VIREO

Visual Resources for Ornithology

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THE COLLECTIVE EFFORTS OF BIRD PHOTOGRAPHERS are staggering in magnitude. Millions of frames are exposed each year by professional photographers, specializing in birds and wildlife, professional ornithologists using photography as a research tool, and amateurs striving to capture moments of bird life and beauty on film. Over the last century these efforts have fueled advances in photography, contributed to ornithological studies, and helped transform conservation, birding, and natural history into public passions.

Yet despite these many decades of bird photography, few of those millions of photographs yield their full potential for ornithology. The vast majority inexorably finds its way into a photographer's cabinet, a shoebox in the closet, or a slide tray on the shelf. This seemingly innocuous fate has two detrimental results—the slides become inaccessible to all but the most organized photographer, and the emulsion's colors degrade with time. Room temperature and high humidity hasten the decay, and light—especially during projection—does so even more.

Photographic agencies solve only part of this problem. Much material of ornithological value simply is not commercially attractive, and thus never even enters an agency's files. Those that do make it in, then often become economically unavailable for scholarly uses. Moreover, the agencies themselves cannot afford the time and ornithological expertise necessary to assess the scientific importance of their slides, nor can they afford the extensive equipment and effort necessary to maintain archival storage conditions.

With this background, The Academy of Natural Sciences founded Visual Resources for Ornithology—VIREO—in 1979. The main impetus came from three sources: (1) Crawford H. Greenewalt's commitment to develop the use of ornithological photographs for scholarly purposes and to ensure that his own remarkable collection would be available for ornithological research; (2) Frank B. Gill's recognition that a centralized collection of bird photographs would be of enormous value to scientists and educators; and (3) the Academy's desire to explore applications of new visual and computer technologies in the natural sciences.

In the four years since its founding, VIREO has developed into a collection of approximately 60,000 images representing more than 2500 species, over one-fourth of the world's avifauna. To date, 135 photographers have contributed photographs to the program. Among VIREO's contributors are many of the world's most widely known and accomplished bird photographers: Helen and Allan Cruickshank, John S. Dunning, Crawford H. Greenewalt, M. Philip Kahl, Frans Lanting, William S. Peckover, Roger Tory Peterson, O.S. Pettingill, Jr., and Eliot Porter. Other participating ornithologists include Leslie Brown, P.G. Connors, K.S. Corbin, H. Fisher, J.R. Jehl, M.R. Lein, C. Munn, R.E. Ricklefs, R.S. Ridgely, and L. Walkinshaw, to name only a few. No comparable program exists anywhere else.

VIREO'S BASIC GOALS IN CREATING a centralized, research collection of bird photographs are to provide for the safety of original materials and to make the image content fully available to users with a variety of needs. Unfortunately, these two objectives compete with one another. Archival storage of color film usually means dead storage—the less access the better. Slide librarianship techniques developed in other fields largely avoid this problem because they work with secondary materials, photographs of paintings or of sculpture, etc., rather than with the actual art objects themselves. Storage is not as critical because new photographs can be taken to replace those that deteriorate.

To satisfy both objectives, VIREO has pioneered a system of live archival storage that rests on three key elements:

(1) Near-freezing archival storage for originals;
(2) A working collection of duplicates, organized in systematic fashion and available for everyday use and review;
(3) Computer management of the database.

Together, these elements of live archival storage provide ready access to images through computer selection, and through review of duplicates in the working collection. At the same time, the near-freezing archival conditions allow controlled access with minimum risk of damage.

Take care

Three cardinal rules for ensuring the longevity of your slides are:
Store your slides in a cool, dry environment.
Project only duplicates.
Do not keep slides in polyvinylchloride storage sheets.

The color dyes used in slides progressively deteriorate with time. Some emulsions are more stable than others, but all undergo slow chemical changes that cumulatively degrade the image. These reactions are quickened by high temperature and humidity.

Few can resist the temptation to project originals, yet a projector's heat and light drastically hasten the degradation of color dyes.

Plastic storage sheets pose an even more insidious threat to your slides' well-being. Some of these are archivally sound, but the most common, made from polyvinylchloride, cause severe damage. They contain plasticizers, solvents, and residual catalysts that are volatile and form a deposit on the emulsion. Hydrochloric acid is also released when PVC reacts with moisture. After a few years you will notice a fine pattern of pits all over your best slides, the ones you cared enough about to store carefully. By contrast, polypropylene and polyethylene sheets are harmless. A rule of thumb is: if you can smell it, don't use it.

VIREO's archival storage procedure follows recommendations developed by Henry Wilhelm (*Industrial Photography* 27:32-35, Oct. 1978), by Crawford H. Greenewalt (*pers. comm.*), and by E.S. Preisendanz and E.B. Snell, research engineers at the E.I. Dupont de Nemours Co. (*unpubl. ms.*). The archival environment is maintained at 1°C and at 25% to 30% relative humidity.

Near-freezing storage temperatures are preferable to subfreezing when the objectives include both protection and accessibility of archived images, as subfreezing temperatures pose hazards to color film that do not justify the increase in longevity compared to near-freezing conditions. The hazards are not inherent to subzero temperatures, but rather reside in the high relative humidity of such environments, combined with moving photographs in and out of such conditions. The film must be sealed hermetically against the subfreezing environment, and any small leak in the sealing might go unnoticed for years.

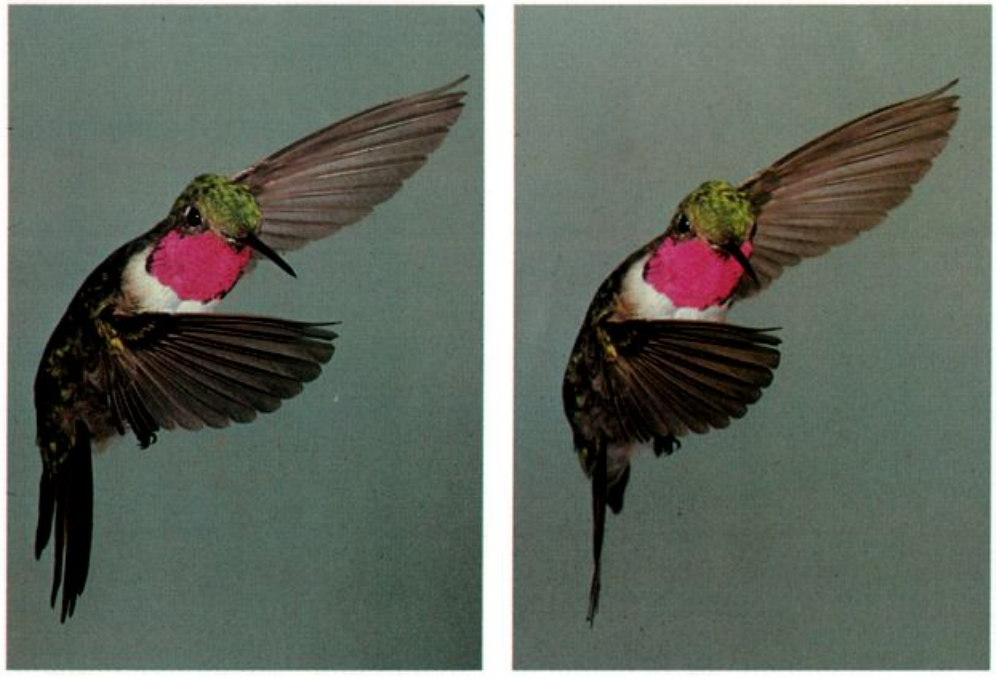
Ross' Gull (Rhodostethia rosea). *VIREO acts as a repository for photographs documenting significant ornithological records. This gull, photographed by R. Mellon in June 1981, took part in the dramatic range expansion of Ross' Gulls first documented by Chartier and Cooke in* American Birds *34:839-841. (VIREO m05/1/43).*

Northern Cardinal (Cardinalis cardinalis). *Long series of photographs of common North American birds form the core of VIREO's collections. Photograph by Helen Cruickshank. (VIREO c03/99/010).*

Western Sandpipers (Calidris mauri). *Bodega Bay, California, January 12, 1982. (VIREO m01/8/2, by J. P. Myers)*

Marbled Godwits (Limosa fedoa). *Bodega Bay, California, September 20, 1981. (VIREO m01/99/10, by J. P. Myers).*

Inca Terns (Larosterna inca). *Mejía, Peru, March 16, 1983. (VIREO m01/99/52, by J. P. Myers).*

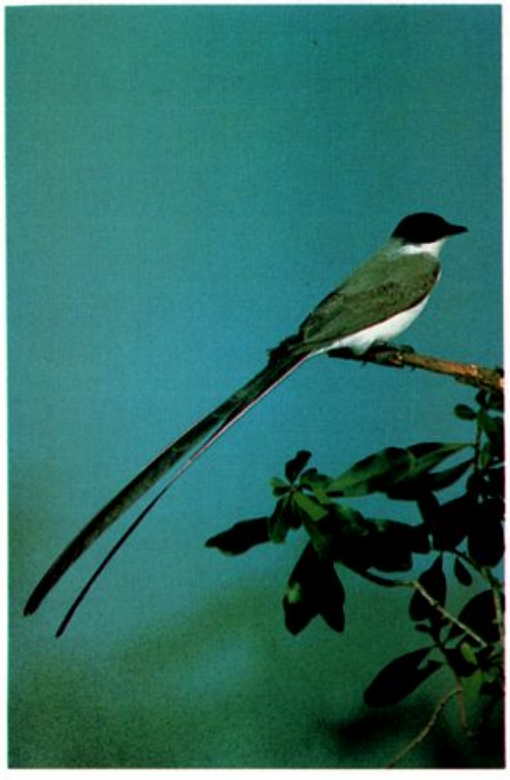


Broad-tailed Hummingbird (Selasphorus platycercus). *These two photographs, when viewed together, yield a life-size, three-dimensional image of the bird in flight. The stereo pair was obtained near Denver, Colorado, in 1957 by Crawford H. Greenewalt, using a mounted pair of Hasselblad cameras and electronic flash triggered by a photocell. Careful inspection of the stereo image reveals this male's narrowed outer primaries, a morphological specialization that produces a whistle as the bird flies. (VIREO g02/4/768).*

Stereo images are made by simultaneously taking two photographs from lens positions simulating the spacing between the viewer's eyes. The two photographs are similar, but not identical. The three-dimensional effect can be seen with a stereo viewer such as those used in interpreting aerial stereo photographs, obtainable from Edmunds' Scientific Corporation (Catalog No. 42118) or with a Sawyer's Viewmaster. The effect can also be observed using two paper or cardboard tubes, each adjusted to restrict an eye's vision to the right or left image. Some people can view the effect directly through control of eye movements, forcing the images to fuse. More information about stereo photography and stereo viewing can be found in Baker, Field Photography *(W. H. Freeman and Co., San Francisco, 1976).*

VIREO archives over 1,500 stereo images taken by Greenewalt of birds from the United States, South America, Africa, and New Guinea, especially hummingbirds and forest passerines. A scaling factor, relating the image size to the bird's size, accompanies each image, allowing life-size reconstruction of natural postures of birds in various activities, especially flight.

Red-faced Cormorant (Phalacrocorax urile). *Contributions from professional ornithologists and students, such as this cormorant on St. George Island by D. Roby, contribute breadth and scientific value to the collection. (VIREO r05/1/12).*



Fork-tailed Flycatcher (Tyrannus savana). *Photographed in Rio Grande do Sul, Brazil, by John Dunning. (VIREO d01/2/006).*

Hoatzins (Opisthocomus hoazin). *Photographed by Charles Munn in Manu National Park, Peru. (VIREO m09/1/025).*

VIREO divides its collections into two types of images primes and spares Prime images are those judged to possess useful scientific and/or aesthetic value, and to meet photographic standards set for the collection. Spares are original slides developing minor variations around themes illustrated by primes and thus supplementing them—for example, four shots of wing position during take-off of a hummingbird. Spares are maintained in the interest of scholarly users who may require large series, but they are not duplicated for the Working Collection.

Prime images are the central core of the collection. For all prime images, an archival reference resides permanently in archival storage. In most cases, the reference is an original, but for some prime images VIREO does not possess the original and therefore archives a reproduction-grade duplicate. All primes are duplicated and made available to users in the Working Collection.

Using VIREO's collections

Images in the VIREO collection are readily available for various uses. Visitors may review the Working Collection by appointment. For scholarly, noncommercial purposes there is no fee. Duplicates of slides may be purchased for noncommercial uses. These duplicates may not be reproduced in any form.

Duplicates may also be ordered by mail or telephone, either as single slides (minumum order of 5) or in slide sets. A number of slide sets are available, including: Raptors of North America, Bird Bills, Shorebirds, Waterfowl, Birds of the World, Backyard Birds, etc. More information is available on request.

A computer file listing all birds of the world and the VIREO species code is available for purchase on floppy disks or as printout.

VIREO also sells one-time reproduction rights for many of its images. Commercial fees are competitive. A review fee is usually waived for first-time users.

Inquiries about how to use VIREO's collection are welcome, and should be addressed to VIREO at The Academy of Natural Sciences during normal working hours (215-299-1069; 9 a.m.-5 p.m. Monday-Friday).

The Working Collection is the heart of VIREO's live archival system. The basic goal of the Working Collection is to make the image content of originals available to users without jeopardizing the originals' safety. Six cabinets currently hold the 22,000 duplicates of the Working Collection in taxonomic sequence. Users have access to the Working Collection by appointment during normal working hours (9 a.m.-5 p.m. on weekdays). Access is made through the VIREO computer data base or through a direct review of slides. Commercial users pay an access fee for time spent in the collection; there is no access fee for scholarly review when done in VIREO's laboratory. Duplicates may be purchased of all Working Collection slides except a small number that are restricted by a few photographers. No slides are loaned.

VIREO employs a microcomputer to record information about each slide, to facilitate a search for slides of a particular subject, and to oversee collection management. Computer searches can be done for species, subject matter, photographer, or any other variable currently used in the VIREO file or to which reference occurs *via* codes within the VIREO file, or any combination thereof. For example, it is possible to determine in a few moments whether a slide of a male Checker-throated Antwren, foraging on dead leaflitter in Panama, exists in the collection. Those familiar with the drudgery of slide-labelling (and its necessity!), will appreciate the fact that by using a custom program, VIREO can now label approximately 400 slides/hour.

A special coding system developed by A.D. Forbes-Watson for all species of birds of the world links the computer files. This code is compatible with both ornithology and computer technology. Eight characters long, each species code consists of a single lower case letter identifying the order (a = Struthioniformes through z = Passeriformes), followed by a 4- or 5-letter abbreviation of family (*e.g.*, Scolo = Scolopacidae), followed by up to 3 digits to identify a species in the family. Thus nScolo66 is the

Northern Gannets (Sula bassanus). *Allan D. Cruickshank carried bird photography in North America to new levels of achievement. His entire collection and that of Helen Cruickshank now reside in VIREO. He took this evocative photograph off the eastern tip of the Gaspe Peninsula in July 1937. (VIREO c02/3/001).*

Bird tours and VIREO

Birders going on tours to foreign countries have much to gain from and much to offer VIREO. Many birders go to great lengths to prepare for such trips, familiarizing themselves with new avifaunas and learning new identification skills in advance. Their work pays off because they hit the ground running, knowing what's there and how to identify it. Often, however, it can be extraordinarily difficult to obtain a painting or photograph of birds from remote lands.

VIREO has photographs of many species that are unobtainable anywhere else. This is particularly true in areas of VIREO's photographic strengths, such as South America and particular regions in Africa and Australia. Duplicates of these may be purchased directly from VIREO.

VIREO also encourages birders who have been on such tours to select their best photographs for inclusion in the collection. There are species whose habitat is so dense, or whose range is so remote, or whose numbers are so low, that they are very unlikely to ever be photographed well twice. A given birder may have only one or two such photographs, but each has extraordinary value. Placing them in VIREO will ensure that photographs of unusual species will become widely available, and it will enable others that follow to benefit from someone's photographic successes. Of course, all duplicates give credit to the photographer.

Brown Pelican (Pelecanus occidentalis). *Few bird photographers now take black-and-white photographs. Many fewer still specialize in this medium. Kenneth W. Gardiner's continuing success with black-and-white, well-illustrated by this pelican in flight, shows the striking potential of the medium with high-speed equipment. (VIREO g05/1/001).*

code for Sanderling, while uTroc015 is that for the Long-Tailed Hermit. Birders and ornithologists can learn the code easily because the family abbreviation is readily identifiable, in contrast to other coding systems based solely on numbers. Printouts or floppy discs (IBM-PC, dBase II data file) of the code for the world's avifauna or for geographic subsets may be obtained from VIREO. Inquiries should be sent to the authors.

The VIREO computer system is built currently around an IBM-PC with 320K RAM and a 10 MB hard disc (Davong), using dBase II (Ashton Tate) as a data base management system. Word-processing for reports and correspondence is done on the same hardware using the QNX operating system software.

This issue's cover represents the quality of material in VIREO, but the collection includes more than just exquisite portraits of birds. There are photographs of ornithologists and birders, and of hand-held birds showing coloration of soft parts or juvenal plumages, pictures illustrating ornithological methods and bird behavior, long series showing individual variation in plumage, color and morphology of particular species, reference photographs documenting rarities and range extensions, photographs of study sites and bird habitats, and even photographs of noted bird art such as work by Fuertes and Audubon. While technical and aesthetic excellence is highly desirable, it is not essential. Many birds or themes in ornithology will probably never be captured on film with the photographic excellence of, say, Eliot Porter's studies of Sedge Wrens. That does not negate their value for scholarly purposes.

The selection of materials rests on a philosophical decision about VIREO's objectives. The collection must look toward possible uses in 50 or 100 years, rather than

focusing solely on currently perceived needs This complicates the task of reviewing materials for accession. Who can anticipate the scholarly uses that will be made of ornithological slides during the next century? The only solution is to remain as flexible as possible and to attempt to document a species' biology or a subject completely. Such considerations heighten the importance of series on species, of complementary materials from different photographers, and especially of accompanying data. Here the knowledge of a contributing photographer who is also an ornithologist becomes especially important.

VIREO's current strengths reflect the photographic interests of key contributors. Table 1 outlines the biogeographic distribution of slides and species in the Working Collection. Within the collection are slides of members of all 28 bird orders and 162 (87%) of the 187 bird families. For three families we have photographs of all species, and in each the photographic coverage is strong: over 1600 photographs by Roger Tory Peterson alone of penguins, an extensive series by M. Philip Kahl of the world's flamingos, and all of the New World vultures.

Other taxonomic groups with strong coverage include the storks (15 of 17 species, including many detailed studies by Kahl), the raptors, the cranes, North American shorebirds, the hummingbirds (including incomparable stereo images of hummingbird flight and iridescence by Crawford H. Greenewalt), and North American wood warblers (with portraits by Eliot Porter as well as detailed hand-held studies by several parulidologists). The complete collections of Helen and Allan Cruickshank provide a solid foundation for the North American avifauna, especially when matched with extensive studies by O.S. Pettingill, Jr., while comprehensive series from Greenewalt, Dunning, Munn, and others working on forest passerines in Central and South America have made significant inroads into this rich avifauna.

Table 1. Biogeographic distribution of VIREO slides

REGION	*TOTAL SLIDES*	*SPECIES COVERED*
South America	4098	686
North America	8561	575
Central America	553	129
Eurasia	701	196
Africa and Malagasy Region	2484	365
Orient	112	58
Australasia	1873	291
Antarctic and Subantarctic Islands	1765	40

There are weaknesses, however. VIREO's poorest coverage presently is in Eurasia and the Orient. The most egregious gaps occur in large families such as the pheasants, pigeons, parrots, swifts, woodpeckers, thrushes and emberizine finches. Even in relatively well-represented groups there are unexpected omissions. And for none, given VIREO's long-term goals, is coverage sufficient, except perhaps for American White Pelicans, Adèlie Penguins, and wintering Sanderlings.

VIREO is always looking for new materials. We especially seek contributions from ornithologists whose research on a particular group can place their photographs in a scientific context. Their series may be small but they can be definitive. Moreover, it is these series which are the most subject to the risk of being lost through time, unless they are preserved in a centralized, permanent collection.

The repository of documentary photographs in the New World

AMERICAN BIRDS AND VIREO together are embarking on a joint effort to establish a centralized repository of photographs of distributional records for the New World. Photographs will be considered for the repository if they document new discoveries in distribution, significant range extensions, or the occurrence of rarities. Each photo-

Contributing slides to VIREO

VIREO needs photographs in color or black and white covering all aspects of ornithology. We accept originals or duplicates but strongly urge contributors to place their originals with VIREO for long-term, safe archival storage.

After review and accession, VIREO provides the contributor with reproduction-quality duplicates of the slides they have contributed, if needed by the contributor. These duplicates are equal to the highest quality obtainable commercially, and are virtually indistinguishable from the originals in terms of color and contrast. Contributors are consulted intensively about scientific data pertinent to each photograph.

Originals are stored in archival conditions and never handled by users unless they are essential for commercial reproduction and then only with the contributor's permission. No commercial agency goes to the lengths that VIREO does in order to protect originals. Depending upon the terms of the contribution, commercial income can be shared by VIREO and the photographer.

Those wishing to contribute to VIREO should write the authors describing the material they propose to donate.

graph in the repository will be archived, as are all images in VIREO's collections, except that data within the computer data base will differentiate slides belonging to this repository. Persons needing access to the images can visit the collection or purchase duplicates.

Regional editors and state distributional committees, in collaboration with the editors of *American Birds*, will screen all slides for scientific merit, make nominations for accession into the repository, and see that critical data on species, plumage/sex, date, locality, photographer, and citation to the literature accompany each slide.

AMERICAN BIRDS AND VIREO are aware of the fact that several regional collections of this sort already exist, but believe that an effort to coordinate these programs on a continent-wide basis is now warranted for two reasons. First is the long-term archival security of photographs at VIREO. VIREO's host institution, The Academy of Natural Sciences, is the oldest natural history museum in the Western Hemisphere (founded in 1812), and houses some of the most important natural history collections in the world. The Academy has made a long-term commitment to ensuring the continuity of VIREO.

The second reason is the accessibility of slides to researchers. No individual effort could match VIREO's organization.

Screening of photographs for the repository of documentary photographs

In order to ensure the scientific merit of distributional records, and so that contributors will receive proper and long-term credit for their photographs, all slides should be screened first by Regional Editors or avian records committees, who will be responsible for nominating photographs for accession by VIREO.

Nominated photographs must

1. Establish new and significant facts about distributional limits or provide essential documentation for the occurrence of rarities.
2. Have full accompanying data: species, plumage/sex, date, locality, photographer, and citation to the literature.

WITH THESE POINTS IN MIND, *American Birds* encourages those holding photographs of distributional significance to contact regional editors and avian records committees about placing them in the repository. Regional editors, when submitting reports to *American Birds* which are documented by photographs, should nominate photographs that merit inclusion in the repository.

—VIREO, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103.