAUGH
Office of Elementary and Secondary Education

Snapshot or daguerreotype, tintype or carte de visite, consider it as you will, in black and white or in color, a photograph is a kind of miracle.

And especially miraculous are *old* photographs like the one shown here. "Of all documentary evidence, photographs come closest to bringing us, as observers, to the scenes of historical events," says Eugene Ostroff, Curator of Photographic History for the Smithsonian's National Museum of History and Technology. Neither words nor art work can work like a photograph to make a scene of eighty or a hundred years ago seem as real and immediate as today — and *this* is the miracle.

This power to bring the past to life makes photographs ideal documents to use in the school classroom with students of all ages and levels. One well-chosen photograph can be enormously effective in stimulating in students a real desire to learn about the people and events of history.



Engine #2 on the Catskill and Tannersville Railway. Photo credit: Detroit Publishing Company, courtesy Library of Congress.

A Nation of Travelers: Leisure, Locomotives, and the Glass Negative

The photograph shown on this page, for example, was taken between 1905 and 1919 by the Detroit Publishing Company, a Midwest-based firm that sent photographers around the country photographing scenes that would appeal to tourists in resort areas as souvenirs. We can tell by the crack in the lower lefthand corner of the photograph that it was made from a glass negative.

The steam locomotive featured in the photograph is Engine #2 on the Catskill and Tannersville Railway, one of several branches of the Catskill Mountain Lines, a summer-only railroad serving the many picturesque resorts that dotted the slopes of the Catskill Mountains in eastern New York State. Smithsonian historians tell us that the rise of resorts in the Catskills and in other areas of the United States after the Civil War marked a new interest on the part of Americans in sports and outdoor life. Golf, tennis, swimming, horseback riding, cycling, and croquet were chief among the activities that became popular with people who had leisure and certain means. Especially on holidays, when thousands of passengers traveled the railroad each day, the Catskill Mountain Lines did a booming business.

This particular locomotive was built in 1900 by the Baldwin Locomotive Works of Philadelphia. It is an eight-wheel, 36-inch-gauge, passenger locomotive capable of traveling at speeds of between twenty-five and forty miles per hour. The men standing beside it are its crew: conductor, fireman, brakeman, flagman, and engineer.

In private collections as well as in historical societies and archives throughout the United States, there are today millions of old photographs of steam engines. Taken during that period in American history (which lasted well into the 1900s) when the railroad was our dominant form of transportation, these pictures attest to the immense importance of the locomotive. The steam locomotive, after all, brought a revolution in transportation to the United States; it helped to determine the outcome of the Civil War, made possible Western expansion, and transformed us into a nation of travelers.

Things to Remember: Possibilities, Problems, and Process

In examining an old photograph like this one to garner its evidence, it is important to remember that every photograph is determined by the subject, the photographer, and the photographic equipment and processes available. A photographer could take only the pictures that his equipment would allow him to take — which means that when selecting old photographs to use in your classroom, you should be aware not only of the kinds of pictures that you and your students may find but also of the possibilities and limitations presented by the different methods of photography.

Historically, two separate developments resulted in photography: (1) perfecting a method of forming an optical image in a light-tight container, and (2) introducing a light-sensitive material that would permanently preserve that image. Optical image formation was first described in the 11th century; the light sensitivity of various chemicals was first investigated in the 17th century. The processes that had been developed to examine these phenomena were finally combined in the 1820s and 1830s to establish the first practical systems of photography.

Daguerreotypes. The various kinds of nineteenth-century photographs you and your students may find are the daguerreotype, the ambrotype, the tintype, paper prints produced by the collodion (wet plate) or the gelatin (dry plate) process, and the snapshot. The oldest of these is the *daguerreotype*. Invented in 1839 by a Frenchman named Louis Jacques Mandé Daguerre, the daguerreotype captured images on a silver-coated copper plate. Although the daguerreotype possessed an exceptional visual beauty, the process required lengthy and meticulous care so that at best an indoor exposure might take fifteen to twenty seconds; at worst, it could take up to twenty minutes! And the images — visible only when held at certain angles — were extremely fragile. The daguerreotype was "reversed" (mirror-like) and "unique" (reproducible only by being rephotographed). It was also very expensive.

Tintypes and Ambrotypes. The 1850s saw the invention of two cheaper methods of photography — although with both of these methods, the quality of the image was poorer than that of the daguerreotype. The first of these, the *ambrotype*, invented in 1851, created a negative image on glass. Backing the glass with a black substance made the image positive. The second of these, the *tintype*, first introduced to the United States in 1856, was much sturdier than either the daguerreotype or the ambrotype. Despite their name, tintypes are actually printed on the blackened surface of sheet iron; and because they were so sturdy, they could be sent through the mail. Because of their poor quality, however, both the tintype and the ambrotype were looked down upon by most serious photographers.

Paper Prints. The collodion (or wet plate) process — which from its invention in the 1850s dominated photography up through the 1870s — was the first popular process in this country to use paper prints. The collodion process required the photographer to coat a glass plate properly just before exposing it, to expose it immediately, and then develop the resultant negative right away, before the plate dried. This meant that a photographer had to have a darkroom available whenever he wished to take a picture. To take pictures away from the studio, he would have to construct a portable darkroom, lugging along with him a load of equipment that was both heavy and fragile. But the collodion process had a great advantage nonetheless: it produced a negative from which multiple positive copies could be made.

Cartes de Visite. In 1859, the *carte de visite* was introduced into the United States. This was a small photograph made in multiple copies (using the collodion process) that could be given or mailed to friends. Exchanging *cartes de visite* became a popular social activity that led to the invention of the photograph album.

Developments in the Late Nineteenth Century. Many of the disadvantages of the wet plate process were overcome with the invention of the *gelatin (or dry plate)* process in 1871. Now a photographer could prepare his plates long before using them and could delay developing them until he returned to a darkroom.

In 1888 photography became even more available to the average person when the Eastman Kodak Company introduced a small hand-held camera which took a hundred round pictures on a single roll of film. (Rectangular Kodak pictures were not introduced until 1896.) When the photographer finished the roll of film, he mailed the entire camera back to the company, which reloaded the camera, developed the old film, and mailed the pictures *and the camera* back to the customer!

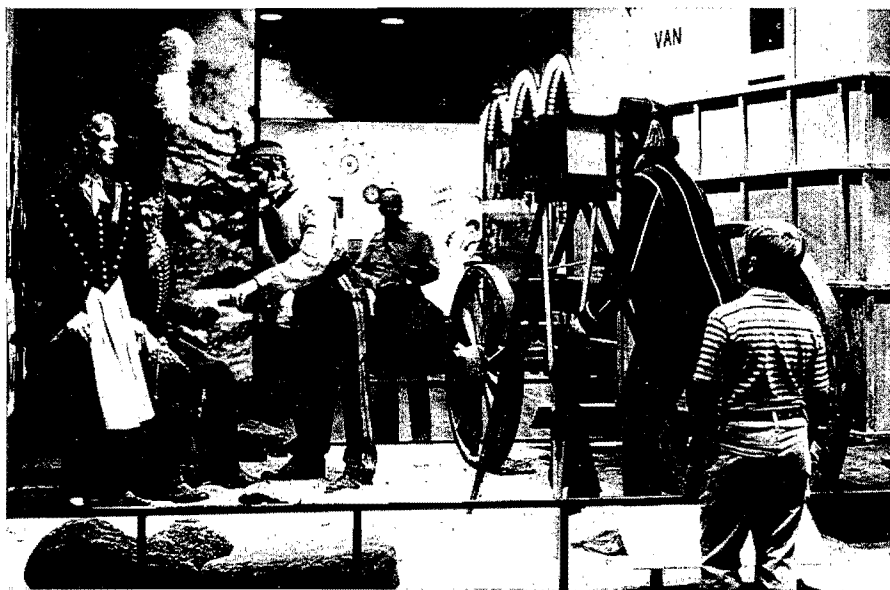
Twentieth-Century Advances. Twentieth-century refinements in photography include faster shutter speeds, more sensitive films, and color processes. (Color pictures in family collections usually date from no earlier than the 1940s.) But our ease in taking photographs can prevent us from really understanding just how much expertise and plain hard work was demanded in nineteenth-century photography. We don't need the patience to time lengthy exposures — or the muscles to lug around heavy, fragile equipment. Also the spontaneity which we take for granted in our snapshots was not possible before 1888, when long exposures made smiling or jolly poses extremely difficult, if not impossible to photograph.

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New with this issue of *Art to Zoo* is the "Pull-Out Page," designed as a regular feature for kids to read all by themselves. From now on, with each issue of *Art to Zoo*, the "Pull-Out Page" will contain articles and activities, front and back, relating to the content of that particular issue as a whole.

There are several ways that you can use the "Pull-Out Page" with your students. One way is to make multiple copies—enough for each student. (When folded on the dotted line, the "Pull-Out Page" will fit a standard xerox or thermofax machine, giving you four pages of material to copy.) Another way is to post it on the bulletin board for everyone to see. Or place it in your classroom library or learning center for the children to borrow.

Since the "Pull-Out Page" is a brand new idea, we need your suggestions and critical comments right now to help us plan subsequent issues. Is the design of the page appealing? Are the activities realistic? Is the reading level right for your students? Are the illustrations too many or too few? In general, what do you think? Without delay, please write to Ann Bay, Arts and Industries Building 1163, Smithsonian Institution, Washington, D.C. 20560. And please be absolutely frank in stating your opinions. We're counting on your help!



This photograph of an exhibit in the Smithsonian's National Museum of History and Technology shows the van used as a darkroom by Roger Fenton—the world's first photojournalist—in photographing the Crimean War in 1855. Fenton used the collodion wet plate process, which meant that he had to have his darkroom right there on the front lines with him so that he could develop his pictures immediately. Photo credit: Robert Harding.

Reading a Photograph: What's the Whole Truth?

Looking at a single, well-chosen photograph can raise lots of good questions, and for curiosity value alone photographs are useful in a classroom. But looking at a single photograph in isolation — no matter how well chosen the photograph may be — can answer few of these questions. The evidence in a photograph needs to be supplemented by evidence from additional sources, including local historical societies, records, books, and other photos.

Thus, "reading" a photograph requires more care than you might expect. We are often tempted to generalize from insufficient information, and portrait photos are perhaps the most misleading in this respect. A sitter may have held a book because he was educated, or because the photographer posed him that way. The sitter may look stiff because she was a rigid person, or because the photographic process of that day required that she hold an uncomfortable position for a long time. Similarly ritual photographs — wedding pictures or class photos — contain little if any real information about their subjects. The tradition of such photographs forbids personalization.

We need to remember that while the camera may not lie, it does not tell the whole truth. A photograph captures a moment: what existed briefly as a photographer wished to record it using the equipment available to him.

The most successful kinds of photos to use in the classroom are those of interiors, street scenes, construction scenes, and activities (like games or pastimes) that are still part of our everyday experience. Such photos encourage the habit of careful looking at the same time that they help focus our attention on changes in our physical environment. These photos "make sense" only when one pays close attention to the details, to the specific parts that strike us as different from or similar to parts of the world as we know it today.

What Can You Learn from a Photograph?

Usually the best time to introduce a photograph to students is right at the beginning of a unit of study, as a way of sparking their interest in the subject to be discussed. The photograph should be carefully selected so that its content, when accurately interpreted, will provide insights into the content of the unit as a whole. Our picture of the steam locomotive, for example — which might be used to introduce a unit of study on "transportation" or "the early 1900s" — was selected for use in this article not only because of its obvious appeal to children but also because it contains clues to the history of transportation, as well as to a number of important aspects of life in the early 1900s. Here is how you might present this photograph to your students.

First divide the class into small groups and give each group a copy of the photograph (mounted on cardboard and protected by plastic mylar) to study. After the children have looked carefully at the photograph and described to one another what they see, ask them to write down any questions they might have about the photograph, such as "When was it taken?" and "Where?" and "Who are the people in the photograph and what are they doing?"

Then have the children look again at the photograph, searching for clues that will help them find the answers to these questions. Have them study the photograph item by item with a magnifying glass,* taking notes on what they see and listing any additional questions that might occur to them. With a magnifying glass, details like clothing decoration, facial expressions, foliage, lettering on signs and posters, and telegraph wires will all become apparent — and each one of these details will tell the children something about the people and the setting. The children may notice, for example, that all of the people in the photograph look relaxed and happy, that the locomotive is shiny and new, and that the stationhouse is in freshly painted good condition — which may lead them to conclude that the occasion depicted is a pleasurable one and that the railroad is prosperous and well run.

Once each group of students has reported to the rest of the class on its questions and observations about the photograph, the class as a whole will be ready to formulate five or six key questions about the photograph to answer through further research. Write down these questions on the chalkboard, listing under each one possible sources that the children can go to to find the answers. For example, in order to find out when the photograph was taken, students might turn to old mail order catalogs (to help them date the style of dress) and to a book on the history of railroading (to help them date the train); and in order to find out where it was taken, they would want to check an atlas and possibly a travel guide. Now assign each group of students a different one of the key questions to answer and report on to the class the following day. As a culminating activity, once these reports have been delivered, the children might like to invent stories about the photograph. Such stories would have woven into them the answers to key questions discussed earlier.

How to Read Photographs, Picture Albums, and Photoessays

"Reading" a photograph can open a window to the past for your students. Photos can show the details of everyday life: the clothes people wore, the tools they used at work, the furnishings they put into their homes. Photographs can help children see what our land once looked like and how we have changed it. For example, by studying a series of photographs all taken of the same spot (a park or street corner) in their home town at different times in history (say 1870, 1910, 1935, and today) students can find out many things about changes in architecture, transportation, communication, clothing styles, merchandising, land use, and urban life in general in their community over the years. And by studying photographs from their own family picture albums, taken when their parents were children, they can begin to get a real sense of everyday life in the United States in the 1940s and 1950s.

One of many possible activities using family photographs that students enjoy is making a photoessay or photographic exhibit on a single theme — like pets, games, styles of clothing, or vacations — relating to their parents' lives as children. The children would select photographs to illustrate the theme they have chosen and write captions for the photographs, plus an introductory paragraph to the exhibit or photoessay as a whole, based on information taken from books and from interviews with their parents. If done as a photoessay, the project could then be xeroxed so that every child could have a copy — and indeed an entire book of photoessays might be made on various aspects of everyday life in the 1940s and 1950s.

Finding Old Photos: Where to Look

Whether snapshot or daguerreotype, tintype, or carte de visite — one old photograph, if carefully chosen, will enable your students to open for themselves a window to the past.

Your local museum or historical society, the photo archives of your town or city newspaper, and your own (or your students' own) personal collections are all possible sources of old photographs for classroom use. Other sources of old photographs include your state historical society as well as the Library of Congress and the National Archives in Washington, D.C.†

You can also order photographs from the Smithsonian. We have collections of pictures on a variety of subjects, from native Americans to aeronautics. Simply write to the Smithsonian Institution, Washington, D.C. 20560, addressing your request to one of the following divisions, depending on your topic:

- *Smithsonian Institution Archives*, Arts and Industries Building, Room 2135 • for photographs relating to the history of the Smithsonian, including exhibits, buildings, collections, and events, as well as pictures of exhibitions in which the Smithsonian has participated.
- *Anthropological Archives*, Room 60A, National Museum of Natural History • for photographs of native Americans taken between 1860 and 1930.
- *Division of Photographic History*, Room 5713, National Museum of History and Technology • for photographs relating to the history of photography.
- *National Air and Space Museum Library*, Room 3100, National Air and Space Museum • for photographs on the history of aeronautics and astronautics.
- *National Portrait Gallery*, Room 307 • for portrait photographs of famous Americans.

An 8"x10" black and white glossy costs \$3.50; a slide costs \$1.00. Minimum order, \$3.50. Allow three weeks or more for delivery; and be sure to be as specific as possible about the content of your order.

BIBLIOGRAPHY

For Children

- Czaja, Paul Clement. *Writing With Light: A Simple Workshop in Basic Photography*. Riverside, Conn.: Chatham, 1973.
- Cook, Ann; Marilyn Gittell; and Herb Mack. *What Was It Like? When Your Grandparents Were Your Age*. New York: Pantheon, 1977.
- Holland, Viki. *How To Photograph Your World*. New York: Scribners, 1974.
- Steinberg, Phil. *Photography*. Minneapolis: Lerner, 1975.
- Weiss, Harvey. *Lens and Shutter: An Introduction to Photography*. Reading, Mass.: Addison Wesley, 1971.
- Weitzman, David. *My Backyard History Book*. Boston: Little, Brown, 1975.

For Teachers

- Abbott, Janet S. *The Whole Thing: A Manual On Pin Hole Cameras*. New York: Prentice-Hall, 1974.
- Arnold, Arnold. *Crowell Book of Arts and Crafts for Children*. New York: Crowell, 1975.
- Challinor, Joan R. "Family Photographs." In Alan J. Lichtman, *Your Family History*. New York: Vintage, 1978.
- Gernsheim, Helmut, and Alison Gernsheim. *The History of Photography from the Camera Obscura to the Beginning of The Modern Era*. New York: McGraw-Hill, 1969.
- Glulok, Shirley. *The Art of Photography*. New York: Macmillan, 1977.
- Jensen, Oliver; Joan Patterson Kerr; and Murray Belsky. *American Album*. New York: American Heritage, 1968.
- Life Library of Photography*, by the editors of Time-Life. New York: Time-Life. (This series currently consists of 18 volumes.)
- Newhall, Beaumont. *The History of Photography: from 1839 to the Present Day*. New York: Simon and Schuster, 1949.
- Pfister, Harold Francis. *Facing the Light: Historic American Portrait Daguerreotypes*. Washington, D.C.: Smithsonian Institution Press, 1978.
- Pollack, Peter. *The Picture History of Photography from the Earliest Beginnings to the Present Day*. New York: Abrams, 1969.
- Taft, Robert. *Photography and the American Scene: A Social History, 1839-1889*. New York: Peter Smith, 1964.

† Write to:
Photoduplication Service
Library of Congress
Washington, D.C. 20540

or

Still Picture Branch
Audiovisual Archives Division
National Archives (G. S. A.)
Washington, D.C. 20408

*A magnifying glass will work to bring up details only in a real print of this photograph; it will not work with the screened version of this photograph as reproduced in *Art to Zoo*.

A GALLERY OF NOTED AMERICANS: PORTRAIT PHOTOGRAPHS

Based on materials by WILLIAM STAPP, Curator of Photography,
The National Portrait Gallery

There is just one place to go if you want to get to know America's most famous heroes and villains, thinkers and doers, conservatives and radicals *personally*, all in the space of a single visit, and that place is the Smithsonian's National Portrait Gallery in Washington, D.C. To walk through the halls of the National Portrait Gallery is to see history not in terms of historical events but in terms of the *people* who made those events happen. The following photo essay spotlights six outstanding portrait photographs of noted Americans, from the National Portrait Gallery's collection.



1855 DAGUERREOTYPE of Confederate General Thomas J. ("Stonewall") Jackson (1824-1863).



I SELL THE SHADOW TO SUPPORT THE SUBSTANCE.
SOJOURNER TRUTH.

1864 CARTE DE VISITE of abolitionist Sojourner Truth (ca. 1797-1883). Sojourner Truth, one of the most powerful speakers of her day, stumped the north-eastern and midwestern United States preaching at camp meetings, in churches, on highways, and in the streets of towns. To help support her ministry, she sold copies of this photograph.

"Often I have found a Portrait superior in real instruction to half-a-dozen Written Biographies . . . the Portrait was as a small lighted candle by which the Biographies could for the first time be read, and some human interpretation be made of them . . ."

This quotation from the pen of Thomas Carlyle is shown on a plaque at the entrance to the National Portrait Gallery of the Smithsonian Institution in Washington, D.C.



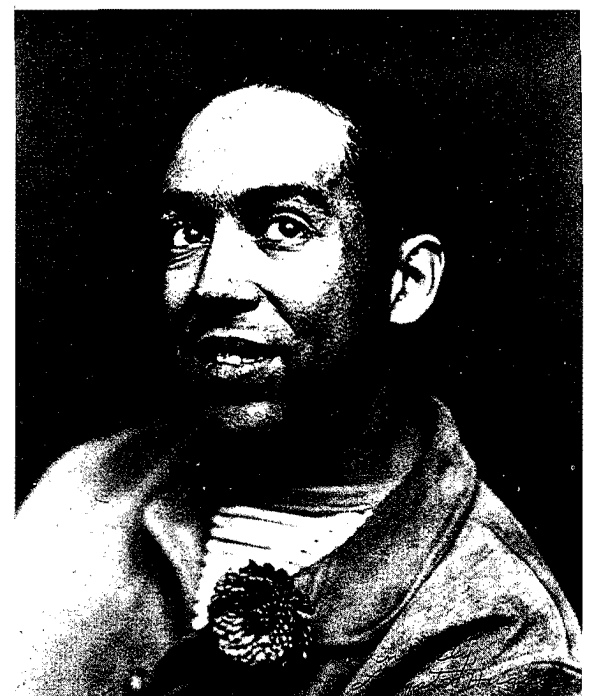
1891 PLATINUM PRINT of poet Walt Whitman (1819-1892). Photographer: Thomas Eakins. Few people realize that the great 19th-century painter, Thomas Eakins, was also a highly gifted photographer. This photograph translates, with a wonderful luminosity, the spirit of Whitman as an old man.



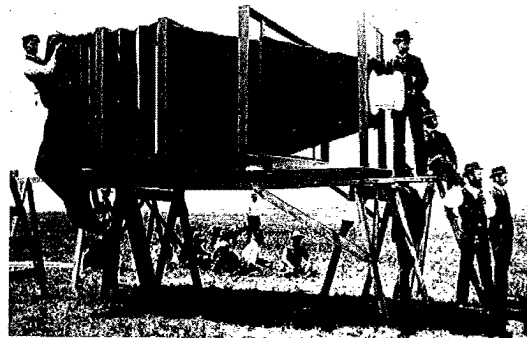
1928 TINTYPE of inventor Thomas Alva Edison (1847-1931). The tintype became very popular in the United States with many low-price photographers from about 1860 on, and its popularity endured (especially at country fairs and seaside resorts) right up until the beginning of World War II. This tintype of Edison, one of America's most famous inventors, was taken for use as a Christmas card.



AUTOGRAPHED GELATINE SILVER PRINT (date unknown) of flyer Amelia Earhart (1898-1937) and her husband, George Putnam, talking to reporters after one of her flights.



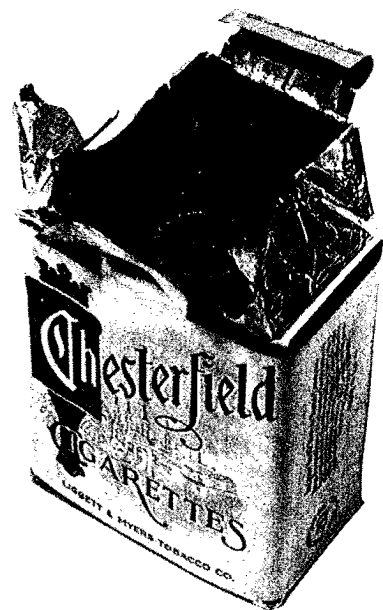
1932 SIGNED AND AUTOGRAPHED GELATINE SILVER PRINT of poet Langston Hughes (1902-1967). Photographer: Edward Weston.



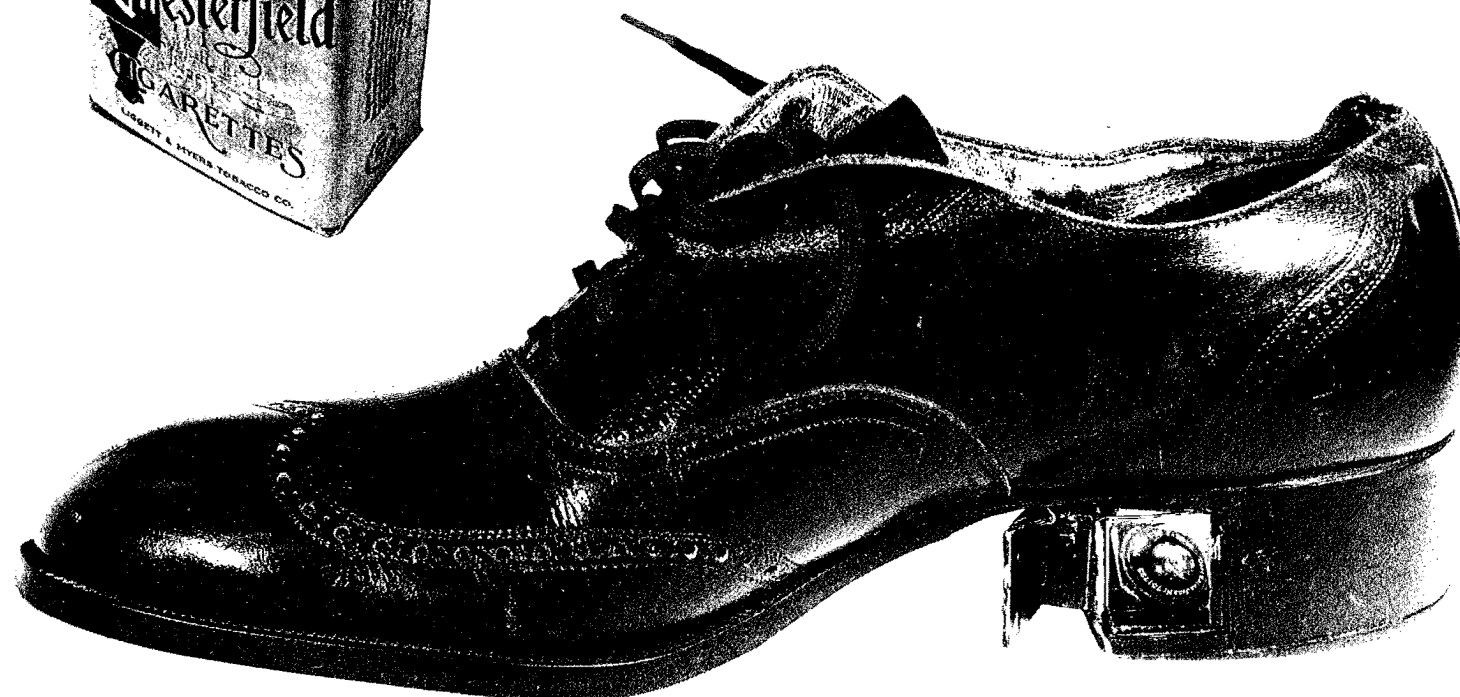
Cameras Large and Small

Back in the early days of photography, photographers often used specially built giant cameras to take very large pictures. And of all giant cameras ever made, this one — which weighed 1400 pounds and needed fifteen men to operate it — was without a doubt the biggest. Called “The Mammoth,” it was built at the turn of the century to make an eight-foot-long picture of a railroad train. The resulting photograph later won the “Grand Prize of the World” at the Paris Exposition in 1900.

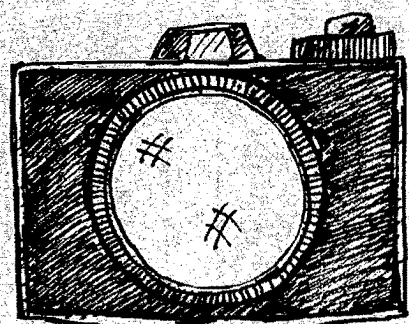
Miniature “detective cameras” designed to look like wristwatches, cigarette lighters, ladies’ compacts, and a wide range of other everyday items were very popular in the 1920s and 1930s. Some of these cameras were designed to be used for fun; others were made for more serious purposes. In the more serious vein, policemen and secret agents used the detective camera for taking secret pictures of documents and suspicious-looking characters, and newspaper photographers used it for “scooping” their competitors. The two detective cameras shown here are from the collection of the Smithsonian’s National Museum of History and Technology.



Made in the 1930s, this camera was camouflaged in a cigarette pack.



A camera designed by the *New York Daily News* fitted into the heel of a shoe.



Design Your Own Detective Camera Contest

During November and December, *Art to Zoo* is sponsoring a contest you may enter. It’s called “Design Your Own Detective Camera.” If you have a good idea for a detective camera design, please let us hear from you. Send a sketch of your design, along with an explanation of how your camera would be operated, to *Art to Zoo*, A&I Building, Room 1163, Smithsonian Institution, Washington, D.C. 20560. A selection of the very best entries will be printed in our March issue.

fold along dotted line

PULL-OUT PAGE

Through a Zoom Lens: Close Encounters of the Beastly Kind

Have you ever had your pocket picked by a baboon? Or come face-to-spout with a whale? Well, Sabin Robbins has. In fact, for him such close encounters — of a strange and *beastly* kind — are all in a good day’s work.

As part of his job as Director of the Friends of the National Zoo (FONZ), Sabin Robbins leads wildlife safaris to places like East Africa (where a nimble-fingered baboon picked his pocket recently) and the San Ignacio Lagoon in Baja California (where he’s been privileged to meet some very friendly whales close up). And on these trips, he always takes his camera.

Besides being FONZ Director, Sabin Robbins is an award-winning photographer who seeks to capture on film his own personal way of seeing the world. On his travels, he photographs not only animals but also people and landscapes and small, everyday things of man and nature. Photography is to him a way of preserving his travel experiences in all their splendid variety and of sharing with his friends his own pleasure in these experiences.

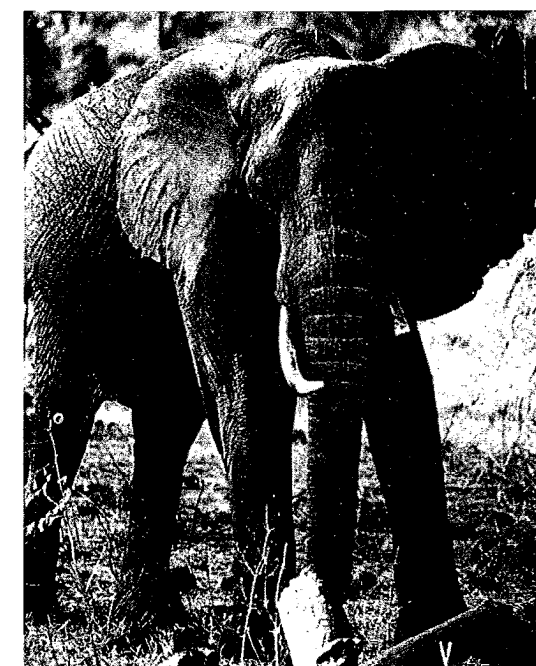
He took dozens of pictures on a recent trip to East Africa, where, for example, in the game parks of Kenya and Tanzania, he was able to photograph lions, elephants, giraffes, and other wild animals roaming free on the open plains (called *savannahs*). Since most of these pictures had to be taken from a distance, Sabin Robbins used a zoom lens, which works like a telescope to bring close up the image of something that is actually far away. The picture of the elephant printed here was taken from a distance of 200 feet, showing you just how effective zoom-lens photography can be.

Photographing California gray whales from a raft in the Pacific Ocean involved a close encounter of a different sort for Sabin Robbins. Some of the whales — which are the size of Greyhound buses — were far out at sea, while the other, “friendly” ones were coming right up and playfully nudging the raft.

“Friendly whales have a rapport with people that is truly magical,” Sabin Robbins explains. “They seem to like being touched and petted, so you can get some wonderful shots of them at close range. You *cannot* predict what a whale will do, however, and once when I was trying to photograph the inside of the baleen mouth of a friendly whale, the animal let loose with a spray of foam, which fogged the lens of my camera, causing me to miss my shot!”

Another dramatic aspect of whale behavior to photograph is “spy hopping.” Suddenly, out at sea, one of the giant creatures will propel itself straight up out of the water about one-third of the way for a quick look around. If you are alert and have your camera ready, you can get a beautiful picture of this impressive sight — head, face, fin, and body leaping right up out of the blue.

continued on page 2



This photograph was taken using a zoom lens from a distance of 200 feet.
Photo credit: Sabin Robbins.



Off the coast of Baja California, Sabin Robbins gets to know a friendly whale.

continued from page 1



A member of the Robbins family has his pocket picked by a baboon.

In the course of his travels to Africa, Baja California, China, and other faraway places, Sabin Robbins has taken literally hundreds of photographs of animals — and has had many an adventure in the meantime. This same sort of adventure you and I can have too, he reminds us, right in a city park or in our own backyards.

Many animals that we see every day, like pigeons, squirrels, and household pets, make great subjects to photograph once you get to know them in a special way. “Getting to *know* an animal means noticing how it moves, studying it from different angles so as to form a good idea ahead of time of just how you want to photograph it,” he says. “Then you will be ready to take your camera in hand and shoot away with confidence.

“Work rapidly with your camera, taking lots of pictures, one right after the other as professional photographers do. Once you feel you have photographed the entire animal to your satisfaction, you may want to go back and zoom in on a particular part — like a foot or a nose — that interests you. In any case, your object will be to capture on film the essence of the animal as you see it; and you can succeed at this very well, with planning and a little practice.”

You don’t have to have your pocket picked by a baboon or come face-to-spout with a whale to get to know a lot of animals and have a wonderful time with your camera. Sneak up on a squirrel . . . peek in on a pigeon . . . or just check out the cat next door. If you open your eyes and go quietly, you’ll find that a whole wild world awaits you right outside your own front door. Practically anywhere you might happen to look, many close encounters — of a wonderfully strange and *beastly* kind — *are* possible, all in the course of your own good day’s work.

Writing with Light

The word “photograph” comes from two ancient Greek words: *photos*, meaning light, and *graphein*, to write. To photograph something, therefore, means to write it down with light. The following materials, based on the ideas of SUSAN WHITMORE, are designed to help you understand just what this means.

Silhouettes

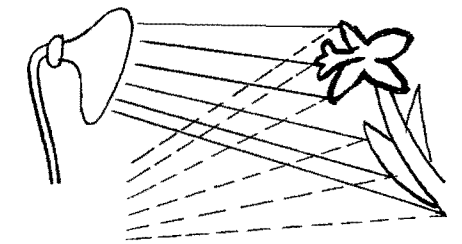
The earliest attempt to capture images photographically was reported in 1802 by Thomas Wedgwood of England, who used paper coated with the chemicals silver nitrate and silver chloride. Objects such as insect wings were put on these papers and exposed to sunlight. The papers’ coatings darkened completely except in areas covered by the objects.

You can try a similar experiment at home or in your classroom. You will need a sheet of “print-out paper” available from your local camera shop and an ordinary lamp with a 30-watt bulb. Cut the paper to the size you want, arrange the object (or objects) to be silhouetted on top of the paper, and place the resulting composition under the lamp. Expose the paper for three to five seconds at a distance of about four feet — and presto, you will have your very own silhouette photograph! Leaves, ribbons, keys, strands of hair, paper cut-outs, and many other things you can think of can be used to make interesting and beautiful silhouette compositions. To preserve your silhouette photograph, rinse it in water for about one minute; then let it dry on a flat surface.

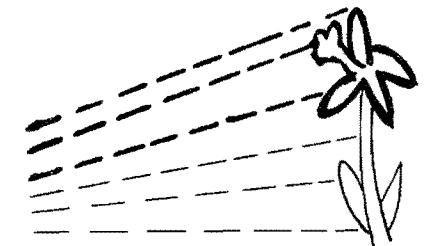
Be sure to read the instructions on the package. With some brands of photosensitive paper you will need to work in a dark or dimly lit room.

How a Camera Captures Images

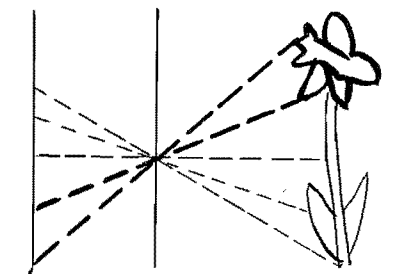
Light strikes an object and bounces off in straight lines.



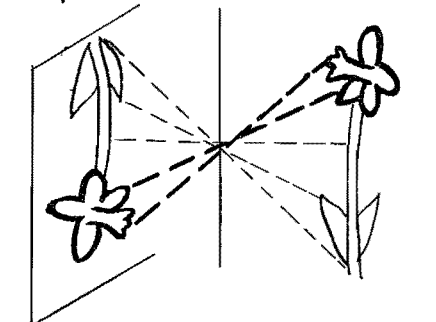
Some parts of the object send back a lot of light, and other parts send back only a little light.



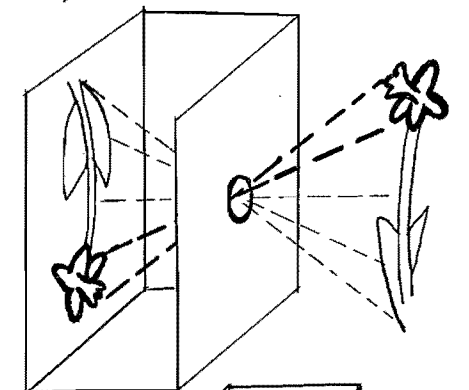
If some of the light rays sent off by the object go through a small hole into a box, they will cross and light up the opposite wall of the box.



Some areas of the wall will have less light than other areas, and this is how a picture of the object is made. Because the rays crossed when they went through the hole, the picture will be upside down.



If you put a glass lens in the hole in the box, the light rays will be focused, resulting in a sharper, brighter picture.



If you put film along the opposite wall of the box, you will have a camera — and you can keep the picture made by the light rays.

