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Field Museum of Natural History Bulletin

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COVER

Benjamin D. Walsh (1808-69), Illinois' first state entomologist and a resident of Rock Island, corresponded with English biologist Charles Darwin from 1864 until the year of his death. The 21 letters of this unpublished correspondence are in the Rare Book Room of the Field Museum Library. Several of these letters are published here for the first time; see page 8

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ILLINOIS' QUIET CONSERVATIONISTS

by Joyce Marshall Brukoff

Almost completely unknown to the man on the street, yet as powerful a force for the preservation of natural areas as the mighty Sierra Club, the Nature Conservancy moves in quiet ways. The primary purpose of this group is to save endangered wilderness areas, which they do quite effectively—slipping in to obtain threatened lands from under the crush of a bulldozer or the teeth of a chain saw.

The Nature Conservancy is a national, nonprofit, member-governed organization, dedicated to the preservation of vanishing natural lands. Some 400,000 acres of forests, swamps, marshes, prairies, seashores, and islands throughout the United States have been saved from destruction through Conservancy action.

The Illinois Chapter of the Nature Conservancy has acquired 25 separate preserves which display a wide variety of geographic forms and ecosystems. Together they total more than 5,200 acres. Caves and prairies, woodlands and bogs, and wetlands and sanctuary areas for endangered species such as the prairie chicken and the bald eagle have been protected under the secure umbrella of the Conservancy's action.

Joyce Marshall Brukoff is a Chicago writer.

Here's how it works. In the beginning, a land is thoroughly inspected to determine its intrinsic value as a natural area. This land is often acquired through purchase with funds raised locally and nationally. Land acquisition is also repeatedly accomplished through the welcome donations of concerned individuals and organizations. A good example of this on a national level is the recent gift to the Conservancy of the Great Dismal Swamp in Virginia, a 50,000-acre donation by the Union Camp Corporation. This unique swamp is a land of great complexity, with an astounding mixture of cypress swamps, brier thickets, loblolly pine barrens, evergreen shrub bogs, and mixed swamp forests of red maple, pond pine, Atlantic white cedar, and other plant species. Placed at the ecological crossroads of northern and southern species, the swamp combines in one contiguous area a fascinating number of varied ecosystems. To acquire this land, the Conservancy needed, in addition to the generous gift from Union Camp, a squadron of negotiators, staff attorneys, and public relations and regional staff officers.

In Illinois, an impressive assortment of land acquisitions have been noted as "successful" in the Illinois chapter logbook. One such acquisition is the Cedar Glen Preserve in Hancock County across the Mississippi River from Keokuk, Iowa. Cedar Glen is the second largest winter roosting site in the United States for our vanishing national emblem, the bald eagle.

Eagles flock to the natural bowl of Cedar Glen every December and stay until early March, roosting each night in the sycamore trees. In mid-March they migrate north. The eagles have come to the glen for hundreds of years; Frank Bellrose, of the Illinois Natural History Survey, has observed them there for some 25 years. As many as 98 birds have been sighted at the glen in a single afternoon. The importance of this preserve may be understood when it is considered that the total number of bald eagles within the contiguous 48 states is no more than 500 to 700 breeding pairs, a figure which has alarmingly declined in recent years.

What makes Cedar Glen such a choice habitat for the bald eagle? Its 410 acres are heavily forested, with gently rolling hillsides dropping into rocky ravines. Several bluffs vary in height from 50 to 100 feet. The forest is composed of maple, basswood, oak, hickory, and sycamore. All of this lies in a protected valley, and it obviously satisfies the bald eagle's requirements for sheltered night roosting.

Prof. Thomas C. Dunstan, Western Illinois University biologist, bands an immature bald eagle at Cedar Glen Preserve.

One-quarter mile away from the glen are the sunny day roosts and favorite fishing places to which the birds set out at the first light of day. Here, they keep a watchful eye for dead and injured fish, chiefly gizzard shad, which are believed to be victims of shifting water temperatures below the Keokuk Dam two miles upstream. How the eagles catch their fish depends on prevailing wind conditions. On calm mornings the birds sit and preen themselves, awaiting mid-day thermal winds on which to soar and search for floating fish. On windless days more energy is required to keep their 9- to 12-pound bodies aloft. When winter skies are blustery however, the birds return to the roost to sit it out and do their fishing on a better day.

In 1971 a plan was announced to sell the eagle roost for timber. This threat prompted members of the Illinois chapter to take immediate action. After consulting with scientists from Western Illinois University, the Nature Conservancy signed a purchase contract for $34,000. Money was raised to keep the sanctuary intact and the eagles protected. Since the original purchase the Conservancy has expanded the preserve with three new additions.

The area is now leased to Western Illinois University as part of the Kibbe Research Station. Dr. John E. Warnock acts as preserve manager, and Dr. Thomas C. Dunstan continues the bald eagle studies he has carried on for years. Both Warnock and Dunstan are faculty members of Western Illinois University.

Other preserves have captured the public interest from time to time, including Volo Bog, a 47-acre preserve in northern Lake County which is a classic example of a northern tamarack bog. It is now designated a National Natural Landmark by the U.S. Department of the Interior. The system of prairie grouse sanctuaries scattered throughout Illinois provides a good example of a long-term program in which the Conservancy worked with other organizations to accomplish a common purpose.

In 1966 the continued survival of prairie chickens in Illinois was questionable. But the subsequent acquisition by the Illinois chapter of the Bogota Preserve (Jasper County)—an area favored by these birds—has done much to insure their survival.

Each year since 1963, the acreages of potential nest cover for prairie chickens have been recorded on the 16-square-mile Bogota study area. The total declined from 837 acres in 1963 to a low of 376 acres in 1966. Since 1966 the total acres of potential nest cover has steadily increased to 1,000 acres in 1973, 71 percent of which was due to the establishment of nest cover on sanctuaries.

In 1963 the 837 acres of available nest cover in Jasper County produced a population containing 65 cocks. By contrast, in 1973 the 850 acres of available nest cover supported a population that contained 203 cocks. It is becoming clear that the present sanctuary grasslands are capable of producing a much higher population level than those that occurred on a similar acreage of private farmland.

The increase in the prairie chicken population since the acquisition and development of a sanctuary system at Bogota has indeed been encouraging. This native grouse will continue to respond just as far as habitat management will permit. Because of the responsiveness and tenacity of this bird, the opportunity to preserve a second flock also appears to exist on the Conservancy's 460 acres in Marion County near Farina and Kinmundy.

Closer to Chicago, the Illinois Chapter of the Nature Conservancy has saved a virgin prairie in the shadow of the city. Gensburg-Markham Prairie, 20 miles from Chicago's Loop in the town of Markham, is a 120-acre grassland which has some 16 inches of topsoil. It has never been plowed. Here are 300 species of wild grasses and flowers—the bright blue spikes of the prairie gay-feathers, the blazing star, and the white heads of Indian quinine. Here

are birds and animals that many thought had disappeared from the state, let alone the environs of a city—the lovely regal fritillary butterfly, the red fox, and the yellow-throated warbler.

Since 1968 the Illinois Chapter of the Nature Conservancy and Northeastern Illinois University have been working together to ensure the preservation of this remarkable parcel of land. With the generous gift of Louis, David, and Meyer Gensburg and a $200,000 grant from the U.S. Department of Interior, the first phase of the acquisition has been accomplished. In the second phase a sum of $90,000 must be raised to cover the total cost of management, fencing, and final acquisition. The prairie is irreplaceable and, when fully acquired, will be dedicated as a nature preserve by the Illinois Nature Preserve Commission, ensuring permanent preservation status.

Elsewhere in our state, the chapter has saved a few unique caves: Burton Cave near Quincy and Rock Cave near Effingham. Twin Culvert Cave, planned for acquisition in the near future, is a migratory haven for the uncommon gray bat.

Another fine preserve is Hart Woods near Champaign. With four Indian burial mounds, the area is used extensively by the University of Illinois Department of Anthropology. Close to home is Berkeley Prairie in Highland Park, where on occasion a passerby may see Conservancy people "burning" the prairie to preserve natural grasses and discourage invading non-native plants. The burning is a function taken on by management in place of natural prairie fires which man has eliminated.

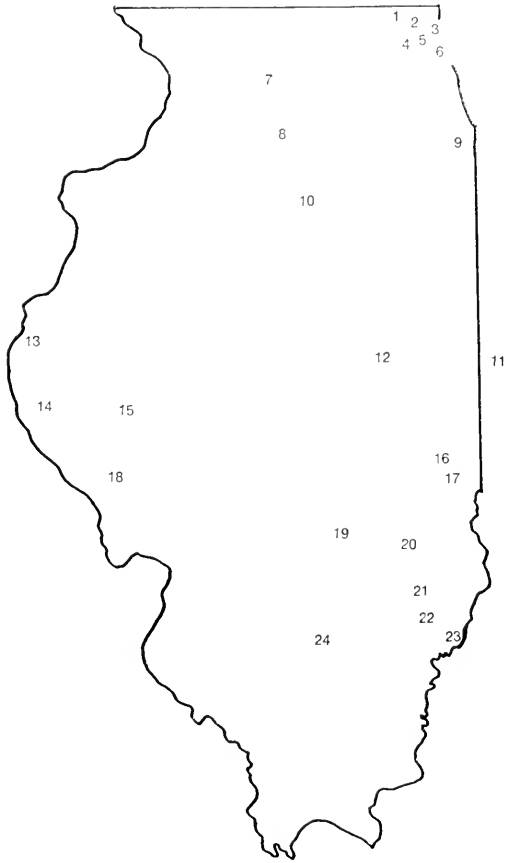
An area now under consideration for action by the Illinois Chapter is Little Black Slough, a diverse 2,500-acre area near Vienna. Within it, Goose Pond—consisting of 98 percent bald cypress—is probably the last, certainly the largest, bald cypress swamp in Illinois. The slough also contains a five-mile-long tupelo swamp and Boss Island, a piece of land which has some of the finest stands of timber in the Shawnee Hill division of the state.

Meredosia Island, south of Beardstown—a recent acquisition for the Conservancy—is a good example of an outright gift. To quote from a recent article in the *Chicago Sun-Times* by environmental editor Bruce Ingersoll:

> The will of the late James R. Anderson, industrialist and outdoorsman, is done: An unpeopled, unspoiled stretch of Illinois River bottomland has been set aside for the waterfowl he wanted to see protected. A 1,850-acre tract of swampy wilderness which he owned on Meredosia Island, south of Beardstown, Illinois, has been given to The Nature Conservancy, just as he directed before he died. The land is valued at $672,000 making it the largest gift the environmental group has ever received in the Midwest.
>
> Frank Bellrose, wildlife specialist for the Illinois Natural History Survey, rates Meredosia, 200 miles southwest of Chicago, as one of the finest waterfowl areas in the state. Hundreds of wood ducks nest in the heavily timbered bottoms. He estimates 86,000 mallards and American widgeons, 17,000 canvasbacks and bluebills and thousands of geese stop off during the spring and autumn migrations.
>
> Regardless of its name, Meredosia is a peninsula, not an island, according to Daniel Pike, director of the Conservancy's Illinois chapter. It is flanked on the west by the river and on the east by Meredosia Lake, a backwater of the river. On the northern neck of the peninsula, Pike said, there is a large heron rookery. Some 100 pairs have their nests, as big as bushel baskets, in the treetops. In the neighborhood during summer are several American egrets.
>
> Prothonotary warblers nest in the swamp willows, and deep in the virgin forest of arching sycamores and silver maples live some very shy pileated woodpeckers. The size of a crow, the pileated lives in tree cavities, as do the raccoon and opossum. And nowadays beaver and mink are making a comeback in the tangled swamps.

So, the Nature Conservancy, America's least known but extremely effective conservation group, is quietly very active, frequently earning the wrath of the opposition. It has often blocked the "get rich quick" efforts and ambitions of land holders and developers. The Conservancy puts its money where its

Burton Cave, located in Adams County, is in a 78-acre tract donated to the Nature Conservancy by the Quincy Foundation.



Natural Area Projects of the Illinois Chapter of the Nature Conservancy

Lake County: *(1) Volo Bog, 47 acres of open tamarack bog. (2) Carpenter Woods, 9 acres of flood plain forest; (3) Lake Forest Preserve, 15 acres of forest and prairie remnants. (4) Wauconda Bog, 67 acres of mature tamarack bog. (5) Sarah Fenton Hinde Preserve, 10 acres of forest and wildflower area. (6) Berkeley Prairie, 18 acres of mesic prairie.*

Ogle County: *(7) Pine Rock, 58 acres of mesic and dry prairie and sandstone outcrop*

Lee County: *(8) Bartlett Woods, 22 acres of upland hardwood forest and wildflower area.*

Cook County: *(9) Gensburg-Markham Prairie, 120 acres of virgin prairie containing more than 300 plant species.*

LaSalle County: *(10) Big Bend of the Vermilion River, two tracts of oak-hickory forest and wildflower area covering 178 acres*

Fountain County, Indiana: *(11) Portland Arch, 147 acres of mature hardwood forest*

Champaign County: *(12) Nettie Hart Memorial Woods, 40 acres of flood plain and upland forest.*

Hancock County: *(13) Cedar Glen Eagle Roost, 408 acres, providing winter roosts for bald eagles.*

Adams County: *(14) Burton Cave, 78 acres of upland forest and prairie remnants, with cave used as hibernacula by bats*

Cass County: *(15) Meredosia Island, 1,850-acre Illinois River floodplain with marshes and woodland.*

Edgar County: *(16) Baber Woods, 59 acres of virgin oak-hickory forest*

Clark County: *(17) Rocky Branch, 183 acres of forest and wildflower area in a sandstone canyon.*

Pike County: *(18) Twin Culvert Cave, 5 acres with cave and outstanding biological and geological features.*

Effingham County: *(19) Rock Cave, 75 acres of hardwood forest*

Jasper and Marion Counties: *(20) fourteen prairie chicken sanctuaries totalling 1,304 acres.*

Richland County: *(21) Big Creek Woods Memorial, 40 acres of flood plain and upland forest.*

Edwards County: *(22) Ica Marks Natural Science Preserve, 40 acres, old field succession research area.*

Wabash County: *(23) Beall Woods, 624 acres of virgin bottomland forest*

Jefferson County: *(24) Devil's Prop, 40 acres of wooded ravine with sandstone outcrops.*

mouth is instead of belaboring an over-saturated public with more environmental outcry. It works behind the scenes, utilizing the skills of seasoned lawyers, realtors, and professional conservationists. Once acquired, maintaining the natural quality and integrity of the land is of primary importance. Scientific research, outdoor education, and other nondestructive public uses may be permitted. A management committee of local volunteers, donors, or Conservancy representatives remains alert to protect the area from abuse.

The Conservancy retains ownership of the majority of its preserves. In some cases, however, lands are conveyed with special restrictive or reverter clauses to educational institutions or to other private or public conservation groups. The Conservancy is supported financially by direct support from the public and grants from foundations. A $3.5 million-dollar revolving fund is maintained by the national organization. By borrowing money from this fund, local chapters and project committees are able to act quickly to purchase threatened land. Fund-raising is then initiated to repay the revolving fund. Careful and intelligent financial management has produced extremely effective results from a relatively small amount of private support.

Many of us have taken a stroll through some natural area and thought, "Such a nice place . . . if only it could stay that way." That is what the Nature Conservancy is all about.

The Illinois Chapter of the Nature Conservancy is located at 708 Church Street, Evanston, Ill. 60201.

Eight Stalwart Maidens

By Christopher Legge

Among Field Museum's most stalwart supporters are eight women who have been with the institution since the present building was opened more than half a century ago. They guard the north and south entrances and, judging by their expression, they are little impressed by the coming and going of dignitaries, by changes of weather, or even by strains of music that drift over from Grant Park on warm summer evenings. It should be evident at this point that these stony-visaged ladies are of no common breed. They are in fact a svelte eleven feet tall and tip the scales at five tons each. Their name: *Caryatids.*

Caryatids are columns fashioned in the shape of draped women supporting a roof or crossbeam. Field Museum's caryatids are arranged in pairs to support gabled pediments above windows. There are two kinds, differing slightly in hair arrangement and attire. One kind has a brooch on her bosom. These maidens are the work of Henry Hering (1874-1949), a New York sculptor who had been a pupil of famed Augustus Saint-Gaudens. Vitruvius, a Roman architect and contemporary of Julius Caesar, wrote a much-studied treatise on architecture in which he explains the origin of the caryatids by an episode in the Persian wars when the city of Carae supported the Persians. After the Persian defeat, the Greeks slew the men of Carae and enslaved the women. Architects of the time used statues of these women carrying heavy burdens as punishment for the nefarious conduct of their menfolk. This is the traditional story, but the view now more widely held is that the sacrificial dance called *caryatis* gave rise to the architectural device. This dance was performed in honor of Artemis, the goddess of the hunt, by women of Carae who balanced flat baskets containing sacred cake, frankincense, and the knife with which to slay the victim of the sacrifice. Hering's caryatids are free adaptations of the best known ones which support a porch of the Erechtheum, an Ionic temple on the Athenian Acropolis which was completed in 410 B.C. These stalwart women, subtly varied in pose and in the folds of their garments, bear their weight with serene dignity. All have lost their noses and most of their arms—victims of religious iconoclasm. There were originally six, but in 1804 Lord Elgin removed one which now resides in the British Museum. This action caused more anger than his acquisition of all the other "Elgin marbles." The name of the sculptor is unknown, but a wit scrawled "opus Phidias" on the five remaining figures and "opus Elgin" on the brick pillar which had been substituted for the sixth.

It is unfortunate that Museum visitors view them whilst having to negotiate the 38 steps of each entrance; and such fine points as the delicate manner in which the *peplos,* or gown, hangs close to the body, and the way in which the leg is braced to take the weight of the body may therefore escape their notice.

In Chicago, besides the eight at the Field Museum there are twenty-four on the outside of the Museum of Science and Industry. It may well be that the city could proclaim itself "caryatid capital of the world"!

Christopher Legge is custodian of collections of the Department of Anthropology.

Courtesy British Museum

The "Elgin" caryatid now in British Museum

Darwin's Backwoods Correspondent

From British aristocrat to backwoods Illinois pioneer is the story of Benjamin D. Walsh (1808-69)—a brilliant, self-taught scientist who maintained during his last five years of life a lively correspondence with Charles Darwin (1809-82). In 1864 Walsh had sent a "fan letter" along with some of his own published papers to the celebrated British biologist whose *Origin of Species*, published five years earlier, continued to be the subject of raging controversy. Recognizing his New World correspondent as more than just another admirer, Darwin responded quickly, and commended Walsh (later to be named Illinois' first state entomologist) on the latter's published work. From this exchange developed a warm correspondence.

In 1948 Field Museum received a bequest of Walsh's entomology library—several hundred books, pamphlets, and periodicals—from the widow of Charles V. Riley (1843-95) who, with Walsh, had founded the journal *American Entomologist*, eighteen original letters (one incomplete) from Walsh to Darwin were added to the collection by Thora M. Riley, daughter of Charles.

The scion of a respected, well-to-do Worcestershire family, Walsh took his master's degree in divinity at Trinity College, Cambridge University. Being of an independent, self-assertive mien, Walsh discontinued his preparation for the ministry and spent the next few years, apparently, in a state of indecision. In 1837 his metric translation of three plays, *Walsh's Comedies of Aristophanes*, was published. Married, he emigrated the following year to the United States, intending to settle in Chicago. But that already thriving village failed to measure up to his expectations, and Walsh with his young bride continued westward by ox cart to Henry County in western Illinois. Here he built a mud-plastered log cabin and, for twelve years, worked a 300-acre farm. Free of the class-consciousness that generally afflicted Victorian aristocracy, Walsh labored as commonly as his Illinois farm neighbors, occasionally making his own shoes as well as harnesses for his horses. In 1850 he moved to the nearby town of Rock Island, operating a prosperous lumber yard there and erecting a number of brick houses, which he rented.

By the late 1850's Walsh had developed a deep interest in entomology—a study that had attracted him since his youth. During the 1868-69 biennial session of the Illinois legislature he was appointed state entomologist. This occurred just months before his accidental death—a tragic, nearly incredible demonstration of Walsh's total involvement in his scientific work. On a November morning in 1869 Walsh picked up his mail at the post office and was headed homeward along the railroad tracks, examining an insect specimen he had received in a letter. Totally absorbed, he didn't notice an approaching locomotive until it was too late. He jumped clear, but not soon enough to suffer internal injuries and a horribly mangled foot that had to be amputated.

Walsh lived for a week after the accident, and joked about his new cork leg: "Why, don't you see what an advantage a cork leg will be to me? When I am hunting bugs I can make an excellent pincushion of it, and if I lose a cork from a bottle, I can carve one out of my foot." As a testimony to his character, he wrote to local newspapers, exonerating the train crew from any blame in the mishap.

At the time of his death, Benjamin Walsh had amassed 30,000 carefully classified and mounted insect specimens—the largest private collection in the country. Later stored at the Chicago Academy of Sciences, the entire collection went up in smoke during the Chicago fire of 1871. He had also published a large number of scientific papers, particularly on insects of economic importance.

The following letters (some of which have been substantially abbreviated here) are a sampling of the Walsh-Darwin correspondence now in the Rare Book Room of Field Museum Library.

—David M. Walsten

Darwin to Walsh:

Down
Bromley
Kent, S.E.
October 21 1864

My Dear Sir:

Ill health has prevented me from sooner thanking you for your very kind letter, & several memoirs.

I have been very much pleased to see how boldly and clearly you speak out on the modification of species. I thank you for giving me the pages of reference; but they were superfluous, for I found so many original and profound remarks, that I have clearly looked through all the papers. I hope that your discovery about the Cynips[1] will hold good for it is a remarkable one, and I for one have often marvelled what could be the meaning of the case. I will lend your papers to my neighbour Mr. Lubbock who I know is much interested in the subject. Incidentally I shall profit by your remarks on galls:[2] if you have time I think a rather hopeless experiment would be worth trying; any how I should have tried it had my health permitted—it is to insert a minute grain of some organic substance together with the poison from bees, sand wasps, ichneumons, adders, and even alkaloid poison into the tissues of fitting plants, for the chance of monstrous growths being produced.

My health has long been poor and I have lately suffered from a long illness, which has interrupted all work, but I am now re-commencing a volume in connection with the "Origin" with sincere thanks for your letter and kind present.

Pray believe me
my dear sir yours sincerely

Charles Darwin

P.S. If you write again I should very much like to hear what your life in your new country is. . . .

Darwin to Walsh:

December 4 [1864]

I have been greatly interested in your account of your American life. What an extraordinary and self-contained life you have led! And what vigour of mind you must possess to follow science with so much ardour after all that you have undergone. I am very much obliged for your pamphlets on geograph. distrib., on Agassiz,[3] etc. I am delighted at the manner in which you have bearded this lion in his den. I agree most entirely with all that you have written. What I meant, when I wrote to Agassiz to thank him for a bundle of his publications, was exactly what you suppose. I confess, however, I did not fully perceive how he had mistaken my views; but I only skimmed through his "Methods of Study"[4] and thought it a very poor book. I am so much accustomed to him it hardly excites my attention. . . .

I am glad that you have attacked Dana's[5] wild notions. I have a great respect for Dana, but I declare I fear that his illness has [illegible] enfeebled his brain. If you have opportunity read in Transac.—Bates[6] on mimetic Lepidoptera of Amazons; I was delighted with his paper.

I have got a notice of your views about the female Cynips inserted in N. Hist. Review; whether the notice will be favourable I do not know yet: but anyhow it will call attention to your views. . . .

I enclose a photograph made of me by one of my sons, and I have no others. I wrote to Westwood[7] for a [illegible] for you, but I have received no answer. I have been told that he is much bitter about Species,[8] and perhaps wishes to show his feelings of this want of common courtesy to us both. . . .

Walsh to Darwin:

Rock Island, Illinois, U.S.
March 1, 1865

My dear Mr. Darwin:

Your letter of Dec. 4 enclosing your photograph came duly to hand & by the same mail your second letter enclosing Westwood's photograph. I am under great obligations to you for both. Westwood I never saw, but I have a very distinct recollection of your countenance when

(Continued on page 12)

1. *Genus of gall wasps*
2. *Galls on plants are swellings commonly caused by certain parasitic insects, including* Cynips
3. *Jean Louis Agassiz (1807-73), Swiss-American naturalist*
4. Methods of Study in Natural History *(1863)*
5. *Probably James Dwight Dana (1813-95), U.S. geologist and zoologist*
6. *Henry Walter Bates (1825-1892), English naturalist*
7. *John O. Westwood (1805-93) English entomologist*
8. *Darwin's* Origin of Species

A CHRISTMAS AFTERNO

Friday afternoon, December 14, was a time for holiday mirth at Field Museum. Stanley Field Hall, festooned with holly, echoed with the merry tunes of Leo Henning's Orchestra, with Christmas carols, folk songs, and dance music as Members and guests joined in the festivities. Clowns, sugar plum fairies, and a grand march rounded out the occasion, sponsored by the Women's Board of Field Museum.

Photos courtesy W. B. Nickerson

ON AT FIELD MUSEUM

DARWIN-WALSH *(from p. 9)*

you were at Christ's,[9] & if you were to shave clean & put on a wig, I should say you are but very little changed since then. Immediately on the receipt of your letters, I wrote to several of my Eastern Correspondents on Westwood's affair of the Portraits, & as soon as I received answers, I took occasion to write to him & communicate the results. I suppose it will probably be some little time yet before I receive a reply. There is a good portrait of Jay[10] in existence, of which he can have a copy taken, if he desires it. Of Harris[11] there is nothing but a photograph extant, which I rather wonder at, considering that the New-England naturalists set great store by him and are apt to get wrathy if one picks any holes in his jacket. . . .

I sent you a month or two ago a Paper of mine on "Phytophagic Species", & by this mail I send you another on "Willow-galls". You will begin to think that I spawn a pamphlet bi-monthly. But for me the winter is the time for writing & in the summer I am out in the woods reading the great Book of Nature. There is one matter in this last pamphlet that I would like your opinion on, i.e., Wagner's procreative larva. The more I turn the thing over in my mind, the more I don't believe a word of it. And yet I find that Siebold[12] has to a certain extent endorsed the Theory, by translating from the Danish a Paper on the subject. All these men seem to me to have confounded two very different things, 1st the case of alternate generation when A produces B, & B produces A. And so on ad infinitum. & 2nd the (supposed) case of *Cecidomyia,* where, *in the same species* A (the larva) sometimes produces A (the larva) and then dies, and sometimes produces nothing at all but becomes gradually developed into the imago B, which reproduces A & so on. Is there anything analogous to this in the known metagenetic transformations? It strikes me like the theory of the schoolboy, that sometimes the earth travelled around the sun & sometimes the sun travelled around the earth. But out here in the backwoods we know but very little on these great modern discoveries. I wish you would enlighten me.

I am delighted to find that you approve of the way in which I handled Aggasiz. I am told there is a notice of that Chapter in the London "Reader" of December 31, but have not seen the article. Thank you for getting my Cynipidous theory noticed in the Nat. Hist. Review. There has also appeared a short notice of that Paper in the Stettin "Zeitung" or whatever the German title of their Natural History Journal may be; so it will get tolerably well

Drawing by Dick Roesener

ventilated, at all events, which is all I wish or expect. *Magna est veritas et pravalebit,*[13] as you by this time see with your great theory. I told young Aggasiz,[14] who argued against your theory because so many naturalists disbelieved it, that the wonder was not *so many disbelieved,* but that in several years from the date of its promulgation so many *believed*; & asked him how many Naturalists believed in Cuvier's great theory several years after that was promulgated?

Since I last wrote, I have read carefully through Aggasiz's "Classification"[15] which one of the New England Naturalists told me contained a most unanswerable refutation of Darwinism, though he allowed that the argument in the "Methods of Study" was a complete failure. The book bears neither title-page nor date, and so far from finding any refutation of your theory in it, I actually feel uncertain whether it was written and printed *before* or *after* your book was published. The line of argument is precisely the same as that in the "Methods of Study", and one book is nothing but an abridged rehash of the other. I was astonished to find that he believes that the same identical species can be and has been created twice over in two separate localities and in two separate geological epochs. Does any other naturalist believe this absurdity? I should have thought that in that case the theory of Chances might have taught him that we should be as likely to find recent species in the Devonian as in the Pliocene strata, & that we might

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9 *Christ's College, Cambridge University*
10 *Thomas Jay*
11 *Thaddeus W. Harris (1795-1856) U.S. entomologist*
12 *Karl Theodor Ernst von Siebold (1804-85), German zoologist*
13 *"Great is the truth and it shall prevail."*
14 *Alexander Agassiz (1835-1910), U.S. zoologist, son of Jean Louis Agassiz*
15 Essay on Classification *(1857)*

expect to meet with as many European species in Australia as in North America. He gives me the impression all the time of a dishonest lawyer pettifogging a hard case. Sometimes he won't have it that there are *any* identical species in successive geologic epochs—this was what he asserted roundly in a lecture which he delivered last year in Rock Island & what he asserts by implication in the "Methods of Study"—& sometimes he says that there are identical species in two distinct geological epochs, but that there was a separate creation for each batch. This reminds one of the Western lawyer, whose client was sued for a kettle which he had borrowed and with a large crack in it, and who put in three pleas: 1st that his client had never borrowed the kettle, 2nd that it was already cracked when he borrowed it, & 3rd that it was perfectly sound when he returned it.

I was also much amused to find how he and I, from exactly the same premises, arrive at very opposite conclusions. Because animals have every mental faculty that Man has, only developed to a less degree, *I* draw the conclusion that neither men & animals have any souls, and *he* draws the conclusion that both men and animals have got souls, which can and will exist in a future elysium independently of their bodies. In that case, if we calculate up all the animals that have ever existed since Paleozoic times, the Agassizian elysium would have to be a pretty large one to hold all their souls. His idea of the soul of a Naturalist studying the souls of his favorite groups of animals—I suppose Aggasiz will devote himself to the souls of Turtles and Fish—reminded me of a French parody of Virgil, which represented the soul of a Coachman in the Elysian shades busily cleaning the soul of a Coach with the Soul of a brush. I have no possible chance out in this uncivilized region to get a sight of Bate's Paper in Mimetic Lepidoptera; when you see him, I wish you would tell him from me that I would be much obliged by anything from his pen. I have seen a review of his Book on the Amazonian insects[16] in Silliman's Journal a year or two ago, and was much interested in it. . . .

Ever yours very truly

P. S. I was glad to see the other day that you have the R.S. medal. [17]

Darwin to Walsh:

March 27 [1865]

I have been much interested by your letter. I received your former paper on Phytophagic unity, most of which was new to me. I have since received your paper on willow-galls: this has been very opportune as I wanted to learn a little about galls. There was much in this paper which has interested me extremely, on gradations and so forth and "your" unity of correlation [illegible]. This latter subject is nearly new to me, though I collected many years ago some such case with birds; but what struck me most was when a bird–genus inhabits two continents the two sections sometimes display a somewhat different type of colouring. I should like to hear whether this does not occur with widely ranging insect genera. . . .

With respect to Dimorphism you may like to hear that Dr. Hooker[18] tells me that a dioicous parasitic plant allied to Rafflesia has its 2 sexes parasitic on 2 distinct species of the same genus of plants; so look out for some such case in the 2 forms of Cynips. I have posted to you copies of my papers on Dimorphism. . . .

With respect to Aggasiz the views there were many, and there are still not a few, who believe that the same species is created on many spots. I wrote to Bates and he will send you his mimetic paper, and I dare say others: he is a first rate man.

Your case of the wingless insects near the Rocky Mountains is extremely curious: I am sure I have heard of some such case in the Old World, I think in the Caucasus. Would not my argument about wingless insular insects perhaps apply to truly Alpine insects; for would it not be destruction to them to be blown from their proper home? I should like to write on many points at greater length to you, but I have no strength to spare. . . .

Darwin to Walsh:

July 9 [1865]

I must send you a line to thank you for your interesting letter of May 29th.

I have been ill during the last two months and have done no scientific work.

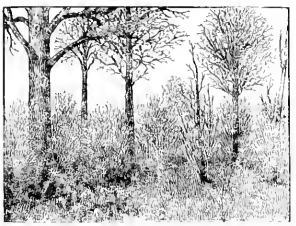
---

16 The Naturalist on the River Amazons (1863)
17 The Royal Society medal
18 Sir Joseph Dalton Hooker (1817–1911), botanist

Many thanks for the case of Panagaeus; this genus is almost sacred to me from old Cambridge recollections.

I sent you a few weeks ago a paper by me on Climbing Plants; but I doubt whether you will find it worth reading.

I am very much pleased that you like Bates' paper. Pray read his Travels.[19] . . .



Darwin to Walsh:

December 19 [1865]

I am much obliged for your interesting letter of Nov. 12—I hope you meet with the success which you well deserve in solving the very curious problem of the Cynips.

I presume that you expect that the sexual brood, whenever it appears, would be more locomotive, and thus spread the species. On the other hand, the new gall which has appeared in England recently has spread very rapidly, & yet only females have been found. I received your paper on the potatoe bug and it seems to me uncommonly well done. Sir I. Lubbock and Mr. Busk called here the other day and neither knew or believed in the male Daphnia[20] laying eggs. The former would be almost sure to have heard of it. He believes in Wagner's case of the breeding larva of the fly. I should not be very much astonished at the Daphnia case, for certain male and female Medusae *whilst sexually mature* throw off reproductive buds and if these buds were encased in a shell, they might be as indistinguishable from true eggs as the ovules and buds in Aphis.

It is curious about the post office that I some months ago was expressing much indignation at your government being so particular about writing in, and sending, single pamphlets. There are no such rules within England and it seems that they apply only to the transit from one country to the other.

I have done no work since April owing to my health, but I have just begun some easy jobs, such as counting seeds of experimental Primulas,[21] and these afford widely different results from what he gives. I mention this because I see that you quote him. . . .

Walsh to Darwin:

March 13, 1866

I send you herewith a copy of a recent Paper for yourself, & another for Mr. Wallace,[22] which I must beg you to forward to him. I do not know & cannot find out his address, or I would not put you to this trouble. He was kind enough to send me a copy of his Memoir on the *Malayan Papilionidae*,[23] which I am highly delighted with. . . .

P. S. Do you know anything of a Quaker gentleman, "Mr. Wilson Armistead, Virginia House, Leeds?" He sent me a circular and a letter, stating that he was about to publish an illustrated Book on the Galls of the whole world & soliciting assistance. I answered him by Mail last autumn, & afterwards on Oct. 13, 1865 sent him through the Smithsonian Institution a large Box containing specimens of Galls. Since then I have not heard a word from him which does not strike me as particularly polite. But perhaps he is sick or dead. He stated that he was recommended by Prof. Westwood to apply to me. . . .

Walsh to Darwin:

July 17, 1866

I sent you by mail last week a short paper of mine exposing some misquotations of Prof. Dana's, which I hope you have received.

I received in due course your welcome letter of April 20, & was rejoiced to find that you were preparing a new Edition of the Origin. As you are kind enough to promise me a copy, please forward it to me through . . . Baillien Bros. of New York, with whom I deal, to be sent thence to me Express. The Smithsonian Institution is so awfully slow in their operations, that they quite put me out of patience. Curiously enough, the same mail that brought me your last letter brought me also one from Wilson Armistead, saying that he had only just received my box of galls, though I sent it to the Smithsonian the preceding autumn. He was delighted with what I sent, & like Oliver Twist calls out for more. I am gathering together another lot for him. I had sent him two bottles of galls packed in common salt brine,

19 The Naturalist on the River Amazons
20 Genus of freshwater water fleas
21 The primrose genus

22 Alfred Russel Wallace (1823-1913), English naturalist who, independent of Darwin, proposed a theory of natural selection much like that of Darwin
23 Papilionidae is a family of butterflies

by way of experiment, and he says it is a complete success & far superior to alcohol—the chief disadvantage being that it is so vulgarly cheap.

I had a copy sent to me the other day of an "Analysis of Darwin Huxley & Lyell, by Henry A. Dubois, M.D., LL.D. of New York" being a reprint in pamphlet form from the "American Quarterly Church Review", 1865 which by the way I never heard of before. The writer is a beautiful compound of fool & knave & makes some most ludicrous blunders in Natural History, besides accusing you of setting up a new God—yes, a real, personal, omniscient, omnipotent, omnipresent God—called Natural Selection . Hence, one would infer that you must be a Deist. But when he comes to attack Huxley, he tells of "the atheistical view embraced in Darwin's hypothesis"; so that you must be Deist and Atheist both at the same time. "Throw plenty of mud, & some of it is sure to stick." My correspondent (Wm. Edwards of N.Y.) wanted me to review the review; but I thought it answered itself sufficiently, & that anyhow "the game would not pay for the candle."

I believe that I have done some little good, at all events among N.A. entomologists, in the way of converting them to the true philosophical faith in the origin of the species. For I find a great many of them now who take much the same ground as Rev. Herbert, but cannot as yet "go the whole hog," as we say out West.

Have you read Prf. Henry James Clark's[24] book on "Mind in Nature"?[25] He strikes me as having almost as illogical mind as Prof. Aggasiz. From one end to the other of the Book I don't see a single new fact or argument to carry out his thesis, namely that "Mind" exists in nature. But, so far as I am a judge, his original investigations seem very valuable. I never knew before the history of Agassiz's treatment of him. It always puzzled me why there was no titlepage to the first two parts of the "Contributions,"[26] but now I fully understand the why of the wherefore.

You mentioned some time ago the case of a foreign gall-fly having suddenly spread over England. Was it not a species that made its gall on the leaf, so that the leaf and gall together might be blown great distances by the wind? I have often remarked that our "oak-apples" are carried by the wind hundreds of yards with the living insect in them; but the species that make their gall in the twig, so that they are part and parcel of the twig itself, infest the same tree year after year, without spreading, except very slowly indeed to adjoining trees. . . .

24. *U.S. zoologist and botanist (1826-73)*
25. *Published 1865*
26. Contributions to the Natural History of the United States *(1857-63)*
27. *John Murray, London publisher*

Darwin to Walsh:

August 20 [1866]

I am sorry to say that before receiving your letter of July 17th the new edt. of the Origin had been dispatched by Murray[27] for you. I received safely your paper exposing Dana's mis-quotation. I never could persuade myself that there was much or anything in Dana's paper, but I see it is taking effect in the United States.

I have read Prof. Clark's book and was interested by it on psychological principles as shewing how differently two men viz. the writer and the reader can view the same subject. I am heartily glad that you are making progress with your Cynips experiment. The new gall which has spread so wonderfully in England (and about which by the way there was a letter 2 days ago in the Times) is attached not to the leaf but to twigs; so that the bushes are rendered conspicuous in the winter by their numbers. I do not think anyone can define an ovule from a bud; the only difference being, as many now view the case, the former must be fertilized. . . .

Some of the Germans, as Prof. Claus, have been taking up a subject which I am glad of, namely to ascertain the amount in order to test my views, of the individual variability of some of the commoner lower animals; and that they find it very great. . . .

Darwin's study at Down House

FIELD BRIEFS

Museum Veterans Retire

Three veteran members of the Museum staff—Dr. Emmet R. Blake, Dr. Hoshien Tchen, and Harry E. Changnon—retired from their full-time positions at Field Museum on December 1. Together, they have been at Field Museum for a total of ninety years. Dr. Blake, curator of birds since 1955, joined Field Museum in 1935. In 1931-32, however, he had served on the Mandel-Field Museum zoological expedition to Venezuela. Dr. Tchen, consultant in the East Asian collection, has been with the staff since 1954. Harry Changnon came to the Museum in 1940. A reception in honor of the three was held in the President's Room on November 13.

Courtesy *Chicago Tribune*

Above: A fire education and training program was recently completed by approximately 350 Field Museum employees, under the guidance of the Chicago Fire Department's Fire Prevention Bureau. The ten-week course included fire prevention techniques, evaluation and procedures, and familiarity with fire fighting equipment. Extinguishing a rubbish fire are Sam Grove (Department of Exhibition) and Dianne Maurer (Division of Birds).

Lower left: "Man in His Environment" is the broad title of a workshop series conducted usually four times weekly in Chicago schools for 6th, 7th, and 8th grade pupils—and some high school classes—by Raymond Foundation lecturers. Here, lecturer James Bland (lower right) and students of Mozart School prepare to measure lung capacities in a demonstration of the effects of air pollution on lung function. The programs are partially funded by the National Endowment for the Humanities.

Lower right: Thomas E. Donnelley, II, (left), Field Museum trustee, accepts a "Have a Great Chicago" button from Frank C. Sain, president of the Chicago Convention and Tourism Bureau, Inc. Donnelley was one of ten Chicago museum officials to pledge his support to the bureau's new hospitality program.

Photo by John Bayalis

Bob Martin, Field Museum exhibit designer, explains an exhibition hall model to three members of the advisory committee. Contemporary African Arts Festival: Mrs. Charles Benton (2nd left), committee co-chairman; Mrs. Hazel Renfroe Huggins (2nd right), and Mrs. Claude A. Barnett, who is also a member of the Women's Board of Field Museum. The exhibition hall will feature the Contemporary African Arts Festival, scheduled to open this spring.

. . . Where Credit Is Due

Who took those marvelous pictures for the *Bulletin's* calendar issue?" is a question the editors have been answering since the December issue came off the press. Their appreciation and thanks go to Maude Wahlman, Museum consultant in African ethnology, for the January, April, May, August, October, November, and December photos; to Herta Newton, professional photographer and Museum volunteer, for February and June; to Museum photographer John Bayalis for March and September; and to Dave Berglund, also a professional photographer and Museum volunteer, for July. Their combined talent helped make the 1974 calendar issue the best one yet.

Associate Curators Promoted

Three staff appointments to curator, effective January 1, 1974, have been announced by Dr. Robert F. Inger, assistant director, science and education. Dr. John Clark, with Field Museum since 1963, has been promoted to curator of sedimentary petrology. Dr. Glen H. Cole, who joined the Museum in 1965, has been promoted to curator of prehistory. Dr. William D. Turnbull, a Museum staff member since 1946, has been named curator of fossil mammals.

New Faces in Exhibition

Recent appointments to Field Museum's Department of Exhibition include Victor M. Banks, senior script writer and script supervisor; and William G. Pasek, production supervisor and administrative assistant to department chairman Lothar Witteborg. Mr. Banks is a native of Chicago and holds a B.S. degree in English and natural sciences from the University of Wisconsin, Madison. Mr. Pasek, a native of St. Louis, holds a B.F.A. in advertising design and art history from Washington University, St. Louis. Barbara J. Bryant, technical assistant; Kathleen L. Sorokin, secretary; and Susan N. Breck, clerk typist, have also recently joined the department.

Richard W. Roesener, with the department since 1969, was recently promoted to chief scientific illustrator. Patricia J. Brew, who joined the staff in 1972, has been named junior graphic designer. Richard Pearson, with the department since 1971, has moved up to chief preparator.

At a recent Capital Campaign luncheon hosted by Marshall Field, Museum Women's Board members (from left) Mrs. Vernon Armour and Mrs. Samuel R. Rosenthal view a drawing of the Museum's north entrance with Museum Director E. Leland Webber. More than two million dollars must still be raised by the Museum before the $25 million campaign is scheduled to end in September. Meanwhile several renovation projects are underway or have been completed.

Photo by John Ba...

Why museums collect specimens

Dear Mr. Traylor

I have noted what I would consider an omission in the November, 1973, issue of the *Bulletin*. In his article "Can These Birds Survive," David Walsten describes birds currently listed as "endangered" by the U.S. Fish and Wildlife Service or by the International Union for Conservation of Nature and Natural Resources. He cites mainly human agency-related causes such as DDT, over-hunting, and the destruction of natural habitat as the causes of species demise. Perhaps one cause not mentioned by Walsten is "collecting."

In the "Field Briefs" section of the aforementioned *Bulletin* you are shown examining birds recently received from Bolivia. To quote the article, "The birds in the shipment represented about 35 families and more than 100 species including some that are new to the Museum's collection." It occurred to me that one of the reasons some of the birds were not previously found in the Museum collection might be that the species is quite rare. If this were the case, the depredation of an overzealous collector could diminish a species by destroying several pairs for the Museum collection. True, we now have a valuable addition to our Museum but in my opinion, a bird in the bush is worth two in the hand. It would be better to ensnare a bird for a zoological collection, let it live its normal life span, and perhaps reproduce before it is "collected" for the museum. I understand that museum expeditions are not authorized to slaughter the fauna of a given area, but what controls are placed on expedition members? How does one determine in the field that his collecting is not hastening the destruction of a species? Perhaps you could advise me how collecting is done with discretion to avoid overkill of a rare or unknown species.

James M. Martens
Chicago, Illinois

Dear Mr. Martens:
Thank you for your interest in our *Bulletin* and in the problem of rare or endangered species of birds. The question of the role of collecting in the decimation of species has been raised before, and it certainly deserves consideration.

To look first at the overall picture, the impact of scientific collecting on the total numbers of birds is essentially zero. The total number of specimens in collections in the United States, amassed over a period of 150 years, is accurately estimated at 4,000,000; this seems a large figure until one realizes that an equal number of mallards—a single species—are killed annually by hunters, and that an estimated 1,600 million birds migrate from Europe to Africa every fall (comparable estimates for North America would be about the same). Another way of looking at it is that every pair of birds that nests in the spring produces an average of two young, so that to maintain a constant population, 50 percent of all birds must die each year, by starvation, old age, accident,or are eaten by predators.

This, of course, does not answer your question about the impact of collecting on rare tropical birds. First, we do not send irresponsible collectors into the field. All of them are trained biologists with an interest in conserving species. Roy Steinbach is the third generation of a family that has added enormously to our knowledge of the avifauna of Bolivia. He is under strict orders not to collect any species that is known to be endangered, and there is a limit of six pairs placed upon his collections of other species. Since the population of any species that is naturally rare, such as the Kirtland's warbler, numbers 1,000 or more, this is still a modest figure.

While the collection of live specimens for breeding in zoos is being tried for a few spectacular species such as the whooping crane, it is a terribly wasteful procedure for small insectivorous birds. Attempts to find the right diet to maintain them in the field, and the trauma of transporting them to a different environment results in a high rate of loss.

Probably the best protection for the birds in this or any other country is the realization by both scientists and laymen that it is in everyone's interest to maintain the natural environment in an undisturbed state so that we can understand how the ecology really works. We must collect in order to know what constitutes the fauna, and selective collecting will not disturb it.

Melvin A. Traylor
Head, Bird Division

Mr. Traylor further discusses the need for collecting specimens:

First and foremost, we need collections in order to know what kinds of animals (and plants) exist. Until the animals have been classified, described and named, the ecologist has no basis for his study of the interrelationships of various organisms or of the effects of pesticides or other pollutants, the parasitologist can not determine the hosts of his various parasites; nor can the epidemiologist describe the carriers of various dieseas. All such scientists need the names and identifications of the taxonomists in order to communicate the results of their own studies. Secondly, we need extensive collections from all regions so that we can know the ranges of each species and the composition of the animal life in different habitats and major geographical areas. The knowledge, in conjunction with the classification based on these same specimens, should enable us eventually to reconstruct the evolution of our modern species. And not unimportant, collections help us to answer that inquiry, "What is the bird in my back yard?"

Melvin A. Traylor

Commendations and fond memories

Dear Field Museum Staff:

May I send my personal commendations and thanks for the splendid issues of the *Bulletin* and your daily efforts in behalf of the Museum—Happy Thanksgiving!

I regret that the memorable "Members' Night" will not be a part of this year's memories; nevertheless, I shall treasure those of years past. Thank you for those!

Now I am a resident of Oklahoma, and the monthly *Bulletin* is very eagerly anticipated! . . . Thank you again for all the marvelous hours through almost fifty years that I have shared in the Museum with my very dear family, and my friends—which includes you!

Ruth M. McReynolds
Bartlesville, Oklahoma

CALENDAR

Exhibits

Continuing

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature; "A Sense of History" presents a graphic portrayal of the Museum's past; and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

Children's Program

Continuing

Winter Journey for Children, "Desert People of the Southwest," focuses on the cultures of the Native Americans. The free self-guided tour provides youngsters with a unique learning experience as they become acquainted with Museum exhibits. All boys and girls who can read and write may join in the activity. Journey sheets available at entrances. Through February 28.

Meetings

January 7, 2:00 p.m., Chicago Shell Club.

January 8, 8:00 p.m., Chicagoland Glider Council.

January 9, 7:00 p.m., Chicago Ornithological Society.

January 18, 7:30 p.m., Chicago Anthropological Society.

Coming in February

Sunday, February 3

"The Living Jungle," free wildlife film narrated by Greg McMillan, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

Opens February 14

"Janss Underwater Photography," an exhibit of exciting color prints and marine specimens. Hall 9

Sunday, February 10 and 17

The 29th Chicago International Exhibition of Nature Photography, a slide show featuring winning and accepted color transparencies, at 2:30 p.m. in the James Simpson Theatre.

Sunday, February 24

"Small World," free wildlife film narrated by Fran William Hall, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

Hours

9:00 a.m. to 4:00 p.m. Monday through Thursday, 9:00 a.m. to 9:00 p.m. Friday, and 9:00 a.m. to 5:00 p.m. Saturday and Sunday

Closed New Year's Day

The Museum Library is open 9:00 a.m. to 4:00 p.m., Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

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Managing Editor
Editor
Staff Writer
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Field Museum of Natural History
Director

COVER

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Four-year-old Kathy Schneider of New York City wears an air pollution mask to dramatize the need for cleaner air. The mask does nothing, however, to filter out carbon monoxide. The earth's total vegetation, represented by Kathy's peony, releases far more of this gas —during growth and decay— than all man-made machines. (United Press Photo)

CARBON MONOXIDE

the bright side to the pollution coin

by Edward J. Olsen

From the outset of the environmental preservation movement in the United States we have been repeatedly badgered by statements and statistics that worry and frighten us over the current quality of our lives—with gloomy prognoses unless decisive action is taken. Most people feel helpless in the face of statements in the media that warn of noxious chemical compounds, about which they know little or nothing and over which they can exercise practically no personal control. On the face of it, it seems as if there is nothing but horrendous statistics and "bad guys."

Environmentalism was, a few years ago, an "in" thing, especially popular among the young, who formed hundreds of chapters of "Earth Clubs" nationwide. Most of this youthful enthusiasm has of course drained away leaving, as usual, a hard nucleus of individuals in universities, government, and private sectors who have continued in methodical fashion to tackle the difficult problems and gradually effect changes where necessary. One of the results of the research of such groups has been the measurement and accurate assessment of pollutants, replacing the often inaccurate "guesstimates" of earlier environmentalists.

Dr. Edward J. Olsen is curator of mineralogy

Some years ago we were horrified to hear the more vocal (and emotional) environmental advocates tell us that we were releasing, annually, 270 million tons of the gas carbon monoxide (CO) into our atmosphere. The atmosphere was carrying an amount of some 530 million tons. Thus, man was creating an annual input of about 51 percent of the amount the atmosphere was holding—a truly frightening figure! Most of this gas can be directly attributed to automotive exhausts, for CO is produced by the incomplete combustion of gasoline in auto engines. It is also produced in most industrial fuel burning and from home heating plants. CO is, as we all know, a highly poisonous gas. Thus, it appeared we were pumping the major percentage of a highly toxic gas into the atmosphere; the implied result was clear.

Beyond these few superficialities we knew little. We did not have records of the CO content of the atmosphere over long spans of time, especially from pre-automotive and pre-industrial times. We did not know of any major producers of this gas on earth other than ourselves. The first major effort was an attempt to reduce CO emissions from auto engines, as well as other auto exhaust gases. The result has been, as we all know, several yards of tubes and pipes, plus other makeshift gadgetry on newer auto engines, that cause them to balk and lurch, and to reduce mileage by two or three miles per gallon. The new equipment has, however, reduced CO emissions along with a large variety of other noxious gases. These measures have turned a basically polluting engine into a less polluting one, at the price of poorer efficiency and operation. The point was to buy time until a clean and efficient engine could be developed.

Japanese policemen measure CO content of auto exhaust in downtown Tokyo. Emissions from autos and other man-made sources account for only about 6.5% of the CO produced on earth (United Press International Photo)

Several years ago it became obvious that good quantitative values for sources of CO were needed. Two research groups at Argonne National Laboratory, headed by Drs. Charles M. Stevens and Henry L. Crespi, began the difficult task. The compound CO consists of one carbon atom attached to one oxygen atom. It has been known for a long time that a small percentage of natural carbon atoms weigh slightly more than others: most weigh 12 units of weight, but some weigh 13 units. These are called "carbon-12" and "carbon-13," respectively. Similarly, oxygen comes in several natural weights of which oxygen-16 and oxygen-18 are the most important. Thus, it is possible for CO to have four different molecular weights—28, 29, 30, 31—depending on whether the carbon atom weighs 12 or 13 and the associated oxygen atom weighs 16 or 18. A given source of CO can produce different combinations, or mixtures, of these four weights and the research teams hoped to be able to associate specific sources with measured mixtures.

Air samples were collected in a wide variety of places: swamps, farmlands, air-collecting bags clamped over living tree branches, within cities, in forests, etc., and at different times of the year. Although the air analysis procedure was fairly straightforward it was extremely tedious, which is certainly one of the reasons it had never been accomplished before the environmental hue-and-cry began.

The results were rather startling. It turned out that five mixtures were identifiable with distinctly characterized CO. Two of the mixtures are found everywhere in the world and may be attributed to the formation of CO from methane (CH_4), popularly known as "swamp gas." Methane is produced by vegetation not only in swamps but

Above, *swamps, rice paddies, and other places where vegetation decomposes in wet or moist conditions produce methane which, in turn, reacts with air to yield about 3 billion tons of CO each year—about 73% of the total put into the earth's atmosphere. (United Press Photo)*

Left, *the living leaves of green plants produce about 200 million tons of CO annually—about 4.9% of the total put into the earth's atmosphere. (United Press International Photo)*

also in damp forests, wet fields, and wherever plant matter decomposes under still water or highly moist conditions. One acre of rice paddy, for example, produces about 3,000 pounds of methane each year, and this will react with air to produce over 5,000 pounds of CO. On a worldwide basis *over 3 billion tons* of CO are produced in this way.

A third mixture appears to result from the living leaves of green plants. This accounts for about *200 million tons* of CO each year, all of which is generated during the summer months

A fourth mixture occurs as a burst of CO during the autumn months, producing up to *500 million tons* in a six-week period. This mixture is identified as the CO produced by the decay of chlorophyll when the autumn leaves turn brown and fall.

A fifth mixture can be definitely related to the CO produced by automotive gases and other man-made sources This mixture accounts for about *270 million tons* each year, and is especially enhanced during the winter months by the burning of oil, gas, and coal in the heating of homes and larger buildings.

If you have been keeping score you will have already come to an unexpected conclusion. From the five mixtures we can account for the production of about *3.9 billion tons* of CO annually. This is certainly an underestimate because the study did not include sampling of production by the myriad microorganisms that populate the waters of the open oceans. The Naval Research Laboratory of Washington, D.C. estimates the annual production from this source at *150 million tons*. Thus, the grand total is close to *4.1 billion tons*, of which human sources account for only 270 million tons or only 6.5 percent! Therefore, man's production of this gas has only a small effect on the total CO balance of the earth's atmosphere.

The balance is clearly related to larger natural forces. The atmospheric load of CO is, as stated earlier, about 530 million tons. This balance is called the "steady state" of CO. The steady state can perhaps best be explained by comparing it to a normal five-gallon bucket, with a hole in the bottom. If you let water trickle into the bucket it will trickle out the hole just as fast, and the actual water content of the bucket will be zero. If, however, you let the water pour in at a higher rate, the rate at which it pours out the hole will keep increasing until the outflow rate exactly equals the inflow rate. The bucket will then have a constant depth

of water. This is called the steady state amount.

Let us suppose, for example, this amount is four gallons. Let's further suppose the inflow rate (= outflow rate) is three gallons per minute. The inflow rate is equal to 75 percent of the steady state amount each minute. Thus, the inflow can be a large percentage of the content of the bucket. It can even be many times greater than 100 percent depending on the inflow rate and the size of the hole out of which the water is pouring. This is analogous to the annual man-made production of about 51 percent of the steady state content of CO in the atmosphere. The percentages appear impressive, but they do not tell the whole story.

It is clear that if 4.1 billion tons of CO are being put into the atmosphere each year, and the steady state amount is only 530 million tons, then around 3.6 billion tons of it are being broken down each year. The fate of the CO molecule is its conversion to carbon dioxide (CO_2), which is a nontoxic gas. The chemical processes in the atmosphere that convert CO to CO_2 are extremely fast—faster than imagined heretofore. The life expectancy of an average CO molecule depends on the season, about 40 days in the winter and only 10 days in the summer.

The man-made production of CO, then, is an insignificant factor in the amount of this toxic gas in the atmosphere. It is controlled primarily by the natural biological environment, and the steady state amount in the atmosphere would be little different if mankind ceased to exist. It is clear now that man himself evolved in an environment that contained about the same steady state amount of CO, and his tolerance for it in that amount and its seasonal variations must necessarily be a part of his evolutionary heritage.

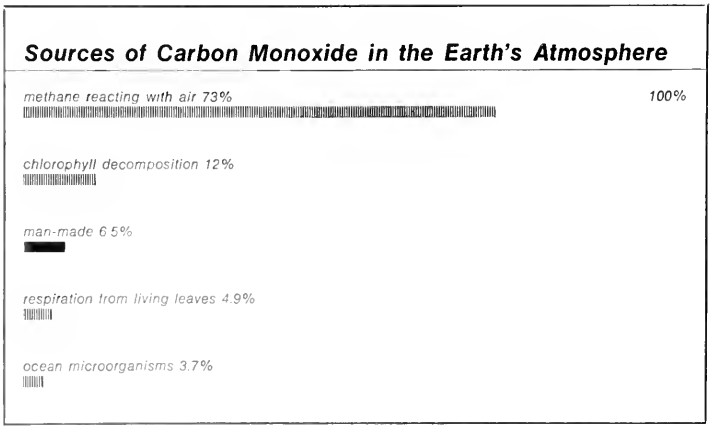
This is not to say that CO is not a hazard under many circumstances. Before it disperses and decomposes it can be concentrated in toxic or near toxic amounts. Certainly during rush hours at street level on major avenues in the "canyons" of Chicago, New York, and other large cities CO can temporarily rise to serious levels. Weather conditions can occasionally retard the dispersal of auto exhaust for several days. These are the smog alert periods cities experience so often, especially in the summer months. For this reason the emission controls on automobiles are desirable.

It should also be mentioned that the conversion of toxic CO to nontoxic CO_2 is only a mixed blessing. Man, as we have seen, is putting very little of the total CO into the atmosphere, and the conversion of this small input to CO_2 is correspondingly small; 270 million tons of CO will ultimately produce only about 420 million tons of CO_2. Natural biological sources are producing over 6 billion tons of CO_2 from CO each year.

The problem arises, however, that man is directly adding major amounts of CO_2 to the atmosphere, *not* by the CO route. The same fuels that produce CO also produce many, many times more CO_2; it is a product of complete combustion of fuels. Consequently, the CO_2 content of the atmosphere has shown a continuous rise of about 0.2 percent per year for almost two decades. Clearly, the input rate is exceeding the rate at which CO_2 can be itself removed, mainly by plants, absorption into soil, and absorption into oceans and lakes. A steady state amount has not been attainable. This is analogous to pouring water into our leaky bucket at a rate faster than the leak can possibly let it out—it turns into a runaway state in which the bucket overflows. CO_2 is not toxic; however, it has other effects.

CO_2 acts to retard the radiation of heat from the sun's rays back into space. This could mean a gradual build-up in heat in the atmosphere, the so-called "greenhouse effect." The ultimate result could be a gradual worldwide climatic change that would

(Concluded on page 14)



Yarrington Elected 7th Museum President

Blaine J. Yarrington, Field Museum trustee since 1970 and chairman of the Corporate and Foundation Division of the Museum's $25-million Capital Campaign, was elected president of the Museum by the Board of Trustees at its meeting January 21. He succeeds Remick McDowell, who is retiring.

Yarrington, president of Amoco Oil Company, a subsidiary of Standard Oil Company (Indiana), is a native of Albany, Missouri. Just before his 20th birthday, in 1938, he joined Standard at St. Joseph, Missouri. After advancing through a series of positions, he was named district manager at Joliet, Illinois, in 1960.

In 1961, Yarrington became New York Regional Manager for American Oil Company (now Amoco). Three years later he returned to the General Office in Chicago and in 1965 was elected a vice president of Standard, responsible for world-wide coordination of marketing, distribution, transportation, crude oil and product supply, and purchasing.

Elected executive vice president of American Oil in 1967, Yarrington was responsible for marketing, manufacturing, transportation, purchasing, and traffic. After becoming president of American Oil in 1970, he was elected a director of Standard Oil Company (Indiana).
In addition to serving as president of the National 4-H Service Committee, Inc., Yarrington

Yarrington

is a member of the boards of Continental Illinois National Bank and the Continental Illinois Corporation, the Bank and Trust Company of Arlington Heights, the Chicago Association of Commerce and Industry, Illinois Manufacturers Association, Chicago Metropolitan Area of the National Alliance of Businessmen, and the Community Fund of Chicago. He is also a member of the Business Advisory Council of the Chicago Urban League, among his other associations.

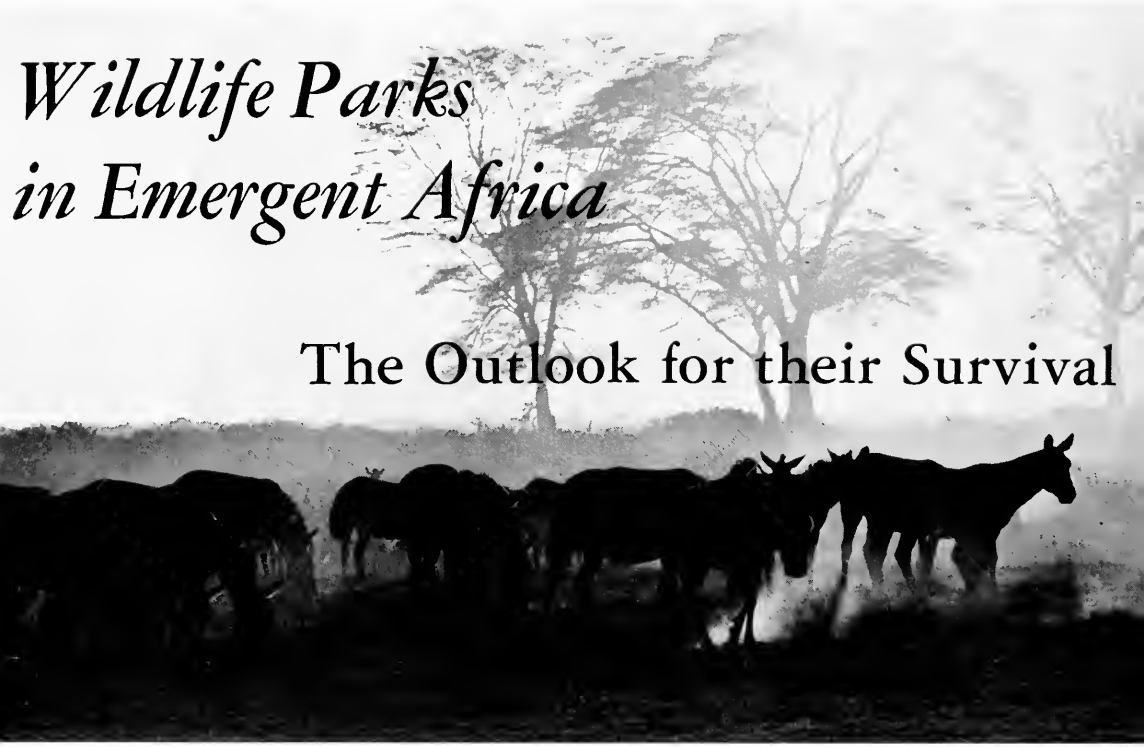
McDowell, who has served as president of the Museum since 1969 and trustee since 1966, also retired last month from his position as chairman of the executive committee of Peoples Gas Company. He will continue as a trustee of Field Museum.

Other officers elected at the Museum's annual meeting include the following vice presidents: William G. Swartchild Jr., for program planning and evaluation; Bowen Blair, resource planning and development; Thomas E. Donnelley II, public affairs; Julian B. Wilkins, facilities planning; and William L. Searle, internal affairs. Also elected were Edward Byron Smith, treasurer, and John S. Runnells, secretary.

McDowell

Wildlife Parks in Emergent Africa

The Outlook for their Survival



Photographs by the author

Naturalists have for years attempted to preserve samples of natural ecologies in order that man in his eagerness to "develop" our planet would not, in the process, destroy all natural systems. In the developed countries such destruction has proceeded almost unabated. Usually this process has occurred without our having any understanding of what was being destroyed—let alone whether it might be to man's advantage for it to be left alone. We have come to realize that most of the world's ecological systems are so intricate and extensive in their interrelationships, and in such delicate balance, that merely isolating relatively small segments of the earth's surface and thus attempting to preserve them will not alone suffice. Furthermore, those few areas that have been in all good conscience set aside are forever subject to man's unique penchant for "development."

Dr. Norman Myers, an ecologist and a consultant in conservation biology in Kenya, is eminently aware of these problems. He proposes some unusual solutions. While unconventional and contrary in some respects to traditional approaches, his proposals are worthy of consideration. He has expounded his ideas at length in an essay in Science *(Dec. 22, 1972). This article so intrigued me that I sought out Dr. Myers while in Kenya last year to see if he might provide Museum members with some further perspective on wildlife conservation via the Museum* Bulletin. *His thought-provoking essay which appears here is necessarily lengthy, for the subject is complex and the attendant problems awesome. But nature lovers must have an intelligent awareness of all sides of these problems if solutions compatible with their interests are to be found. Those who wish to pursue Dr. Myers' ideas further will find his* The Long African Day *(Macmillan, 1972) of interest.*

—Dr. William D. Turnbull, curator of fossil mammals

by Norman Myers

Yellowstone National Park was founded just over one hundred years ago, and together with most other parks of North America it stands a good chance of lasting another hundred years. But the outlook for parks and reserves in the savannah areas of Africa can scarcely be so hopeful. Indeed, one must ask whether they will survive this century.

Nowhere outside Africa is there such a large remnant of the tremendous panoply of mammals that roamed during the Pleistocene (1,000,000 to 10,000 years ago), which in turn comprised the most spectacular array of mammal life the planet has known. The new nations of Africa have been working hard to protect their wildlife heritage. Tanzania, for example, expanded during its first decade of independence (acquired in 1961) its network of parks from one to eight; another three are on the drawing boards. It has been spending a greater slice of its national income on parks than does the United States, and does it with a total annual budget of less than what Californians spend each year when they go sport fishing.

The parks of savannah Africa cover some extensive tracts. In eastern Africa (Kenya, Tanzania, Uganda, and Zambia) the parks total 38,000 square miles—an area the size of New England. Outside this main region, other parks comprise an additional 40,000 square miles. Similar parks have been set up in western Africa, but they are not as significant for conserving wildlife as the great chain of parks along the eastern side. Most African parks are in savannah zones, though other parks protect mountain and marine biotopes. Tsavo Park in Kenya and Kafue Park in Zambia are both over 8,000 square miles in area, Kruger is over 7,000, Serengeti 5,000, Wankie 5,600, Luangwa Valley 5,000, Ruaha 5,000, Kalahari-Gemsbok 8,030, and Virunga (formerly known as Albert or Kivu) 3,000. For comparison, Yellowstone—the largest park in the United States—is 3,400 square miles in area. A number of game reserves in eastern Africa afford adequate protection to wildlife, the most notable being Selous in Tanzania with 15,000 square miles.

"Wildlife Parks in Emergent Africa" is in part adapted from Dr. Myers' "National Parks in Savannah Africa," which appeared in Science, *Vol. 178, pp. 1,255-63, Dec. 22, 1972.*

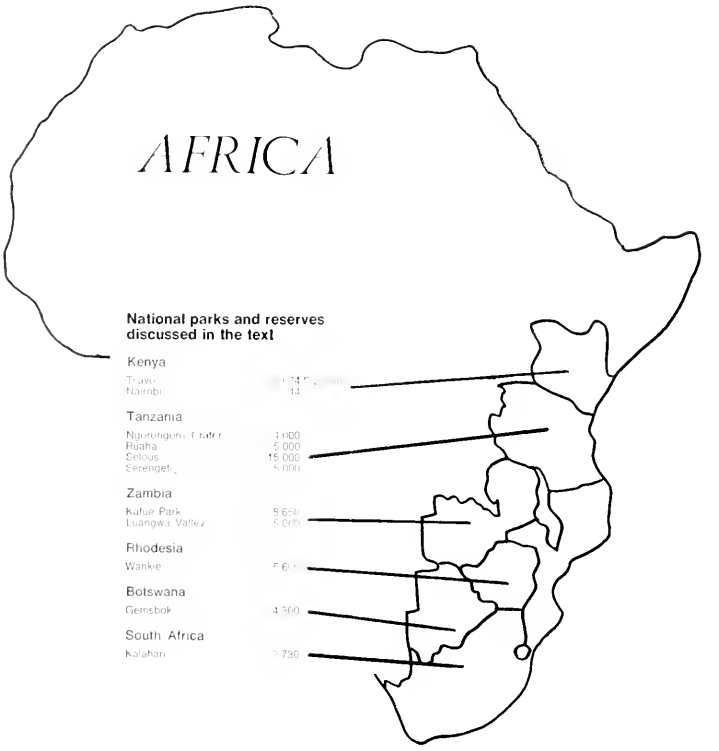
Parks not large enough

But these parks and reserves for the most part are still too small. Their borders were generally established in response to political expediency rather than ecological requirements, with scant regard for the year-round needs of wild herbivores. The huge throngs of wildebeest, zebra, gazelle, and other large mammals now total almost two million in Serengeti Park alone, and the park should be enlarged by one-third or two-thirds in order to meet the long-term needs of its ecosystem. During a recent drought, for instance, the wildebeest migrated 25 miles beyond the park's perimeter in search of fresh grazing and water.

In October, 1973, Nairobi National Park totaled 26,000 herbivores for its 44 square miles, in contrast to its usual population of only 4,000 herbivores. The massive influx came from the hinterland territories, ten times larger than the park itself. Thus, Nairobi Park's ecounit totals almost 450 square miles, and without protection for this wide stretch of the life-support system, the park will not be permanently viable. Nairobi Park, in common with Tsavo, Wankie, Kruger, and a number of other parks, has constructed dams and pumping stations to provide water for wild herbivores during the dry season, hence the seasonal fluctuations in numbers.

In the past, these variations have not mattered much because adequate *lebensraum* was present in the support zone of the environs of the parks. But now savannah Africa is experiencing the biological and economic pressures of its human population, and the response of the two processes in combination is much greater than the arithmetic sum of the two if they worked in isolation. The most fertile areas of Africa now frequently support at least 500 human cultivators per square mile, and in some areas 1,500 to 2,000. In spite of high mortality rates, population growth rates in black Africa are among the highest in the world. This means a human spillover from the fertile territories into less suitable but more spacious biomes, notably the savannah grasslands. The process is taking place at extraordinary—and accelerating—rates. Uganda has seen the amount of land available to elephants decline from 70 percent of

Drought in the Serengeti: Gazelles strip leaves from low branches.



the country in 1929, to 17 percent in 1959, to less than 10 percent by 1974. While the overall number of elephants in Uganda is diminishing, the number of elephants in the parks is increasing through immigration.

Complexity of African parks

Moreover, there is some justification for saying that a park in savannah Africa could hardly ever be large enough. In North America and elsewhere in the temperate zones, a wildland ecosystem is generally not so complex or so integrated as those in tropical Africa. A disruption of the workings of Yellowstone or Yosemite, whether within the protected zone or outside, does not set off such significant repercussions throughout the system. An African park, by contrast, features an extreme diversity of animal and plant life; this is what makes it unique. Precisely because of these dynamic aspects, parks in Africa lend themselves much less readily to being put behind "fences," whether on the ground or on a park warden's maps or in the minds of international connoisseurs of parks. An African park ecosystem is more open-ended than the relatively "static" parks in the temperate zones. In addition, North American parks are frequently established to protect wild landscapes as much as to protect wild animals. Not that these factors should be considered merely as limitations on functional management; they can also serve as constraints on creative policy.

In the medium-term, let alone the long-run prospects for parks in Africa, the survival parameters will depend on the extent to which ecological determinants are balanced with socioeconomic factors. This equilibrium must be established and maintained at the interface between "nature's world" and "man's world" (to use two rather imprecise and disputable terms—man is, after all, of "nature," and "nature" is a human concept—but these terms nonetheless serve to point up the two sides of the argument as frequently perceived). In Africa, a reconciliation between ecologic and economic factors must recognize that tropical environments feature great productivity and great vulnerability. In addition to these two aspects to be safeguarded, there are often a dozen additional interests arising from man's immediate and future needs: the needs of human communities in emergent Africa, the needs of conservationists outside Africa, the needs of tourists, of the biotic associations, of the physiographic background, and so forth. When once the conflict is recognized as comprising not merely two sides in direct opposition, but as constituting a spectrum of activities to be accommodated in common accord, then conflict could give way to coordination, allowing the exceptional potential of savannah ecosystems—for meat and money as well as spectacle and science—to be mobilized for man's benefit.

Issues affecting park survival

To tackle this situation, a prerequisite contribution rests in park policy: what is a park supposed to be? what purposes should it serve? One central issue concerns the extent to which park policy at the national level should

be permitted to conflict with what is unique to a particular area. Tsavo Park affords a refuge for one of the last great aggregations of elephants and the only great aggregation of black rhinoceros left on earth. Should it not therefore be managed as a park for these two species, instead of as a duplicate of the spectrum of plains herbivores to be seen in a dozen other parts of Kenya alone? Not, of course, that Tsavo should protect the elephants whatever the cost to other creatures; the first to suffer would probably be the rhinoceros, since it is the only other large browser without a regurgitatory digestive system for extracting as much protein as possible from the plants that it eats. Perhaps the objective should be to aim at as large a number of elephants and rhinoceros as possible, in conjunction with protecting the park's ability to support a variety of "high interest" species and communities.

Serengeti leopard with its kill.

A second issue deals with the notion that wilderness is to be protected from the interfering hand of man, especially modern man. According to this approach, African parks should constitute areas of the earth on which man can look without seeing the reflection of his own image. But in many instances, a policy of excluding man would imply that this should be the first occasion in a very long time that an area has been freed of man's influence. Man is a component, if not the dominant component, of most ecosystems in Africa. The Uganda parks were the scene of human habitations for centuries (if not millenia) until the early part of this century. The site of Nairobi Park was used as a military training ground, for growing wheat, and for leisure riding, until its designation as a park only 25 years ago. Potsherds dating from the time of Christ have been found in Serengeti Park. Indeed, some of the grassland areas with their tremendous throngs of herbivores may have arisen as a result of the extensive practices of pastoralist man, burning away bush to increase forage areas for his livestock, during only the past 5,000 years. The immense concourse of Serengeti animals, two million strong, is a spectacle that was probably afforded to very few of our primitive ancestors of Africa.

To this extent, then, parks should be established not merely to guard against something, namely man and his unwanted works. More positive justifications for parks include the values to science. Ecologists and ethologists can investigate them as "reference points" against which man can measure the effects of his activities in other parts of his living space. All the more is this pertinent when the wildland phenomena to be protected constitute exceptional instances of nature's works.

Supporting parks through tourism

Serengeti Park illustrates the conflicts facing those who frame policies for parks. The park serves a range of overt and covert purposes: encouraging tourism, stimulating the regional economy, serving science, reflecting the national need for revenue or prestige or both, matching the local need for meat and money, serving the world's needs for irreplaceable spectacles, among others—not all of which purposes are compatible. Throughout the 1960s, Tanzania was fortunate in having its network of parks extended, with great energy and foresight, while there was still time and space to do so. But during the 1970s, significant socioeconomic changes are overtaking the country, changes as

"It is not only the African lion that is a marvel of nature in Africa, it is the African ecosystem within which the lion exists in its own distinctive manner."

far-reaching for Serengeti in five years as those that took fifty years in times before the park was established. By the 1980s, there could well be ten times as many visitors to Serengeti as the present 70,000. They would be bringing enough foreign exchange into the country so there would be little doubt as to the most profitable use for Serengeti, provided of course that tourist revenues could be more equitably distributed around the region.

Yet, in the interim, some arrangement is needed to bridge the critical period of the next ten years. As with many other aspects of contemporary life, society badly needs broad-scale schemes to induce people to regard parks as long-term investments: pay now, benefit later. Areas such as Serengeti might well qualify for what the rest of the world could contribute in the way of "cost difference compensation," especially when the rest of the world is insistent that what is at stake is not the Africans' heritage alone. Compensation along these lines might eventually be available under the World Heritage Trust system of parks, protected areas being formulated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

Furthermore, tourism as a support for parks is subject to serious criticisms, by the man living in the park hinterlands or within a game reserve itself. With a monthly income perhaps totalling what a single busload of tourists pays at the park entrance and with a waistline that reveals different nutritional problems from those of the visiting foreigners, he is little interested in foreign exchange. He is little likely to be any more impressed by tourism's impact on the economy than is the American rancher who sees his rangeland disrupted by the Yellowstone elk herds. The African peasant knows a leopard not as a splendid subject for the camera viewfinder but as a beast that may ravage his livestock.

The gate fees of most parks go to the national exchequer, although a portion is sometimes diverted to the district treasury. Game reserves are usually run by the local council, which gets most, if not all, of the revenues. Safari lodge owners and other concessionaires in parks and reserves generally pay a bed levy and various other taxes, some of which go to augment local funds. But these allocations of revenue are rarely what the local man thinks of as local. Amboseli's central sanctuary of 30 square miles has been producing well over half the total income for the 8,000-square-mile district. These profits should allow for dispensaries, schools, and cattle dips all across the landscape for those Masai who have been particularly deprived by tourists' needs; hitherto they have benefited but little from tourist contributions to the district treasury.

Support through game cropping

A more favorable prospect for the local man, as well as for park administrators with an excess wildlife population, is game cropping. The ecological merits of cropping have been documented in detail, and the economic potential of turning wild creatures into meat and trophies is considerable. Cropping, like tourism, need not be an exclusive activity, since it can prove complementary to subsistence or commercial livestock ranching. It can also support rather than conflict with park policies, even if these policies are seen as protecting wilderness for its aesthetic, cultural, and scientific values alone, while on the other hand, cropping is a purely commercial activity. During the 1960s, 20 million pounds of elephant and hippopotamus meat from park cropping projects were put on the market in Uganda. Butchers came from 100 miles away for a product which they knew had a ready market. Presumably the customers with protein-poor diets had few qualms about whether the meat was poached or legally shot, whether it derived from conservation management or from commercial exploitation; they gladly left such deliberations to wilderness moralists.

Cropping can also be highly profitable. An elephant—the most frequent candidate for projects aimed at reducing excess park populations—is worth at least $250. A reduction campaign of 10 percent for the surplus elephants in Tsavo Park would double the present financial allocation for all of Kenya's parks, while a substained-yield harvest of 5 percent per year would triple the total wildlife research budget. (Natural mortality accounts for 7 percent in a stable population.)

These possibilities emphasize the need to view parks as no more than heartlands within broad ranges of supporting territory to permit genetic exchange; to provide protection against disease, and to allow scope for the various dynamic and compensatory factors which constitute what is ultimately unique about African parks. It is not only the African lion that is a marvel of nature in Africa, it is the African ecosystem within which the lion exists in its own unique manner.

The strategy of multiple use of land, as implied by these policy perspectives, is being attempted at the 3,200-square-mile Ngorongoro Conservation Unit in northern Tanzania. Here, a broad range of resources and an integrated strategy attempt to cater not only to wildlife-based activities but to cultivation, pastoralism, and forestry as well. The framework allows for several purely protective practices, such as watershed management. Major objectives are directed at tourism and game cropping, as well as protecting the supreme spectacle of Ngorongoro Crater. The water tables of the 100-square-mile crater are dependent on catchment areas 20 miles beyond its rim, hence the forest resources are exploited in a manner compatible with the crater's interests. This conservation unit thus allows man to manage ecosystems for the two returns he needs from his environments, namely simplicity of food production and enough variety in land forms to protect his own living space. The largest share of the unit's revenues comes from tourism, and that resource base in turn is protected to ensure tourism's continued contributions to the local economy. If the crater were declared a national park, the income would mostly go to the national exchequer in Dar es Salaam, 400 miles away. The conservation unit enjoys virtually all the advantages it did when it was part of Serengeti Park, and seems better fitted to meeting the pressures of the future by being integrated with surrounding land uses. However revolutionary the Ngorongoro strategy may seem to conservationists who like their sanctuaries in neat packages, it is not so very extraordinary to local people who have long combined various forms of land use. What seems revolutionary to them, if not regrettable, is the idea of parks in segregated segments.

For single park authority

Those wildlife tracts which are already designated as parks could receive better protection if the park were integrated with a regional management plan, operating under a single conservation authority. The hinterland would constitute a buffer zone where game cropping and sport hunting could take place. The environs would thus afford the park a breathing space, instead of a no-man's land "noose" constricting the park's life-support systems. Radiating from the park at the center, with its policy of minimal interference by man, would be zones of increasingly intensive subsistence and commercial activities, such as those now threatening the ultimate survival of the parks. The park itself would continue, with little modification of its basic purpose other than

Elephants and a water buffalo share a water hole.

Viewing parks as natural resource ecosystems, rather than as places of refuge, would allow a start on the mobilization of all exploitable resources for local human communities of emergent Africa. This measure would anticipate the times when such huge tracts of land as parks and reserves in savannah Africa will have to justify their existence by meeting local needs. This stage will arrive soon enough, and parks must accept the new situation, if they are not to vanish altogether within a few decades. Multiple-purpose units, such as are proposed in this article, would still leave scope for the purist spectator to experience wild nature, undefiled by man's hand.

In the main, the institutional framework known as "national park" does not allow park managers to deploy the full range of conservationist techniques for protecting wildland resources. But a park must be considered a regional as well as a national entity. In Africa a park could never have perfect boundaries, since the ecosystems show too much flux in their workings from one season to the next. Human institutions, by contrast, tend to be inflexible, to emphasize boundaries of local authority and to encourage administrative autonomy. Man must strive to interfere as little as possible with "given" ecological factors such as the locality of the Serengeti migration. But wildlife parks are, like any institution contrived by man, subject to changes dictated by his biological and economic requirements. All the more, then, should park boundaries be flexible in concept in order to match the dynamics of park ecosystems.

CARBON MONOXIDE *(from p. 6)*

result in the atmosphere becoming intolerably hot. There would be many associated repercussions—for example, the surface would be drier with much water held in permanent clouds, creating worldwide drought.

Since CO_2 is considered today to be a "clean" product of fossil fuel burning, the development of engines that more completely burn fuels and generate more and more of it, though nontoxic in itself, will not be a blessing in the long run. Use of fossil fuels must reach a plateau, preferably a lower one than at present, and other energy sources that produce no carbon-bearing compounds must be developed.

The facts about CO are, nevertheless, of immediate interest. The earlier environmentalists were wrong in their estimates of the importance of the man-made input of it into the atmosphere. They served, however, a useful function in raising the cry against it. The research that followed has laid to rest the large-scale and long-term effects of CO as a pollutant (except on a local scale for short periods, as mentioned above). Were it not for the environmental concerns of the few, specific figures on the various sources of CO might never have been forthcoming.

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Fieldiana publications may be ordered directly from the Field Museum Division of Publications.

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"Hoffmannias from Mexico and Central America," by Louis O. Williams. Vol. 36, no. 6. $0.75.

Geology *Fieldiana*

"Large Upper Devonian Arthrodires from Iran," by Hans-Peter Schultze. Vol 23, no. 5. $1.50.

"Catalogue of Type and Referred Specimens of Fossil Corals in Field Museum of Natural History," by P. N. Windle, R. M. Augustynek, and M. H. Nitecki. Vol. 32. $5.00.

"New *Archaeoscyphia* (Porifera) from the Ordovician of Anticosti Island, Quebec," by J. K. Rigby and M. H. Nitecki. Vol. 33, no. 1. $0.75.

"Osteology, Function and Evolution of the Trematopsid (Amphibia: Labyrinthodontia) Nasal Region," by John R. Bolt. Vol. 33, no. 2. Price to be announced

Zoology *Fieldiana*

"Cave Beetles of the Genus *Pseudanophthalmus* (Coleoptera, Carabidae) from the Kentucky Bluegrass and Vicinity," by Carl H. Krekeler. Vol. 62, no. 4. $2.75.

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"A New Genus and Species of Quill Mites (Acarina: Syringophilidae) from *Colinus virginianus* (Galliformes: Phasianidae) with Notes on Developmental Chaetotaxy," by John B. Kethley. Vol. 65, no. 1. $0.75.

Field Museum's Members' Tours to Grand Canyon and the Ozarks

Grand Canyon Geology Field Trip

August 16-24, 1974

A nine-day course on the geology of the Grand Canyon region will be conducted by Dr. Matthew H. Nitecki, associate curator, Department of Geology, while traveling down the Colorado River on rubber rafts.

This exciting study will be concerned with all aspects of geology, but will stress the geological history of the area, which encompasses almost one-third of the earth's history, volcanics, sedimentation, paleontology, metamorphism, and erosion. The trip will be very rigorous and no luxuries will be provided. Half-day geological inner-canyon hikes up to four miles are also planned. Camping out will be without tents and under the stars. Excellent meals will be prepared by the boat crew.

A pre-trip evening meeting at Field Museum will be scheduled for participants.

Cost of the course is $700.00, which includes all expenses (air fare, boat fare, meals, and one night's lodging (double occupancy). Camping supplies (sleeping bags, blankets, etc.) will not be furnished; these may be rented at destination for an additional $20.

For further information, please write or phone Mrs. Madge Jacobs, 922-9410, or use the coupon.

Please reserve . . . place(s) on Field Museum's Grand Canyon Trip.
Enclosed is check for $200 deposit per person,
or $ . . . .
I would also like to reserve camping equipment
for . . . person(s).

Ozarks of Missouri Geology Field Trip

April 7-13, 1974

This is a geological field trip led by Dr. Matthew H. Nitecki, associate curator, Department of Geology, with hiking in the countryside and over the hills. It is also an excursion, with transportation, accommodations, and good food. The trip will include four long hikes, for which appropriate clothing is required.

The beautiful Ozarks region is a diversified geological area that consists of igneous and sedimentary rocks. The oldest igneous rocks and granites were once molten, and are at least one billion years old. The region was often covered by a sea, into which sediments were deposited, which later became rocks. Other geological processes produced deposits of minable ores, particularly lead and iron. A wide variety of geological phenomena will be studied in the field, and fossils and minerals will be collected in mines and quarries.

Headquarters will be in picturesque Ste. Genevieve, Missouri, a two-century-old French river town, unique for its historic and architectural interest.

Details of the trip will be discussed during a preliminary meeting for participants at 11:00 a.m. on March 16 at Field Museum. Tuition, which covers all expenses, including air transportation to St. Louis, chartered bus in the field, hotel (double occupancy), and meals, is $250.00. For further information, please write or phone Mrs. Madge Jacobs, 922-9410, or use the coupon.

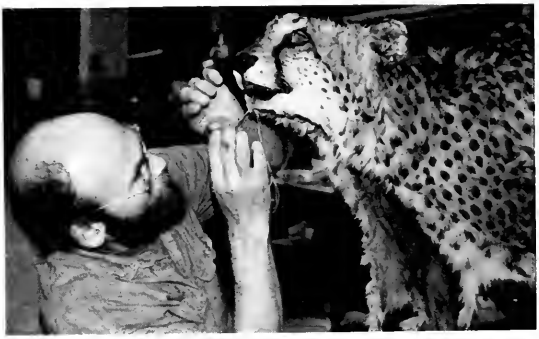
Please reserve . . . place(s) on Field Museum's Ozarks Field Trip.
Enclosed is check for $100 deposit per person,
or $ . . . .

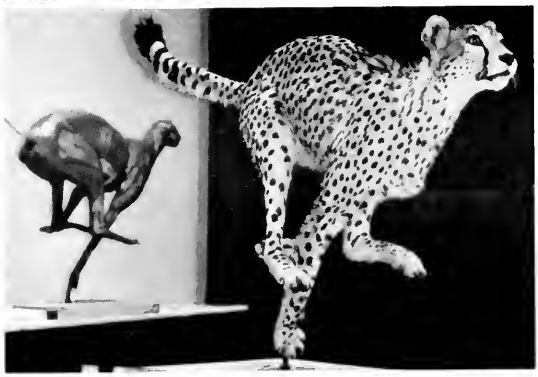
FIELD BRIEFS

Carnes New Education Chairman

Dr. Alice Carnes, who joined the Museum's Department of Education in 1972 as coordinator of teacher training, has been appointed chairman of the department, for which she was serving as acting chairman for the past several months. Before coming to the Museum, Dr. Carnes was acting director for the Master of Arts in Teaching program of the University of Chicago, where she obtained her PhD. She received a BA degree in foreign and comparative literature from the University of Rochester in 1964, and her Master of Arts in Teaching from Harvard University the following year. Dr. Carnes, with her husband and daughter, lives on Chicago's north side. *(Photo: John Bayalis)*

The skin of a cheetah is sewn around an artificial body (formed around the animal's real bones) by taxidermist Ernst Gramatzki, whose finished project, shown with its model, is a stunning example of the art of taxidermy. Gramatzki, who recently resigned his Museum position for personal considerations, has posed the cheetah in pursuit of its prey, giving it much more interest and educational value than it would have if in just a sitting or standing position. (Photos: Louva Calhoun)





Change African Arts Festival Date

The Museum's "Contemporary African Arts Festival"—including a major exhibit, a film series, demonstrations, and performances—has been rescheduled to begin Saturday, April 20, instead of March 30. You may wish to make a note of the new date on your calendar included with the December *Bulletin*.

Canon City Meteorite

It is remarkable that of approximately nine meteorites that land in the United States each year, in most years none of these is ever recovered. Even more remarkable is the fact that so few objects are ever struck by them, although it does happen occasionally. A few examples would be:

Horse killed. New Concord, Ohio. 1860.
Barn roof hit. Forest City, Iowa. 1890.
Roof of house penetrated. Baxter, Missouri. 1916.
Auto struck inside shed. Benld, Illinois. 1938.
Rain gutter torn off house. Hamlet, Indiana. 1959.
Warehouse roof penetrated. Denver, Colorado. 1968.

To this list we can now add the meteorite that landed during the evening of October 27, 1973 in Canon City, Colorado, about 30 miles west of Pueblo. Narrowly missing a house, it crashed through a garage roof and smashed onto the concrete floor, breaking into more than fifty pieces. Its total weight was 1380 grams (about 3 pounds).

According to Ed Olsen, Field Museum curator of mineralogy, it is a stone meteorite, very similar to others already known.

However, he says, it has the peculiarity that most of the mineral grains are very coarsely crystallized rather than being of microscopic sizes, as is the case with most others of its kind. Olsen says the meteorite is of considerable research interest because it was recovered immediately after its fall onto a clean floor, so there is little chance for contamination by soils and industrial dusts.

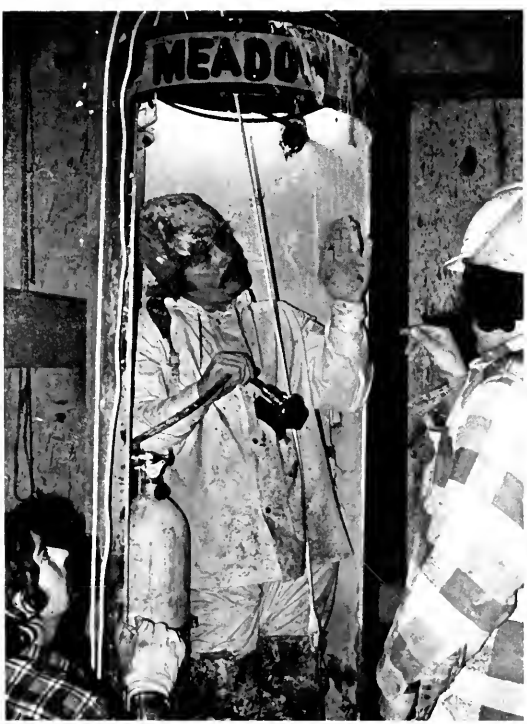
The main pieces of the Canon City meteorite are currently being subjected to elaborate radiochemical studies at the University of California (La Jolla) and NASA laboratories at the Johnson Space Center in Houston. Field Museum has acquired a small piece of the meteorite for mineralogical examination.

Underwater Photo Display To Open

The fascinating and often dramatic world of marine life has been captured in full color by the camera of Edwin Janss Jr., whose large photographs have been handsomely mounted in an exhibit opening February 14 in Hall 9 for a six-month showing. Entitled "Janss Underwater Photography," the display, with label material, will identify and explain unique behavioral patterns of many species of fish. Also shown will be brilliantly colored coral, eel, and nudibranchs (mollusks without shells and true gills). Janss, whose firm developed the model community of Westwood, California, became interested in underwater photography as an extension of his scuba diving interest. Many of the pictures appearing in this exhibit were taken in the Gulf of California, Socorro Islands, Channel Islands, Micronesia, and the Galapagos Islands.

Right: During a Museum tour with their McCleary School (Aurora) fifth-grade classmates, Lorrie Bishop and Gary Foster stumbled upon Eddie Alvarado giving a beauty vacuuming to the famed African elephants. (Photo: John Bayalis, Jr.)

Below: One of the Museum's timber pile supports was blocking the shaft being drilled to install hydraulic equipment for the new freight elevator, so one workman, with rubber suit and air tank, was lowered 35 feet into the narrow shaft to saw through the obstruction. (Photo: Kent Buell)



Within $2 Million of Goal As Final Phase Begins

Now that the Museum's Capital Campaign is within $2 million of its $12.5 million private gifts goal, enthusiastic support of the drive by as many Museum members as possible is most necessary.

Several large gifts within the past few months have brought gifts and pledges for the campaign to more than $10.5 million. Among these was a $100,000 gift from the Robert R. McCormick Charitable Trust, Inc., Chicago.

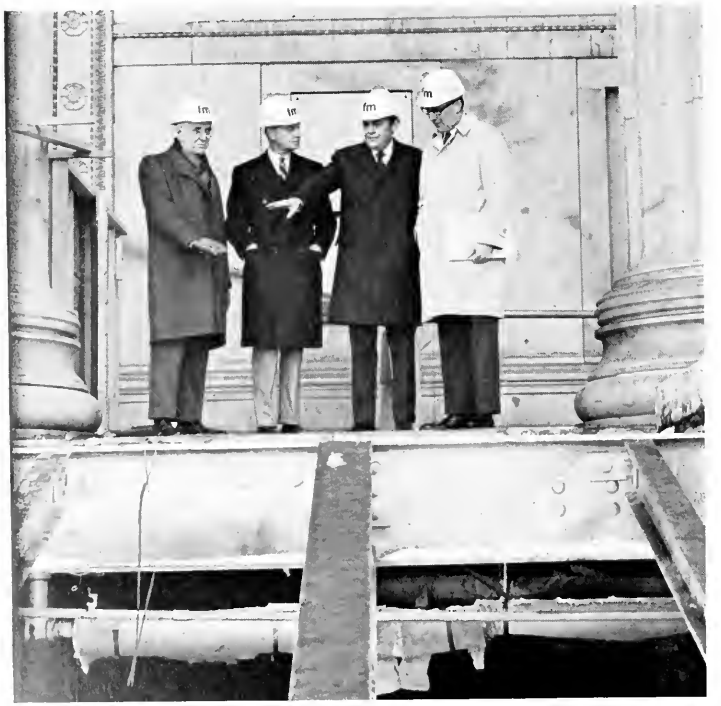
According to Nicholas Galitzine, Museum trustee and campaign general chairman, the drive has been "outstandingly successful" so far. "Now we must look principally to the Museum membership for several additional large gifts and a great number of pledges for gifts of one thousand dollars and more," he states.

Since September of 1971, scores of business and individual volunteers have been helping Museum trustees, and more recently Women's Board members, in soliciting capital gifts from foundations, corporations, and individuals. Private gifts for this funding effort to renovate the Museum's physical plant are being matched by another $12.5 million in public funds.

This past fall, when gifts and pledges for the campaign hit the $10 million mark, an intensified effort was launched to reach many more key members of the Chicagoland community for leadership gifts. Museum trustees Marshall Field and William H Mitchell are co-chairmen of the Capital Campaign's Individual Gifts Division. More than 20 volunteer business leaders serve on the division's solicitation committee. Also on the committee is Mrs. Corwith Hamill, Museum Women's Board liaison chairman for the Capital Campaign.

Campaign volunteers have been hosting other community leaders at luncheons in the Museum that are followed by a slide-film program and a special tour of the Museum's half-century-old facilities.

This is the first capital campaign in the Museum's 81-year history. Its success to date, says Galitzine, demonstrates that individuals, business firms, and foundations recognize the need for improved facilities to provide expanded programs and to encourage greater community participation in Museum activities.



The $100,000 Capital Campaign gift of the Robert R. McCormick Charitable Trust, Inc. will be used in the construction of new, consolidated administrative offices under the north entrance stairs. Viewing the construction site are (from left) the McCormick Trust's executive director, Thomas R. Furlong; Nicholas Galitzine, general chairman of the Museum's capital campaign; Museum Director E. Leland Webber; and Museum Trustee Stanton R. Cook.

Exhibits

Opens February 14

"Jansa Underwater Photography." An exhibit of exciting color prints and marine specimens. Through September 6, Hall 5.

Continuing

Field Museum's Anniversary Exhibit combines independently "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological and cultural aspects of nature; "A Sense of History" presents a graphic portrayal of the Museum's past; and "A Sense of Discovery" spotlights examples of research conducted by Museum scientists. Hall 3.

Film Program

Sunday, February 3

"The Living Jungle." Free wildlife film narrated by Greg McMillan, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

Sunday, February 10 and 17

The 28th Chicago International Exhibition of Nature Photography, a slide show featuring winning and accepted color transparencies, at 2:30 p.m. in the James Simpson Theatre.

Sunday, February 24

"Small World." Free wildlife film narrated by Fran William Hall, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

Children's Programs

Through February 28

"Winter Journey for Children." Desert Rainbow of the Southwest" focuses on the cultures of the Native Americans. The [illegible] included four storyteller-puppeteers whose learning experiences as they [illegible] enriched with Museum exhibits. All [illegible] children will learn and take home [illegible] the arts, customs, dwellings and [illegible] Series.

Saturday, March 16

Field Museum's "Wolf" Workshop for [illegible] 10 through 16, from 9:30 a.m. to 12 [illegible] the Lecture Hall. Conservationist John [illegible] will present a two-hour program on [illegible] Friday, the timber wolf, will accompany [illegible] Harris. A film, "Death of a Legend," [illegible] be shown. For reservations phone 922-[illegible] Ext. 351.

Meetings

February 8, 7:30 p.m., Chicago Anthropological Society.

February 10, 2:00 p.m., Chicago Shell [illegible]

February 12, 8:00 p.m., Chicagoland [illegible] Council

February 13, 7:00 p.m., Chicago Ornithological Society.

Hours

9:00 a.m. to 4:00 p.m. Monday through Thursday; 9:00 a.m. to 9:00 p.m. Friday, and 9:00 a.m. to 5:00 p.m. Saturday and Sunday.

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

Coming in March

Begins March 1

Spring Journey for Children. "Old Creatures."

Ayer Adult Spring Film Lecture Series. 2:30 p.m. Saturday, in the James Simpson Theatre. The [illegible] [illegible] opening at 2:30 p.m. Friday, March 22.

March 2: "Hong Kong and Macao," narrated by Kenneth Armstrong. The bustling British crown colony and the sleepy-paced Portuguese territory, [illegible] 37 miles apart in the fringe of Southeast China, offer a study in contrasts.

March 9: "Holland," narrated by [illegible] Eckerts. A look at the picturesque countryside, windmills, dikes, and Rembrandt, its ancient and modern cities, and its people.

March 16: "Canada's Western Frontier," narrated by Dr. Arthur C. Twomey. Scenes of the great outdoors, leisure time, national parks, spectacular mountains, glacier, wildlife, and unusual sights.

Sunday, March 17

"Uncountry Uganda." Free wildlife film narrated by Jeanne and John Bell Jones, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

March 22 and March 23: "John Muir's High Sierra." Narrated by Dewitt Jones, [illegible] the trail of naturalist John Muir and explore during this four-season [illegible] Yosemite Valley, the country of the giant sequoias, and Mt. Whitney.

John us for coffee after the Friday evening, March 22, film lecture presentation and meet speaker Dewitt Jones.

March 30: "Wildlife By Day and By Night." [illegible]

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Field Museum of Natural History Bulletin

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Managing Editor G. Henry Ottery
Editor David M. Walsten
Staff Writer Madge Jacobs
Production Russ Becker

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COVER

Cover design rendered from "Pitchers in the Pine Barrens"—photograph by Audrey Braun, of Clifton, New Jersey. The photo received an honorable mention in the 29th International Exhibition of Nature Photography, sponsored by Field Museum and the Nature Camera Club of Chicago. See pages 9-11. The pitcher plant (genus *Sarracenia*), common in eastern North America, is one of the so-called carnivorous plants. The pitcher, or trap, shown here, is a modified leaf which contains nectar-secreting glands for attracting insects, downward-pointing hairs which hinder their escape, and digestive enzymes. Digestion is accomplished by the enzymes and bacteria, and the products are absorbed by the plant. Indigestible parts accumulate in the pitcher where they remain until the leaf dies.

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to by Maude Wahlman

Akin Euba

an interview with Nigeria's distinguished composer

Music and poetry are traditionally linked in Africa, and both are a part of daily life. State ceremonies, religious rites, work in the fields, selling in the market place, the arrival of guests, the departure of friends, marriages, funerals, puberty ceremonies, sickness, are occasions for music. The itinerant praise-singer is a familiar sight even today in West Africa. Through him history and local legends are kept alive.

This bonding of poetry and music is not always maintained by contemporary artists. The composer of music is involved in a transition from performing to writing a score to be played by others. The poet now shapes a written language, rather than a common oral tradition.

But the links between poetry and music have not been broken entirely. As Leopold Sedar Senghor, the poet-statesman of Senegal, says: "The poem is not complete until it is sung, words and music together." Many of his poems are published with notations: "For two flutes and a distant drum" or "for balafong (xylophone)."

The relationships between traditional and contemporary African music and between music and poetry has been explained by the Yoruba composer, Akin Euba of Nigeria. Akin Euba's first exposure to music was through a European instrument, the piano. He studied with his father, then later at the Trinity College of Music in London and at the University of California in Los Angeles, where he learned to compose string quartets and symphonic pieces.

The direction his musical career has taken in recent years has in many ways been a return to his African heritage. Yet at the same time, he says, to deny Western influence is to deny a part of himself.

Mr. Euba has published many articles on African music and completed over twenty compositions which have been performed in Africa, Europe, and the United States. A recent composition, Dirges, *was first performed in 1972 at the Cultural Olympics in Munich, Germany. In it Akin Euba makes use of the traditional linkage of music and poetry, for he sets to music the poems of ten modern African authors who write in English or French. To overcome the dual difficulty of having to write a score for African musicians who cannot read Western musical notation, and for Western musicians who cannot play African instruments, Akin Euba "assembled" the music. He combined the narration with music performed to his direction and with tapes of traditional music from various African traditions. Excerpts from* Dirges *will be played continually, on tape, in the poetry and music "enclosure" at Field Museum's forthcoming Contemporary African Arts Festival, opening April 20.*

The following discussion is taken from a 1973 interview conducted by Dr. Robert Plant Armstrong with Akin Euba at Mr. Euba's home in Ife, Nigeria. Dr. Armstrong, former director of Northwestern University Press, was serving as visiting director of the University of Ibadan Press, Ibadan, Nigeria, at the time of this interview.

Armstrong: In the United States, indeed in much of the world, people think of African music in very limited terms. I think those terms may be somewhat fair toward African music, but at the same time may enforce in the public mind, a kind of limitation. I know that you have done a good deal of experimentation with the traditional forms and I would like you to tell us something about the traditional musical forms and instruments and how you have used these in your own music.

Euba: Many people view African traditional music as something that doesn't change. They want to see the pure forms, the pure idioms, and they forget that, in fact, traditional music has always changed: that traditional music today is not what it was 200 years ago, or 500 years ago. For though the rate of change may not be as radical as that which goes on in European music, there is in fact a lot of change. If one were to draw some kind of broad generalization between the music of the Oriental cultures and the music of the Western world, one might say that in the West there is a lot of experimentation going on. Composers are so curious, they want to change their form; once somebody else has done something before, they want to do something new, whereas in the Oriental cultures and in Africa, change is not so important. There is a substantial amount of tradition that is retained; but in fact, people are not necessarily antagonistic towards change. If there is something that appeals to them that is new, they will take it. But they are not preoccupied with change. As a result of this, I think that the traditional music that we have today probably retains many features that existed in the past. But secondly, certain aspects of it also are new. But many people forget this and, when they see somebody like myself—now I am a product of two cultures. I am a Nigerian and an African by birth, but I have also been exposed to Western culture. And when they see a person like myself who seeks to cause the kind of radical change that goes on in Western music, they think we are doing something bad to African music. They forget that change as such is not something that is abhorrent to the traditional musician. But when they see us trying to introduce new elements into traditional music or trying to use traditional music in a new way, they think that we are bastardizing traditional music. There are some Europeans who are inclined to be more conservative than we are in Africa. For instance, when we produced a work of mine, *Chaka*, this poem by Leopold Senghor which I set to music—when we produced this, in 1970, and we used a combination of European and African instruments—there was a European critic who wrote in very, very unsympathetic terms about this, who said we had no right, no business, to be introducing European elements into African music, and he was talking about Akin Euba and all these second-rate Europeans who support the music. But in the same article this man was praising a colleague of mine from England who is not an African but who uses African elements. Now it's all right for her to use African elements, although she is European, but it is bad for me, as an African, to use European elements.

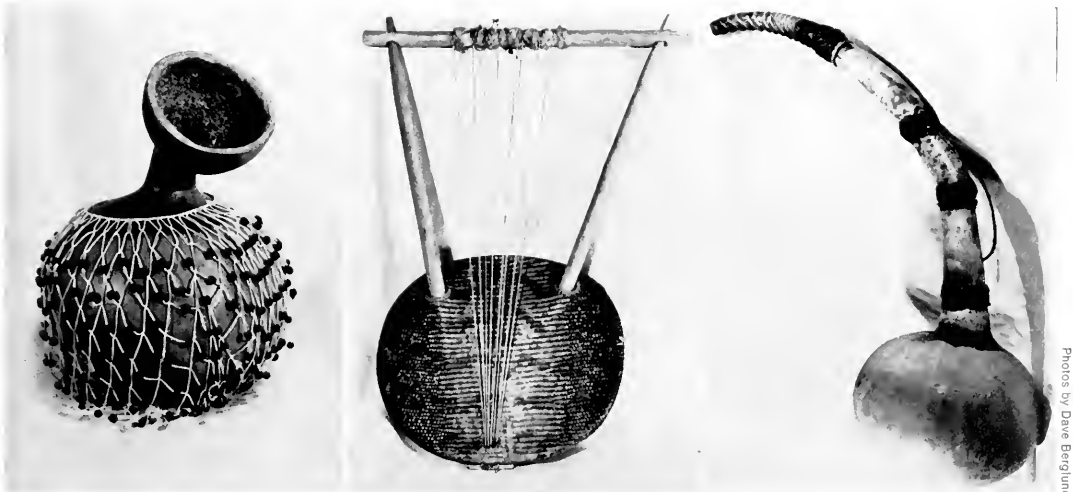
And then last year we went to Munich to present a work, which in fact had nothing to do with Europe, because the instruments that we used were all African, the forms were all African. But this man who was reviewing for some paper in Munich also had this to say: that he felt we were Europeanized and we were not African enough. My first question—the question that I would have loved to have asked this man if we were sitting together—was whether he had ever been to Africa. Because if he has been to Africa he would know that in at least my part of Africa—Nigeria—there is hardly any corner that is not Europeanized in some form or other. People in small villages in the western state of Nigeria today eat bread for breakfast. They wouldn't think of

eating anything else. In any case, I don't see any reason why African composers should not seek to try new things and I feel that if you are an artist—if you are a true artist, and you have been exposed to something, this will not but influence you in one way or another.

. . . For the past five years or so I have been very interested in the question of setting poems by African composers. Because I think a composer—when he seeks to work with a text—the most immediate area for him to look is among the poets of his own culture. Most of us try to set music to literature in Africa. Most of my colleagues either write very bad poetry for themselves or take something from the Bible. It doesn't occur to them that there is a good deal of good poetry being produced here that could be set. In any case, I was interested in the problem of setting, to music, poetry in non-African language—in the English language for instance—because our poets are producing work in the English language. How does a composer approach this? When you set a work in the English language, are you going to set it in the Western idiom? Are you going to try and use some kind of idiom that you are interested in if it is African? I became interested in this problem, and I have found, in fact, that there is quite a lot of poetry that has been written by African authors that could be very, very useful as material for composition. And secondly, I was interested in this from another point of view that traditional poetry in Africa is so much integrated with music anyhow, and modern poetry tends to become isolated from music—at least there are some poets who indicate that their poetry should be performed with music. Senghor is one of these. There are several poems by Senghor which are meant to be performed with music. But basically, I think that African poetry, contemporary African poetry in non-African languages, has tended to become isolated from the natural context of poetry in Africa, and this is poetry with music. And I also am interested in trying to work out some kind of medium whereby one could use African poetry in composition.

And so I attempted one or two things in the past: short poems. And then a friend of mine introduced me to *Chaka* by Senghor and I decided to try and set this and this was my longest work yet in this medium. This was produced in 1970. But since then, I have also written a work which I feel is probably on an even larger scale than *Chaka* and this was a work which I call *Dirges* and which we took to Munich—in fact, the subject of this critic's review in Munich. Now this work *Dirges* consists of poems by several authors: Senghor, J. P. Clark, Soyinka, Achebe, and others; in fact, there are at least ten different poets represented. This work, when we performed it in its original form, was for speakers, singers, instrumentalists, light instrumentalists, as well as traditional music on tape from various parts of Africa. This was dramatized in the original production. I feel that This extended my views, the views that I had while I was composing *Chaka*. *Chaka,* incidentally, was set for soloists, solo speakers, a chorus and an orchestra consisting of European and African instruments. In any case, quite apart from my own musical sensibilities, I feel that the use of

African musical instruments: left, *rattle (Nigeria);* center, *stringed instrument with resonator made of calabash covered with python skin (Kenya*); right, *horn made of gourds, beeswax, and horn of the sable antelope (Kenya)*



Photos by Dave Berglund

Catalogue No. 221395 Catalogue No. 187998 Catalogue No. 300258

European instruments in conjunction with African instruments, in this context, is justified, because in any case, there is a white voice in *Chaka* and how do you create the opposition between white and black? It is by using—juxtaposing—European and African music.

Armstrong: Surely, that is a good dramatic touch. I think we ought to say right here for the benefit of the people who are perhaps not so familiar with African history, that *Chaka* was the distinguished Zulu. . .

Euba: The distinguished Zulu warrior of the last century who organized great armies; in the end he was betrayed by his own people and killed by them.

Armstrong: Wherein comes the element of drama that greatly appeals to you.

Yoruba musicians in Oshogbo, Nigeria

Photo by Maude Wahlman

Euba: Quite. The text—Senghor's poem—concerns the time after Chaka's death, and then this white voice seemingly brought Chaka back to life to cross-examine him on the bad things he had done, and Chaka tried to defend himself.

. . . One can be guilty of making generalizations about African music. I think however, that one or two generalizations may be justified and this is that African music, as it has been traditionally practiced, tends to be integrated with other arts. It is not an isolated thing. We don't have such a thing as absolute music. At least not commonly. There are some forms of music in Africa that are designed purely for listening. But, by and large, we would find that music is practiced in the context of other arts such as dance, poetry, and even non-performing arts—visual arts, sculpture, and masks integrated into the same context with music. And secondly, all these arts, taken as a complex, are most often integrated into some kind of event. They are not usually performed for their own sake but more often than not, you will find that music is performed to celebrate an event. I am not of course saying that music is never performed for its own sake, it is done. But, quite often you will find that music is integrated with an event. Now, on the other hand, European music has tended to become more and more obsolete, at least the so-called classical, serious music.

As a serious composer am I going to try to go the European way and write European classical music? Or am I going to write music that mirrors elements of my own culture? Now my training was such that for the first several years of my career I was brought up in Western music. When I was taught music as a child I started to play the piano and nobody thought of teaching me drums. Because I lived in Lagos and there were several pianos—my father had studied piano—he was my first teacher. So my first exposure to music was through European music. And then, of course, I went to London to study some more European music. And so when I started to compose in England, it was quite natural that I was producing European music. I was composing sonatas and string quartets and things like that. But sooner or later I had to start asking myself whether in fact, this was the most exciting thing I as a composer could be doing.

And then when I got back from my studies in England, I began to become more and more interested in traditional music. It wasn't an interest that arose out of a mere duty. I began to feel, I began to react, emotionally, to traditional music as I normally reacted to European music. And at this point I began to see the possibility of myself developing into a composer who seeks to experiment with the use of traditional African as well as European elements. Since then I have been through several stages; there was a time when I felt I should reject my European background completely and write totally African music. But I have found also that, in fact, as I was saying a moment ago, a true artist cannot reject any experiences. You have been exposed to something. There are good and bad

things in every form of art. In fact, I feel that you cannot say there is bad music, as such. There are bad musicians, there are bad elements in the works of specific composers, but to reject any experience totally, I think is wrong. I might do this for nationalistic reasons, but I wouldn't be doing it for truly artistic reasons. So I felt that I would just create music in terms of my total experience of music. So that what this means nowadays, is that I write in various mediums; sometimes I produce works which are essentially European, sometimes I produce works which are a marriage of the African and the European.

Armstrong: Yes, I see. I was very interested in the comment that you made about the concept of the contextuality of the music, as indeed of the other arts in Africa. Which leads us to the observation, of course, that the arts in general in Europe tend to be more a witnessed kind of event, a kind of realm of experience which is set apart as a special means of enjoyment. This, I believe, is not the case so much in Africa

Euba: No, not the case, because in Africa, you know, there is a good deal of participation. It is very difficult in traditional culture to separate the audience group from the performing group, you see; because usually, members of the so-called audience are encouraged to join in the performance in any way that they can. Even if they cannot play instruments, they are encouraged to sing if they can, or to dance. So there are no clear lines between the audience and the performers. But in contemporary African cultures, some of us who have been exposed to this form of absolute music, we have now, at least —whatever else we may try to reject, whatever else we think is not worthy of copying in Western culture—this element we have retained. That is, whereby we perform to an audience—the audience is now more separated. A friend of mine took me up on this at one point. He said, "Look, why are you, a modern African composer, trying to do something which the Europeans are trying to get away from?" Meaning that in Europe today the composers are seeking to develop a kind of audience participation that we in Africa have always had. And I said, "Well why not, we have always had participation, why can't we experiment in another area?" Good music has been written where people participate. There are also good music, musical pieces, that have been written from the point of view of non-participation from the audience. It goes down again to the same point I was making: you really cannot reject anything, you've got to leave yourself free to try to develop your art in any way that you feel is artistic.

Armstrong: Good, this spoken like a true artist, and in the fashion familiar to most Americans who are familiar with the stories of artists in the world. Artists the world over, it seems, face the problem of expression in whatever terms it is posed to them in terms of their traditional culture. I'm interested in another aspect of your work, namely, the question of musicianship as it applies to the instrumentalists in your ensemble, your symphonic groups. Insofar as you use traditional African instruments, for example, to what extent do you expect European players and orchestras to perform?

Euba: This is a problem again, because when you use traditional instruments and then you write your score, now, how do you expect people outside your culture to play this? This is the major problem. And really what I say is that perhaps some of the music that we write, until it is possible for one to communicate on paper with musicians of other cultures, can only be presented in recording. Maybe we could also make scores, whereby people can study a score and see what you're doing while they listen to a tape. But I think our main medium of presentation today will have to be the medium that the jazz musician relies on, you see, because a jazz work lives in the performance of the composer. The composer doesn't write for somebody else to perform. In any case, this is typical of African music. Composers in Africa are also performers. You have to write your own work and then perform it. In fact, the process of composition is realized only when you perform it. So I see this as a problem, but not an overwhelming problem because it is a good thing that the sound media have become so sophisticated that I could make tapes of records and things like that. So to be able to have a score which somebody else can play; this is an ideal thing. But to have a score which somebody else can play maybe today is not really that difficult.

In fact, we have other problems as well. How do I communicate my ideas to people who are excellent on traditional instruments but cannot read a notation? This is a composition problem that we have. What this means is that most of my new work doesn't exist on paper—at least most of my work that uses traditional instruments. Most of the time you have to give your musicians verbal directions. *Dirges* was composed really not by sitting down with pen and paper and writing notes. It was composed by asking my musicians to play a specific piece taken from the traditional context that I felt would fit a particular situation. It's more or less like selecting prefabricated elements to use. I try to marshal, I try to direct the creative potential of my performers and get them to do what I myself cannot do.

Armstrong: Mr. Euba, you have already introduced the idea of American jazz and I think in a very useful and evocative kind of way. Many of the people who will be at the Field Museum and indeed the other museums in the United States, at which this most important show of Contemporary African Arts is to be held, will be of Afro-American descent and will be very familiar with the traditions of American jazz. Now American jazz as invented by the Afro-Americans and contributed to American civilization, represents one acculturated stream of music. On the other hand, yours is a very similarly acculturated stream of music, some significant time later. How do you compare the music which is *your* acculturated African and European music with *their* acculturated African and European music?

(Concluded on page 16)

What Good Is Ecology?

by Robert F. Inger

Persons like myself who have been doing research in ecology for years are often frightened, as members of the human race, and disappointed, as professionals, that society is not using what is now known of that branch of science. Few of us think it appropriate or desirable that ecologists alone make decisions about matters in which all citizens should share some responsibility. But society ought to use and apply ecology in appropriate situations, just as it applies the knowledge of other sciences in various technologies. The following examples may serve to illustrate what I mean by "using" ecology:

Pesticides

Since the appearance of Rachel Carson's *Silent Spring* in 1962, the use of pesticides to control harmful or nuisance insects has probably generated more heated public debate between ecologists and government agencies than any other "environmental" problem. Ecologists have regarded the advocates of broadcast use of nonspecific pesticides as just plain ignorant. When a particular insect begins to inflict measurable damage on a crop, we have usually initiated an ambitious program of spraying a general pesticide over a large area. Such programs almost always fail and almost always create new problems; and these negative results usually develop rather rapidly.

What makes ecologists hopping mad is that we (the technologically advanced societies) have known enough about ecology to predict these failures in advance. Specifically, the relationships that have been understood for years are:

- General pesticides affect a large array of species, even an entire animal community.
- Smaller living things, such as insects, are affected more radically and more rapidly by pesticides than are larger animals.
- The reproductive rate of herbivores, or plant-feeders (whether leaf-eating insects or grass-eating mammals), is greater than that of their predators.
- Populations of herbivorous animals are kept in check by predators.
- The principal predators of insects are other insects.
- The most important herbivores in the world, in terms of total vegetation consumed, are insects.
- Most herbivorous insects are not pests, partly because they are kept in check by other insects that prey on them.

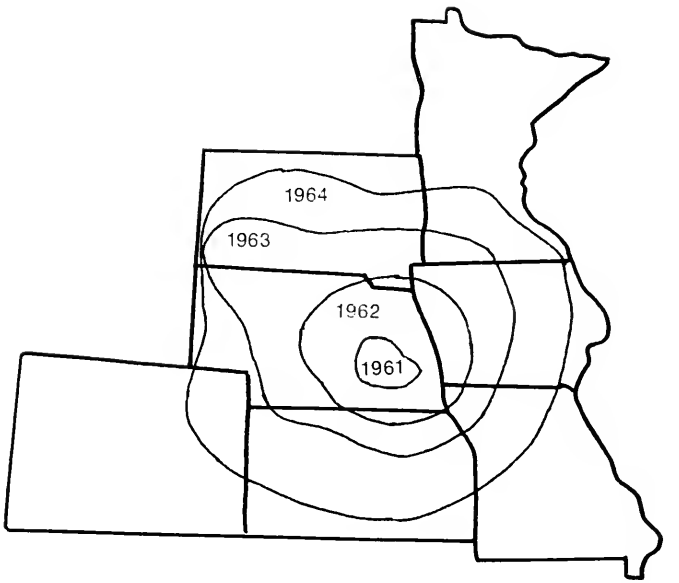
So we spray a general poison over a large area, thus killing large numbers of insects, many of them members of the target species (the pest), many of them the normal predators of the pest, and many of them non-pests, though herbivorous. All of these populations are depressed, but none are exterminated.

If we now reduce the level of spraying, all these populations begin to rebound, but not at the same rate. The herbivorous insects rebound faster than their normal predators because of their higher reproductive rates. Not only is this true of our target pest; it is equally true of the non-pest herbivorous

Spraying crops with DDT in this manner was a common sight until it was recognized that the insecticide posed a threat to wildlife and, ultimately, to man.

Photo by UPI Compix

Dr. Robert F. Inger is assistant director, science and education



In three years a population of the highly destructive western corn rootworm that was resistant to dieldrin and related insecticides spread from a few counties in western Nebraska to an area that included sections of seven midwestern states. The extent to which the population spread at one-year intervals is shown above.

insects, some of which may develop such large populations under these circumstances that they become pests.

So instead of having just one pest to contend with, we now have many, because inadvertently, but *predictably*, we have disturbed the populations that had formerly kept some of these p'ant-eaters under control.

Or we could continue spraying indefinitely. But not only is such a procedure costly and perhaps directly dangerous to human health; in the end it is doomed because continued mass spraying almost invariably is followed by insect pests developing immunity to the poison. This has occurred with 129 important agricultural pests, including the western corn rootworm. Resistance has also developed in medically important insects, such as 21 species of *Anopheles*, the malaria-transmitting mosquitoes.

The failure of mass spraying of pesticides to control agricultural pests does not mean we should discontinue the fight and let these pests take over. There are many examples of successful programs that are ecologically safe and sound and economically practical. They include the use of natural predators and parasites, chemical lures (mainly sex attractants affecting single species), mass release of sterilized males, and the spot application of poison at critical points in the life cycle of the pests.

Wonder crops and the green revolution

"Wonder crops," like pesticides, have not lived up to all expectations. And

(Continued on p. 12)

29th Chicago International Exhibition of Nature Photography

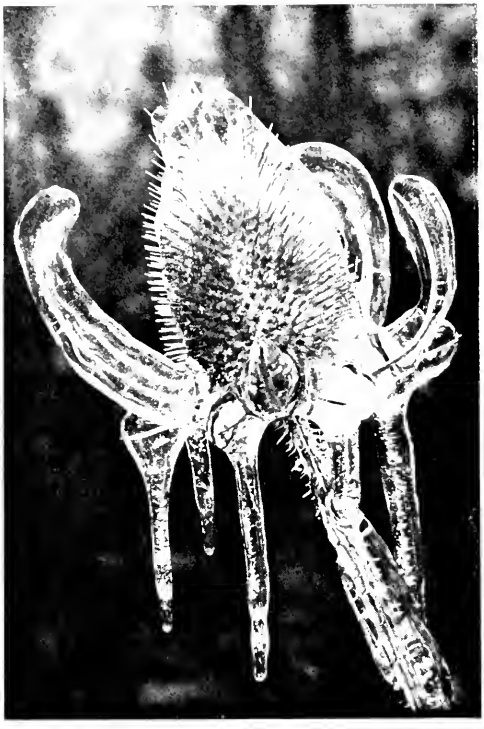
This year's Chicago International Exhibition of Nature Photography, sponsored jointly by Field Museum and the Nature Camera Club of Chicago, was truly an international affair More than 700 amateur photographers from all over the world entered the competition; each of the continents and many foreign countries were represented

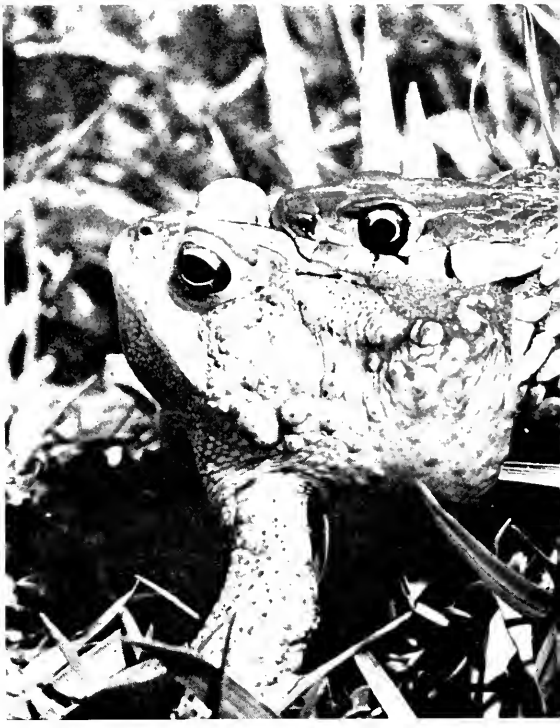
In excess of 3,000 color slides were entered; 700 were selected by the judges for public showing in February at the Museum. These photos represent some of the best nature photography being done in the world today —largely by amateurs who pursue this interest only as a hobby

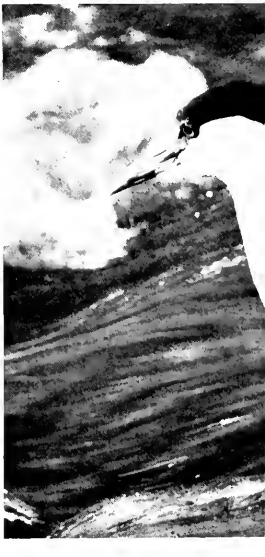
During the nearly three decades that these exhibitions have been held, two distinct trends have occurred: The first is in an improved image quality made possible by better film, cameras, optics, and flash equipment. The second change is that of an expanding geographic scope. This year more photos of the Antarctic region were entered than ever before. There was also more underwater camera work done in tropical seas. These photographers have not only been stimulated to examine the world about them more thoroughly, their interest has led them to the far corners of the earth.

—William Burger
President, Nature Camera Club of Chicago

The six photos on pages 8-9 (as well as the cover photo) were among those awarded "Honorable Mention" by the exhibition judges. Top left: "Ice-clad Teasel," by Thomas Yoshida, Hamilton, Ontario, Canada; top center: "Survival of the Fittest," by Don Wollander, Cedar Springs, Mich.; top right "Fox Number Three," by Lawrence J. Smith, Santa Barbara, Calif.; bottom left: "Haleakala Crater," by Hank Greenhood, San Jose, Calif.; bottom center: "Patient Fisherman," by Marie R. Kirkland, Bountiful, Utah; bottom left: "Drenched Anemones," by Eva C. Keller, Colorado Springs, Colo.







ECOLOGY *(from p. 9)*

that failure is the result of having expectations divorced from ecological reality.

Application of the science of genetics to the growing of food plants has been gradual. Suddenly we realized that the green revolution was upon us: miracle wheat, hybrid corn, wonder rice. The food problems of the world could be solved through plant genetics and massive use of chemical fertilizers. Maybe. But there are these ecological phenomena to be considered:

- Species and varieties of plants vary in their rates of production.
- The productivity of a given species or variety of plant is not constant but varies depending upon environmental factors such as rainfall, temperature, etc.
- Most plant species, including all major food crops, are subject to a number of diseases, mainly caused by viruses and fungi that are highly specific in terms of the plants they attack.
- Simple ecosystems—those composed of one or very few species or varieties are less stable than diverse ones.

Another kind of biology—evolutionary biology—which is difficult to separate from ecology, has an important concept to contribute here: All species of plants and animals mutate; all are subject to spontaneous genetic changes whose occurrence and effects are unpredictable.

So we develop a highly productive, genetically homogeneous strain of corn or rice and cultivate it over vast areas in order to satisfy the nutritional needs of man's increasing population. All will go well, assuming we can produce and distribute enough fertilizer, unless or until a drought occurs. But since all the wonder grains require large amounts of water compared to their less productive relatives, they are more seriously affected by drought. The regions where most grains grow—the temperate and subtropical areas—are subject to drought. We can safely predict that any large grain-growing area will experience a severe drought, though we cannot with our present technology predict when it will occur. And if that area has been planted to a wonder grain, its harvest is almost sure to be smaller than if it had been planted with the old, genetically heterogeneous varieties.

The other hazard to which the green revolution is exposed is plant disease. When a large area is sown in a single crop—particularly a genetically pure strain such as a wonder grain—a virus or fungus disease can spread with great speed and cause extensive loss. In a recent growing season, corn leaf blight spread from the Gulf of Mexico to the Great Lakes and reduced the corn crop of that region about 25 percent. Plant geneticists respond to such a situation by developing a variety with resistance to the particular disease. They succeed, but only for a while. For here's where evolution steps in: Plant viruses and fungi mutate and in time a new strain of fungus or virus will develop the capacity to overcome the supposed genetic resistance of the crop. We can't say when this will happen, we only know that ultimately it will.

Should we then abandon all hope of increasing food production by this means? My answer as a citizen, not as an ecologist, is *no*. But as an ecologist, I feel constrained to say that there is nothing magical about the green revolution. It offers no hope of avoiding periodic, severe hunger. There are ways, however, to minimize some of the hazards, the main one being to avoid planting large areas with a single strain or species of food crop. Diversity of planting can buffer the total crop against loss by either drought or disease.

Mining and biological succession

Now for an example in which ecological concepts are important but not dominant. Our search for fuel sources has pushed us in the direction of extracting oil shales and strip-mining coal in the West. Because much of the oil shales are on public lands, the federal government has developed conditions for leases by private industry. So far only six prototype leases, each covering about 5,000 acres, are at issue.

The oil-extraction process will disturb the land severely and inevitably destroy existing vegetation cover. To cope with this environmental destruction, the federal leases call for restoration of the vegetation so that the same number and the same species of animals will occur following the mining and processing of the oil shale as did

Photo by UPI Compix

In North Dakota a huge stripping shovel removes rich topsoil in order to reach low-grade coal 40 feet below the surface

before. This is a noble objective, but unfortunately it is ecological hogwash.

There is an ecological phenomenon called succession, a process that can be observed everywhere in the world. Abandon a cornfield in Illinois and what happens? Annual weeds move in first, are gradually displaced by perennials and shrubs and small trees (hawthorn and crab apple), and in turn are displaced by larger, longer-lived trees until the climax, or steady-state assemblage, is reached. Barring disturbance, this steady-state will last for thousands of years. Disturb the soil severely at any point in this process of succession and the system reverts to annual weeds.

The animals, being completely dependent on the plants, pass through succession stages in parallel with the plants. Disturb the soil, and the animals as well as the plants revert to an early stage of succession.

Hardly any action by man disturbs vegetation more profoundly than what will occur as the result of extracting oil shale. To believe we can wave a federal lease in the air and command plants and their associated animals to forego the responses they have evolved over millions of years—that strikes me as helplessly ignorant or arrogant.

Processing oil shales requires large amounts of water, produces large amounts of saline waste water, and seriously affects air quality. All of these are environmental problems every citizen should consider. But these problems are not in the province of ecology. Rather, they are the professional concerns of other environmental scientists—geologists, hydrologists, and atmospheric scientists. I do not know what scientists in those fields think about the environmental problems associated with processing oil shale. From the ecological point of view, however, the terms of the leases cannot be carried out.

Solar radiant energy

One final example—conversion of solar radiant energy into other forms of energy. Somewhere—an unkown distance into the future—lies the application of this only real "income" the earth has.

One of the major advantages of converting solar energy for human use is that there are none of the pollutants such as sulfur dioxide, nitrogen oxides, particulates, or radioactive wastes that result from the use of fossil or nuclear fuels. The major possible hazards associated with solar energy conversion is the buildup of waste heat and warming of the earth's atmosphere. (These same hazards are also consequences of our present energy technologies.) A highly significant environmental issue, though one that will not affect us for some time to come, is posed here. But we will get no help from ecology, because the major questions involve rates of heat dissipation of various wavelengths—a problem that is mainly the province of atmospheric physics.

Finally, let me answer the question posed by the title of this article. Ecology does not differ from any other science in terms of its value to mankind. Ecology, as any science, is a body of knowledge, a mass of data and concepts, even a set of natural laws; and it is only one of the environmental sciences. But it is not a complete body of knowledge—there is much we still do not understand. Ecology is not magic; it is not the key to a rosy, untroubled future. On the other hand, unless we use this body of information and those of other environmental sciences, we will find ourselves as impotent as old King Canute commanding the tide not to come in.

The use of solar radiant energy for heating the home is nothing new. In 1949 this experimental "solar" house was built by Massachusetts Institute of Technology engineers in Cambridge, Mass. Solar energy is collected by panels on the roof.

Photo by UPI Compix

Ray A. Kroc Environmental Education Program

The Ray A. Kroc Environmental Education Program, Spring 1974, will focus on human impact on the environment. Topics include land, populations, pollutants, ecological research, energy, and the future. Program elements consist of field trips, lectures, films, workshops, and courses designed to inform citizens about important environmental questions facing them now and in the future. This program is being made possible by the Ray A. Kroc Environmental Fund, which recently was established at Field Museum by his friends to honor Mr. Kroc, chairman of McDonald's Corporation, on his 70th birthday. Other events of this new program will be presented in coming months and years.

To encourage participants to translate concern and knowledge into action, follow-up reading information and lists of environmental organizations will be provided. All programs take place at or originate from Field Museum.

Saturday, March 9

Film seminar: **"Tragedy of the Commons."** Based on an essay by ecologist Garrett Hardin, the film explores the effects of overpopulation on individuals, the finite resources in the world, and possible solutions to the problem. The audience will have the opportunity to discuss its reactions to questions posed during the screening. James Bland of Field Museum's Department of Education will be moderator. Place and time: Lecture Hall, 10:30 a.m. and 1:00 p.m.

Sunday, March 10

Film seminar: **"Tragedy of the Commons,"** repeat. Place and time: Lecture Hall, 11:00 a.m.

Lecture: **"Ecology, the Tragic Insight,"** by Garrett A. Hardin, ecologist at University of California, Santa Barbara. Place and time: James Simpson Theatre, 2:00 p.m.

Saturday, March 16

Workshop for young people: **"Nature Photography without a Camera."** Limited to 20 students, ages 8-12; by advance registration only. James Bland, instructor. Place and time: North Meeting Room, 2nd floor, 1:00-3:00 p.m.

Saturday, March 23

Adult field trip: **"Meeting Human Needs."** A tour of the Bethlehem Steel plant in Burns Harbor, Ind.; followed by lunch and discussion and exploration of the Dunes Lakeshore Area. Limited to 40 adults*. Matthew H. Nitecki, Field Museum geologist, leader. Meeting place and time: North Parking Lot, 9:00 a.m.

Film: **"Pollution is a Matter of Choice."** A focus on economics and its impact on the environment. People living near the Florida Everglades and residents of a potential Maine seaport must decide what is important to their environment. Place and time: Lecture Hall, 10:30 a.m. and 1:00 p.m.

Sunday, March 24

Film: **"Pollution is a Matter of Choice"** (repeat). Place and time: Lecture Hall, 11:00 a.m.

Lecture: **"Changing Climate, Changing Times."** Reid A. Bryson, director, Institute for Environmental Studies, University of Wisconsin. Place and time: James Simpson Theater, 2:00 p.m.

Saturday, March 30

Film: **"Survival on the Prairie."** The prairie stands as a vast, seemingly empty space, but it is teeming with life. An in-depth look at the dangerous game man plays with the land. Place and time: Lecture Hall, 10:30 a.m. and 1:00 p.m.

Workshop for young people: **"Nature Photography without a Camera."** limited to 20 students, ages 8-12; by advance registration only. James Bland, instructor. Place: North Meeting Room, 2nd floor; two sessions offered—10:00 a.m. to 12 noon and 1:00-3:00 p.m.

Sunday, March 31

Film: **"Survival on the Prairie."** (Repeat). Place and time: Lecture Hall, 11:00 a.m.

Garrett Hardin, distinguished ecologist, lectures on March 10 on "Ecology, the Tragic Insight."

Symposium: **"Chicago Scientists Review the Changing Chicago Environment."**

Participants: Matthew H. Nitecki, Field Museum, "Geology of the Region"; Floyd A. Swink, Morton Arboretum, "Impacts on Flora of the Region"; Loren P. Woods, Field Museum, "The Lake and its Inhabitants"; Gunnar Peterson, Open Lands Project, "Preserving the Land."

Saturday, April 6

Course: **"Nature Photography."** The first session in a series of 6, to be held on successive Saturdays, April 13, 20, 27, May 4, 11. The course will cover basic problems of nature photography, exposure, focus, film lighting, close-ups, composition, and trouble shooting. Designed for amateur photographers with some knowledge of photography and who have access to a single lens reflex camera. Course includes 4 lectures and 2 field trips. Limited to 40 persons. A $10.00 fee holds advance registration for the course, and covers all expenses other than students' film. William Burger, Field Museum, project director. Place and time: North Meeting Room, 2nd floor, 9:30 A.M.

Film: **"Multiply and Subdue the Earth."** A provocative study of land usage and planning; film narration by Ian McHarg, author of the best-selling book *Design with Nature;* produced by NBC-TV. Place and time: Lecture Hall, 10:30 a.m. and 1.00 p.m.

Adult field trip: **"Planned Communities."** Tour of 2 Chicago-area planned communities: Four Lakes and Park Forest South. Limited to 40*. Gunnar Peterson and Wayne Schimpff, Open Lands Project, leaders. Place and time: North Parking Lot, 9.00 a.m.

Saturday, April 20

Field Trip for High School Students: **"Indiana Dunes."** Introduction to the skills of backpacking, survival, reading the landscape, and ecological relationships. Limited to 30 students, ages 15-18*. James Bland, leader. Place and time: North Parking Lot, 9:30 a.m.

Sunday, April 21

Lecture: **"Alternative Paths to the Future."** Willis H. Harman, Stanford Research Institute, director, Center for the Study of Social Policy. Place and time: James Simpson Theatre, 2 p.m.

Saturday, April 27

Course: **"Urban Streams."** First session in a series of 6, to be held on successive Saturdays, May 4, 11, 18, 25, and June 1. Course will include seminars, field trips, and research to investigate problems of water flow, resilience of biological populations in water, and research techniques in the urban environment. Limited to 40 persons, 15 years or older. A $15.00 fee holds your advance reservation and covers all expenses. Donald Myers, Gary Milburn, biologists, Environmental Protection Agency: project directors. Place and time: Ground Floor Classroom, 9.00 a.m.-12.30 p.m.

Film: **"Insect War."** An exploration of research techniques and findings in man's battle with insects for possession of food crops. Filmed by BBC. Place and time: Lecture Hall, 10.30 a.m. and 1.00 p.m.

Sunday, April 28

Film: **"Insect War"** (Repeat). Place and time: Lecture Hall, 11:00 a.m.

Symposium: **"Ecological Research at Field Museum."** Participants: Henry Dybas, Field Museum entomologist, "Cicada: Strategy for Survival"; Lorin Nevling, Field Museum botanist, "Implications for Change in the American Tropics"; Robert Johnson, Field Museum ichthyologist, "Aspects of Oceanic Ecology"; Robert Inger, Field Museum assistant director, science and education, moderator. James Simpson Theatre, 2.00 p.m.

Subsequent programs, extending through June, will be announced in the April, May, and June *Bulletins*.

*Reservations will be confirmed in order of receipt and payment. A $4.00 fee to cover lunch and transportation also holds your advance reservation.

For further information call Carolyn Blackmon, Field Museum, 922-9410, ext. 361 or 363.

RAY A. KROC ENVIRONMENTAL EDUCATION PROGRAMS

Field Museum—Environmental Program
Roosevelt Road at Lake Shore Drive
Chicago, Illinois 60605

Please enroll me in the following program(s) at Field Museum:

Program _____ Date _____ time _____

Program _____ Date _____ time _____

Enclosed is my check for $ _____, payable to Field Museum.

Name _____

Address _____

City _____ State _____ Zip Code _____

Phone: Daytime _____ Evening _____

Drum used by Baoule People, Ivory Coast

Catalogue No. 210059
Photo by Dave Berglund

(Continued from page 7)

Euba: When I have tried to resolve for myself what I felt I was trying to do, in my compositions, at the point where I began to be interested in using African traditional materials in my composition, I found myself increasingly comparing what I was trying to do with the evolution of jazz. I felt that in fact, you see the kind of music that I was groping towards, was a kind of music that is parallel with jazz, something that made use of African traditional music. Something that is a sort of metamorphosis of elements taken from African traditional music. And in fact, as a pianist I began at some state to become interested in creating what I called an African pianism, because I started musical life as a pianist and I was interested in creating an African pianism. And I began to reason in these terms: If it is possible to have a "Chopinesque pianism," or a "Bartokian pianism," or a "jazz pianism," surely it is also possible to have an "African pianism." And in fact, from that point I began to then see very close similarities between what I was trying to do and jazz. Because when I tried to rationalize my concept of an African pianism, I began to think not only of the pianistic style itself, but of the instruments that would surround the piano. I began to think in terms of the piano with African percussion instruments and then I began to see a link-up, because around that time people in Africa or some people in Nigeria, at least—some of the people in jazz in Nigeria—were beginning to talk about an Afro-jazz and I felt that they were not doing what in fact Afro-jazz to my mind is. Because Afro-jazz is like a re-Africanization of jazz, but I felt that they were not doing this. All they were doing really, was to copy American jazz and I felt that an Afro-jazz, in fact, would need to bring in more concrete elements of African music than just using African melodies or African rhythms. I began to see the possibility of experimenting with piano and African drums to create something which maybe, in fact, will run even more closely along the lines that jazz is following today; because nowadays there is also a lot of experimenting in bringing in other cultures in jazz. Jazz has so far been an integration of European and African elements, although some people would dispute the presence of either of these elements. But there have also been other cultures, as they are bringing Indian elements and other cultural elements to jazz. I feel that there is a lot of fruitful experimentation that could go on in jazz, purely because there is already this basic African background. And even outside of jazz, there are other composers—black composers in America who are trying to write in the so-called serious idioms. Mind you, I think nothing is more serious than jazz; it is an academic discipline for me. But there are people who are trying to work in other serious idioms, and most of them, I feel, have not yet found their feet. They are more or less doing the same things that European composers are doing, and I feel that there is a field of black music, a potential field of black music that could be just as fruitful as jazz which some of the black composers in my field in America could be working in; and I think we are going to see an emergence of this very soon, because more and more black musicians are coming to Africa to become properly acquainted with African music.

Armstrong: Profoundly learning the African mediums.

Euba: Yes. There are many problems that we African composers have that they also have. Problems of trying to interest the members of our culture in the new developments that are taking place. And I see that there are many ways in which we could collaborate in the future. It is important, first of all, to get to know one another in music. There is one common thing in Africa today and this is that even some of us in Africa, the contemporary composers—we don't know one another. I work in my own little world and I don't know what somebody else is doing somewhere else, and I feel that before we can have a proper school—and I see a kind of school of thought developing—we must have a lot of dialogue, not only between ourselves in Africa, but with experimental composers in Europe and America

Youngsters' Popcorn Sale Nets $30 for Capital Campaign

A School children's popcorn sale has brought the Museum closer to its $25-million fund raising goal.

"Our classrooms heard about your 80th anniversary and why you needed to raise money," Anne Nordstrom, 9, wrote to the Museum. "So we had a vote about how to raise money for you. And we decided to pop corn. All together we raised $30 to help you."

Anne and 74 other middle school pupils at Elm School, 60th and Elm Sts., Hinsdale, had learned about the Museum's efforts to raise $25 million for rehabilitation of its 53-year-old building.

Principal R. J. Michalek explained, "Most of the children have visited the Museum and enjoyed it so much that their desire to help in this way seemed perfectly natural to them."

"It was amazing how enthusiastic the children were in planning and carrying out their project," added teacher Janice Machado.

The corn and boxes were provided by the students, and the popcorn was made in the classrooms and sold to pupils.

"Everybody ate the popcorn while we were making it," confessed Paul Schacht, 9. "It was 15 cents a box. We sold 200 boxes and got $30. (That's pretty good, isn't it?)"

"We hope this is enough money," said Peter Colella, 10.

Some of the pupils made specific suggestions regarding the Museum's use of their contribution.

Jeff Gjersoe, 9, thought it could be used to start a new exhibit. An unsigned letter added, "We were wondering if it could be dinosaurs because your other one is so good!"

Museum director E. Leland Webber expressed surprise and gratitude for the children's gift and letters. He said, "We have received many gifts during this campaign—large and small—but this one is unique! It is particularly gratifying since the children must feel that the Museum is important to them, and they must feel comfortable here or they would not have gone to this effort. And children are one of the reasons for which we exist."

Half of the $25 million is being raised by the Museum from private sources; the other half is being generated through the bonding authority of the Chicago Park District.

The museum must still raise nearly $2 million before the scheduled conclusion of the capital campaign in September.

Meanwhile, the Elm School students are already looking forward to their next visit to the Museum, possibly this spring.

Scott Schroeder (left), Sue Marcheschi, and Paul Athens learn that raising money by selling popcorn to their fellow Elm School students can be fun.

Photo by G. Henry Ottery

FIELD BRIEFS

Sign up now for Field Trips!

Be sure to send in your reservations soon for the two exciting members' geological field trips announced recently.

The Ozarks of Missouri tour (April 7-13) is $250 per person, with a deposit of $100 each. The Grand Canyon tour (August 16-24) is $700 per person, with a deposit of $200 each. The costs of the trips are all-inclusive.

Dr. Matthew H. Nitecki, associate curator, Department of Geology, will lead both groups.

For further information, please write or phone Mrs. Madge Jacobs, 922-9410.

New Handbook on African Art

Contemporary African Arts by Maude Wahlman, Field Museum consultant in African Ethnology, is being published in conjunction with the exhibit of the same name opening April 20. The text of this soft cover book is composed of essays on the various African art forms and art media. Twelve color plates and 120 black and white illustrations supplement the text. Scheduled for publication April 20, the book will be on sale for $5.00 at the Museum's Book Shop and in a special shop in the exhibit area. Museum members are eligible for a special pre-publication price of $4.00 until April 1. Orders should be addressed to the Field Museum Book Shop.

African Arts Preview and Dinner

The Women's Board of Field Museum is hosting a dinner and preview of the forthcoming Contemporary African Arts Festival in Stanley Field Hall on Thursday, April 18, at 6:00 p.m. Music and entertainment will be provided. Attire is informal. $30.00 per person (includes food and beverage). For information and reservations call Mrs. Straub at 922-9410 or 922-9419.

New Coordinator of Teacher Training

Barbara Reque has been named coordinator of teacher training in the Museum's Department of Education, where she will conduct workshops and develop materials to help teachers and other adult leaders make better use of the Museum as an educational resource. With a master's degree in early childhood education from the University of Chicago, she taught at Howland Elementary School, Chicago, where for the past two years she was curriculum assistant for the Follow-Through program and developed and supervised an open classroom program involving 200 primary school children.

Install Parking Lot Lights

Persons planning visits to the Museum after sundown, such as on Members' Nights May 2 and 3, or on Friday evenings, will appreciate the newly installed parking lot lights in the north parking area. The bright illumination should help eliminate stumbling and make it easier for visitors to locate their automobiles. It's just one of many ways the Chicago Park District is working to ensure pleasant visits to Chicago institutions.

Volunteers Honored

Field Museum honored its 143 volunteers, who collectively logged nearly 30,000 hours of service to the Museum during 1973, at a reception held in Stanley Field Hall on February 14. Hosts for the party were Blaine J. Yarrington, Field Museum's newly-elected president, and Dr. Robert F. Inger, assistant director, science and education. The volunteers each received a small memento as a token of appreciation for their efforts.

The 1973 hourly total of volunteer work was an increase of almost 50 percent over the 1972 figure. The number of volunteers active in 1973 was also up about 40 percent over 1972.

The volunteers who contributed the greatest number of hours were: Mrs. Alice Schneider, 1,218 hours; Mr. John O'Brien, 975 hours; and Mrs. Anthony DeBlase, 865 hours. Those who gave more than 600 hours were: Mrs. Rudolph Wolfson, Mr. Charles P. Henry, Mr. Walter Mackler, and Mr. Sol Gurewitz. Volunteers in the 500-hour category were: Miss Alison Gail Hoppe, Mrs. David Calhoun, and Miss Ann Lippl.

Other top ranking volunteers were: Mrs. Gibson Winter, Mr. Mark Hershkovitz, Mr. Robert Hicks, and Col. M. E. Rada.

The departments of anthropology, botany, geology, zoology, education and exhibition, and the library, all benefited from the services of 113 volunteers. Their duties covered a wide range of tasks, including cataloging, fossil preparation, research assistance, and photography.

In addition, 22 volunteer women instructors supplemented the work of staff members in the Raymond Foundation division of the Department of Education. At the present time eight additional volunteers are completing the volunteer instructor training program. Currently there are a number of openings at the Museum for qualified volunteers. Further information may be obtained by calling or writing Carolyn Blackmon of the Museum's Department of Education (922-9410, ext. 361).

For complete list of volunteers see p. 19.

Weaving Demonstrations on Mexican Loom

Mrs. Eugene Kosky and other members of the North Shore Weavers' Guild are demonstrating the use of a two-harness handcrafted Mexican floor loom 12 hours weekly in the Museum's South Lounge. The loom is a descendant of a medieval loom brought to the New World from Europe by the Spanish during the 16th century.

Photo by G. Henry Ottery

Mrs. E. Leland Webber, 1919-1974

With deep regret we report the death February 15, following a long illness, of Ellen Duer Webber, wife of Museum Director E. Leland Webber. A native of Baltimore, Mrs. Webber became a Chicago-area resident upon her marriage to Mr. Webber in 1946. There are three children: Leland, James, and Ellen R. Webber. Also surviving is Mrs. Webber's mother, Mrs. A. Adgate Duer, and a brother, A. Adgate Duer Jr., both of Baltimore.

Paul S. Martin, 1899-1974

Dr. Paul S. Martin, chairman emeritus of Field Museum's Department of Anthropology, died in Tucson, Arizona, on January 20 at the age of 74, after a short illness. He was chairman of the department from 1935 to 1964, its acting chairman from 1934 to 1935, and assistant curator of North American archaeology from 1929 to 1934.

For the past nine years Dr. Martin had conducted the museum's summer training program for high-ability college sophomores and juniors, "New Perspectives in Archaeology," at its field station in Vernon, Arizona. At the time of his death he was serving as research associate in the department of anthropology at the University of Arizona and at the Arizona State Museum.

For more than 40 years, Dr. Martin's primary field of study was the American Southwest, especially Anasazi and Mogollon prehistory. His published reports on archaeological sites in New Mexico, Colorado, and eastern Arizona have filled a dozen volumes of the Museum's scientific series, *Fieldiana: Anthropology*.

In 1929, as a graduate student under the guidance of American archeologist Dr. Alfred Vincent Kidder, Dr. Martin discovered the Temple of the Three Lintels at Chichen Itza in Yucatan, Mexico, and was responsible for its excavation and reconstruction. He was the recipient of the Alfred Vincent Kidder Award in 1968, given every three years by the American Archaeology Association in recognition of leadership and outstanding contributions to the field of New World prehistory and archaeology.

During his almost 45 years at Field Museum Dr. Martin made thousands of friends. No one who ever met him failed to be impressed by his warmth and sincerity. Because of his great interest in young people Dr. Martin came to personally know many of the students who worked with him over the years, many of whom have become prominent in their chosen areas of endeavor, anthropology and archaeology.

Dr. Paul S. Martin 1899-1974

These dedicated volunteers served Field Museum in 1973:

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Mrs. T. Stanton Armour
Mrs. Richard Bentley
Mr. David Berglund
Mrs. Michael Birnkrant
Mrs. Earl Bolton
Miss Idessie Bowens
Mrs. Roger Brown
Mr. John Clay Bruner
Mrs. Thomas Burke
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Mrs. Marvin Wolfson
Mrs. Rudolph Wolfson
Mrs. Theodore Wroblicky

MARCH at Field Museum

Exhibits

Janss Underwater Photography, an exhibit of exciting color prints and marine specimens. Through September 8. Hall 9

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature. "A Sense of History" presents a graphic portrayal of the Museum's past; and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

Children's Programs

Begins March 1

Spring Journey for Children, "City Creatures," combines museum exploration with outside activities. The free do-it-yourself project is designed to acquaint youngsters with animals that have made their homes in the concrete "wilderness" of the city. All boys and girls who can read and write may participate. Journey sheets available at entrances. Through May 31.

Saturday, March 16

Field Museum's Wolf Workshop for ages 12 through 18, from 9:30 a.m. to 12 noon in the Lecture Hall. Conservationist John Harris will present a two-hour program on wolves. Rocky, the timber wolf, will accompany Mr. Harris. A film, "Death of a Legend," will also be shown. For reservations phone 922-9410, Ext. 351.

Special Events

Ray A. Kroc Environmental Education Program activities listed on pp. 14-15.

Weaving Demonstration by members of the North Shore Weavers' Guild at 10:00 a.m. to 12:00 noon, and from 1:00 to 3:00 p.m. on Mondays, Tuesdays, and Fridays in the South Lounge.

Film Program

Ayer Adult Spring Film Lecture Series, at 2:30 p.m. Saturdays in the James Simpson Theatre. The March 23 program will also be presented at 7:30 p.m. Friday, March 22.

March 2: **"Hong Kong and Macao,"** narrated by Kenneth Armstrong. The bustling British crown colony and more leisurely-paced Portuguese territory, located 40 miles apart on the fringe of Southeast China, offer a study in contrasts.

March 9: **"Holland."** narrated by John Roberts. A look at the picturesque country of windmills, dikes, and Rembrandt, its ancient and modern cities, and its people.

March 16: **"Canada's Western Frontier,"** narrated by Dr. Arthur C. Twomey. Scenes of the great outdoors feature famous national parks, spectacular mountains, a glacier, wildlife, and unusual sports.

March 22 and March 23: **"John Muir's High Sierra,"** narrated by Dewitt Jones. Follow the trail of the famed U.S. naturalist, writer, and explorer during the four seasons to Yosemite Valley, the country of the giant sequoias, and Mt. Whitney.

Join us for coffee after the Friday evening, March 22, film lecture presentation and meet speaker Dewitt Jones.

March 30: **"Wildlife By Day and By Night,"** narrated by Karl H. Maslowski. Birds, animals, and insects of the American Midwest are shown in their natural habitats, around the clock and at various times of the year.

Sunday, March 17

"Upcountry Uganda," free wildlife film narrated by Jeanne and John Goodman, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

Meetings

March 1, 7:30 p.m., Chicago Astronomical Society.
March 8, 7:30 p.m., Chicago Anthropological Society.
March 10, 2:00 p.m., Chicago Shell Club.
March 12, 8:00 p.m., Chicagoland Glider Council.
March 12, 7:30 p.m., Nature Camera Club of Chicago.
March 13, 7:00 p.m., Chicago Ornithological Society.

Coming in April

Contemporary African Arts Festival, opening April 20, features a major exhibit of the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as music, films, lectures, dances, and other events. Special April programs are:

Films in exhibit area:

1:30 p.m. April 20 through 26: **"The Hazda"** and **"Bitter Melons."**

7:30 p.m. April 26: **"Borom Sarret"** and **"Tauw."**

1:30 p.m. April 27 through 30: **"The Tuareg," "Nawi,"** and **"Masai Warrior."**

4:00 p.m. April 28: **"The Lion Hunters."**

Royal African Puppet Theatre
10:30 and 11:30 a.m. Saturday, April 20 and 27, in the James Simpson Theatre.

Ayer Adult Spring Film Lecture Series, at 2:30 p.m. Saturdays in the James Simpson Theatre. The April 13 program will also be presented at 7:30 p.m. Friday, April 12.

April 6: **"Vanishing Africa,"** narrated by Lewis Cotlow.

April 12 and 13: **"Aldabra—Island in Peril,"** narrated by Ley Kenyon.

April 20: **"Alaska Wilderness Lake,"** narrated by Dr. Theodore J. Walker.

April 27: **"Scotland,"** narrated by Bill Madsen.

Hours

9:00 a.m. to 5:00 p.m. Saturday through Thursday; 9:00 a.m. to 9:00 p.m. Friday.

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410.

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1974

Museum of Natural History Bulletin

Field Museum of Natural History Bulletin

Volume 45, Number 4
April 1974

Managing Editor G Henry Ottery
Editor David M Walsten
Staff Writer Madge Jacobs
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COVER

Detail of wool and hemp tapestry from Ramses Wissa Wassef Weaving Workshop, Harrania, Egypt Collection of John Anthony Ward

Photo by Herta Newton.

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The Contemporary African Arts Festival

By Maude Wahlman

Many people find African art in its various forms startling and think of it as mystical, old, and anonymous. But visitors to the Museum's "Contemporary African Arts Festival," opening April 20 for six months, will see African art that is startling, mystical, innovative — and signed. The festival will include a major exhibit at the Museum, a series of educational programs, and a shop offering contemporary African art.

The art exhibit

The exhibit element of the festival presents an anthropological study of change in Africa as interpreted by thirteen artists or groups of artists, each working in a different medium. The study is selective: it does not attempt to include every contemporary African artist. Instead,

Left: Wall hanging, starch resist design on cotton, by Senabu Oloyede, Nigeria. All photos by Herta Newton.

Maude Wahlman is consultant in African ethnology at Field Museum.

it examines the work of a few individuals, chosen because each plays a different role in a different culture.

However, as many arts as possible are included: graphics, painting, pottery, sculpture, carved calabash, weaving, resist dyeing, leatherwork, architecture, music, dance, literature, and counter-repoussé. The emphasis is primarily on the role of the artist in contemporary African life.

One aim of the festival is to demonstrate how the arts of a people change as other aspects of their culture change. Africa is undergoing rapid social and technological change. Until relatively recent times, many areas of the continent were virtually inaccessible to Africans and foreigners alike—the term "dark continent" was aptly applied. Today almost any village can be reached by road. Television, radio, the airplane, and modern automobiles link tribal societies to each other and to the rest of the world. The influences of Islam from the East and of Christianity, colonialism, and tourism from the West are now a part of daily reality.

When cultures are in transition and change is rapid, it is important to document each phase in its own time, before the opportunity is lost. One means of studying change is through artists, their arts, and their role in society. Since art is an expression of society, contemporary African art reflects both tradition and the changes taking place in Africa.

And it is the artist who most keenly feels the tensions between the old and the new, between tradition and innovation. An important aspect of his role is the pulling together of those experiences that seem most jarring emotionally, bringing pieces of the past and present together in a manner that makes sense to the rest of his culture and perhaps to those beyond his culture. And his influence is widely felt because he and his works remain a central facet of daily life in Africa. Daily life continues to include the need of the artists' hand-made products: pottery, pattern-dyed cloth, woven textiles, carved calabashes, leatherwork, and sculpture. Even pottery, music, and dance are a part of everyday life. The artist, therefore, is very much in the mainstream of life, and he influences its course.

Another goal of the exhibition is the identification of artists by name whenever possible. Artists are referred to by the names by which they are known in their cultures: for example, Yoruba artists are often known by their first names. Traditional African art has so often been presented as anonymous — a false impression perpetuated by scholars and dealers alike. Artists were known in the past, in their own communities, for most art was commissioned from them by priests, kings, and wealthy merchants. Today's artists are as well known as those of the past, despite the fact that the old patrons of the arts can no longer afford to support artists to the extent they once did. Art is now also commissioned by local and national governments, by the growing middle class, and by foreigners. Other art is produced for sale in galleries and at airport shops. However, this festival emphasizes those artists who create for both Africans and foreigners.

J. L. Williams, leader of African dance workshops to be held at Field Museum, wearing dress of African wax resist cloth

The processes of change are not the same throughout Africa, nor is every artist equally successful in meeting the challenge of new media, new patrons, and new ideas. Some artists, such as the Tuareg leatherworkers of Niger, continue traditional forms with little innovation. Other artists express themselves in borrowed mediums. Bruce Onobrakpeya of Nigeria has adapted Western printmaking techniques to convey African ideas. He communicates through book illustrations and through color prints that comment on Nigerian society. Skunder Boghossian communicates his Ethiopian heritage through his paintings and as a teacher at Howard University, Washington, D.C.

Asiru Olatunde of Nigeria uses a new material — aluminum — to continue an older art form, that of story-telling on panels. The potter, Ladi Kwali of Nigeria, continues to produce high quality traditional pottery shapes and designs, but she uses a nontraditional stoneware clay that enables her pots to be glazed and used for tableware. They can also be exported. Ladi Kwali is both preserving a valuable heritage and publicizing it. In Sierra Leone, Kadiato Kamara provides style-conscious Africans with new textile designs worn to express national pride and a highly individual sense of fashion.

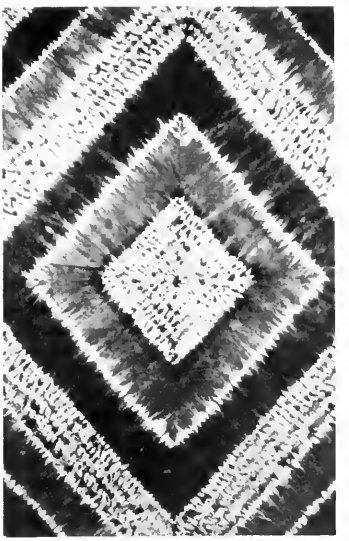
In Kenya, Peter Nzuki is reviving a fine old Kamba art form — the

carving of calabashes, or gourds. He carves traditional and new designs on calabashes that are sold in Nairobi. In Rhodesia, Thomas Mukarobgwa carves stone into innovative shapes, some inspired by local mythology. In Egypt, children at the Harrania weaving workshop weave designs and scenes of daily life as a part of their schooling. This workshop may provide a viable educational model for other cultures. The Egyptian architect Hassan Fathy departs radically from other contemporary African architects in his plea for architecture for the poor.

An artist's right to receive inspiration from any sources has been successfully defended by Nigerian composer Akin Euba. (*See* Field Museum of Natural History Bulletin, *March 1974*.) He combines African musical elements with his experiences as an artist who has lived and studied all over the world. The Dogon dancers of Mali have found a moderate position between the two extremes presented to many African dance groups — the traditional versus the theatrical.

These artists fill different roles in their respective cultures. Most are social commentators, such as the Harrania weavers, Asiru Olatunde, Bruce Onobrakpeya, and Skunder Boghossian. None is subsidized solely by governments, tourists, kings, or priests. Few artists have a religious role today, although all have an economic role. In many cases patronage comes from foreigners in Africa. However, in the long run, the quality of contemporary African arts will reflect the standards Africans set for them. To produce art valued by Africans is the most difficult challenge faced by the artists, and the most significant.

The exhibit was planned by a committee composed of scriptwriter Helen Chandra, designer Robert Martin, and graphic designer Clifford Abrams of the Department of Exhibition; David Pressler, representing the Department of Education; and the author.



Tie-dyed cotton cloth, designed by Mrs Kadiato Kamara, Freetown, Sierra Leone

Educational programs

The many educational programs to be presented in conjunction with the exhibit are under the direction of Dr. Alice Carnes, chairman of the Museum's Department of Education. They include performances, demonstrations, three film series, dance workshops, arts workshops, and exhibit/kits for Chicago area schools and community organizations. (A partial schedule of activities may be found following this article.)

Some arts, such as dance, music, drama, and poetry, can be fully appreciated only through live performances. Therefore, performances by Africans in the United States and by Afro-American groups that have studied African arts have been scheduled. There are also artistic techniques that can be best appreciated by seeing the process as well as the product; thus, a series of demonstrations by Africans in the United States has been arranged. Carolyn Blackmon, the Museum's coordinator of special educational services, has organized these activities.

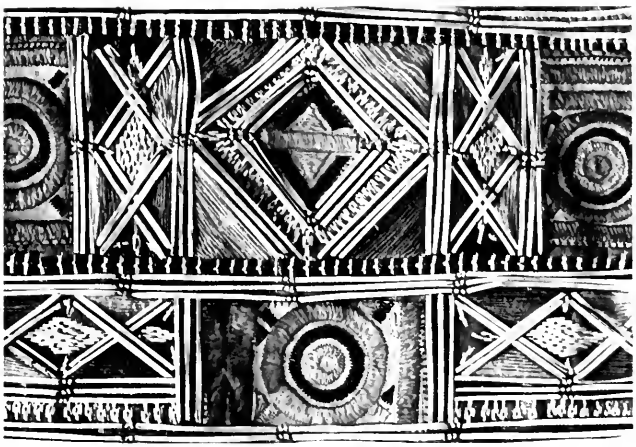
The three film series of the festival will be comprised of a group of short films shown repeatedly during weekdays; a Friday evening series of films by African film maker Ousmane Sembène; and a Sunday afternoon showing of major feature-length films. The films depict many aspects of African cultural life in addition to art, and they document arts in their natural contexts. In charge of the film series is Ann Prewitt, Department of Education volunteer.

J. L. Williams, Outreach Program instructor, will offer an African dance workshop for thirty teenagers from high schools and community organizations in the Chicago area. Students who play musical instruments will also be welcomed to participate in the four six-week workshops. Through the use of ethnographic accounts, films, and music, students will examine the form and content of "coming of age" ceremonies in Africa. Utilizing cross-cultural perspectives, participants will then consider the phenomena in the urban environment. How does a person pass from one age to another? What are the cultural cues that tell us when we pass from one stage of growth to another? Using information derived from African sources, and with the thoughts and reflections of the participants, students will develop their own "coming of age" ceremonies, and perform them.

Woven tapestry by Fatima from the workshop of Ramses Wissa Wasset, Harrania, Egypt (Collection of Betty and Theodore Tieken)

Big Orange, oil painting by the Ethiopian painter Skunder Boghossian (Collection of the artist)

Counter repoussé copper panel by Asiru Olatunde, Oshogbo, Nigeria



Detail of Tuareg leather saddlebag, Agadez, Niger

Calabash carved by Peter Nzuki, Kenya

"Genre Scene," from the Ramses Wissa Wasset Weaving Workshop, Harrania, Egypt

Two workshops weekly, each two sessions, on African tie-dye and wax resist dyeing, also will be offered. Working under the principle that modern design is a link to the past, the students will tour the African art exhibit then proceed to the workshop to discuss forms, design, and traditional African techniques of tie-dye or wax resist. Participants will design and dye fabrics for wall hangings, scarves, or costumes. These workshops invite the participation of senior citizens, or of community youth groups for ages nine through the teens.

Thirty exhibit/kits will be made available on a loan basis to Chicago area schools and community organizations through the Harris Extension Division of the Museum's Department of Education. They are being developed by David Pressler, coordinator of the Harris Extension Division, and Cynthia Mark, researcher/assistant. These educational kits will present some of the arts included in the main exhibit: architecture, leatherwork, sculpture, calabashes, and textiles. Each exhibit/kit will contain artifacts that may be handled by educators and students, a program and activity guide, color slides, and exhibit panels. Each exhibit/kit is designed to be a self-contained experience. However, it can also serve as an introduction to the main exhibit for groups planning to visit the Museum.

African arts shop

In Hall 27, between the exhibit and the small theater (for films, workshops, and demonstrations), there will be a shop devoted exclusively to contemporary African arts available for purchase by all visitors to the Museum. Many of the items will be the work of artists featured in the exhibit; however, a greater variety of arts will be available in the shop than will be featured in the exhibit. All will be labeled with artists' names, places of origin, or with information about the use of the artifact in African culture.

The festival book

A paperback book published in conjunction with the festival, entitled *Contemporary African Arts*, will be available at the Museum's main bookshop and at the festival shop. Its 120 pages contain 120 black-and-white photographs and 12 color reproductions, in addition to essays on the various art forms featured in the festival. Appendices include lists of African artists currently residing in the United States, selected African and Afro-American dance, drama, and music groups in the United States; a recommended film series; distributors of films on Africa; films by Africans; and a list of sources of imported African arts that may be purchased. Also available will be color slides of artifacts in the exhibit, for use with the book in teaching classes on contemporary African arts.

Conclusion

If African arts are exciting, it is because African cultures are exciting and dynamic. This, more than anything else, is the message of this festival. The variety, the richness, the high quality, and the innovation one finds in contemporary African arts are indicative of cultures that are changing and evolving in their own unique directions.

AFRICAN ARTS FESTIVAL EVENTS, APRIL & MAY

Educational programs

April 20 & 27 — Royal African Puppet Theatre demonstrations by Baba Alabi S. Ayinla, of Yoruba. For children and adults. At 10:30 & 11:30 a.m., in the James Simpson Theatre.

May 4 — Ayinla Puppet Workshop students' performance. At 10:30 a.m. in the James Simpson Theatre.

May 11 — Batik demonstrations by Samuel Nyunuri, of Kenya. At 10:30 & 11:30 a.m., and 2:00 & 3:00 p.m., in Stanley Field Hall.

May 18 — Dance and drum performances by Ladji Camera, of Guinea. At 10:30 & 11:30 a.m., and 2:00 & 3:00 p.m., in Stanley Field Hall.

Films

(In exhibit area)

Daily, 1:30 p.m.

April 20-26 — "The Hadza" and "Bitter Melons" depict the disappearing way of life of the hunter-gatherers.

April 27-May 3 — "The Tuareg," "Nawi," and "Masai Warrior: Child of Two Worlds" picture the pastoral way of life in traditional Africa.

May 4-10 — "The Dry Season" and "African Village: Guinea" depict traditional village life in Africa.

May 11-17 — "Malawi: Two Young Men" and "Women Up In Arms" show conflicts involved in the transition from traditional into modern African societies.

May 18-24 — "Heritage of the Negro" and "In Search of Myself" portray the historical and cultural background of the arts in Africa.

May 25-31 — "The Creative Person: Leopold Sedar Senghor" and "The Swamp Dwellers" depict the literary and theatrical arts in Africa.

Fridays, 7:30 p.m.

Films of Ousmane Sembene

April 26 & May 4 — "Barom Sarret" and "Tauw," both set in Dakar, follow their male protagonists through a day in their lives, which is also a day in the life of their country.

May 3 & 31 — "Black Girl."

May 10 — "Mandabi," a comedy telling the story of an illiterate old man who is cheated out of the proceeds of a money order by a series of corrupt officials.

May 17 — "Emitai," the first African epic, depicts southern Senegal during World War II, and portrays the cruel effect of the French conscription of Africans in a tiny rice and fishing village.

Sundays, 4:00 p.m.

Feature films

April 28 — "The Lion Hunters," suspenseful tale of the men of Niger who hunt lions with bows and arrows. Grand Prize winner, Venice Documentary Film Festival.

May 26 — "Benin Kingship Rituals" and "Galede."

Chinese Cat Painting

by Berthold Laufer

An anonymous sixteenth-century Chinese writer once described the perplexity of poet-statesman Ou-yang Hsiu as he stood silent before a painting of a cat; the animal was shown crouched near a clump of peonies. Ou-yang, however, could see no message or significance in the painting. At last, a neighbor came by, glanced at the painting for a moment, and offered this explanation: "The subject of the painting is midday. Observe that the peonies are fully open and rather dull in hue—the proper condition of flowers at noon. The cat's pupils are thin black slits—just the way they should appear when the sun is brightest."

Field Museum has a number of Chinese cat paintings, all collected during the Mrs. T. B. Blackstone Expedition to China and Tibet (1908-10), and it is indeed intriguing to study them and to ponder their poetic symbolism.

Note: The romanization system for Chinese names used by the author in this article may differ in some instances from current usage.

Two sleeping cats by Yun Shou-p'ing (1633-90), considered the greatest artist of the Ch'ing dynasty. Ink on paper. The caption at upper left reads: "The rat has overturned your bowl while you did not look, and now you decline to search for butterflies beneath the flowers, and have fallen asleep—what a sin!"

The preoccupation of Chinese artists with nature scenes, animals, birds, fishes, and insects was a logical development as the precepts of Taoism and Buddhism affected every facet of Chinese culture, including, of course, art. The harmony of man with nature was basic to both philosophies. The cat was of particular importance as traditional guardian of mulberry bushes (the food plant of the silkworm), although the plants most evident in cat paintings are conspicuous flowering types such as the chrysanthemum and peony. The first known cat paintings appeared as early as the T'ang Dynasty (A.D. 618-906); by the Sung Dynasty (960-1279) the genre had come into its own.

Through the centuries cats have continued to be favorite subjects for Chinese painters. Tzu Hsi (1834-1908), the eccentric dowager empress who was all-powerful in the twilight years of the Ch'ing Dynasty, commissioned cat paintings as gifts. Field Museum's collection includes one of these, the bright seal of the empress stamped boldly upon it [*see illustration p. 12*].

A cat with one or more butterflies has been a popular motif since cat paintings first appeared. The combination is regarded as a rebus, the characters for "cat and butterfly" being pronounced the same [*mao tie*] as those for "the age of ninety years." The gift of a picture showing a cat together with one or more butterflies was thus intended to wish the recipient a long life [*see illustrations pp. 10, 13*].

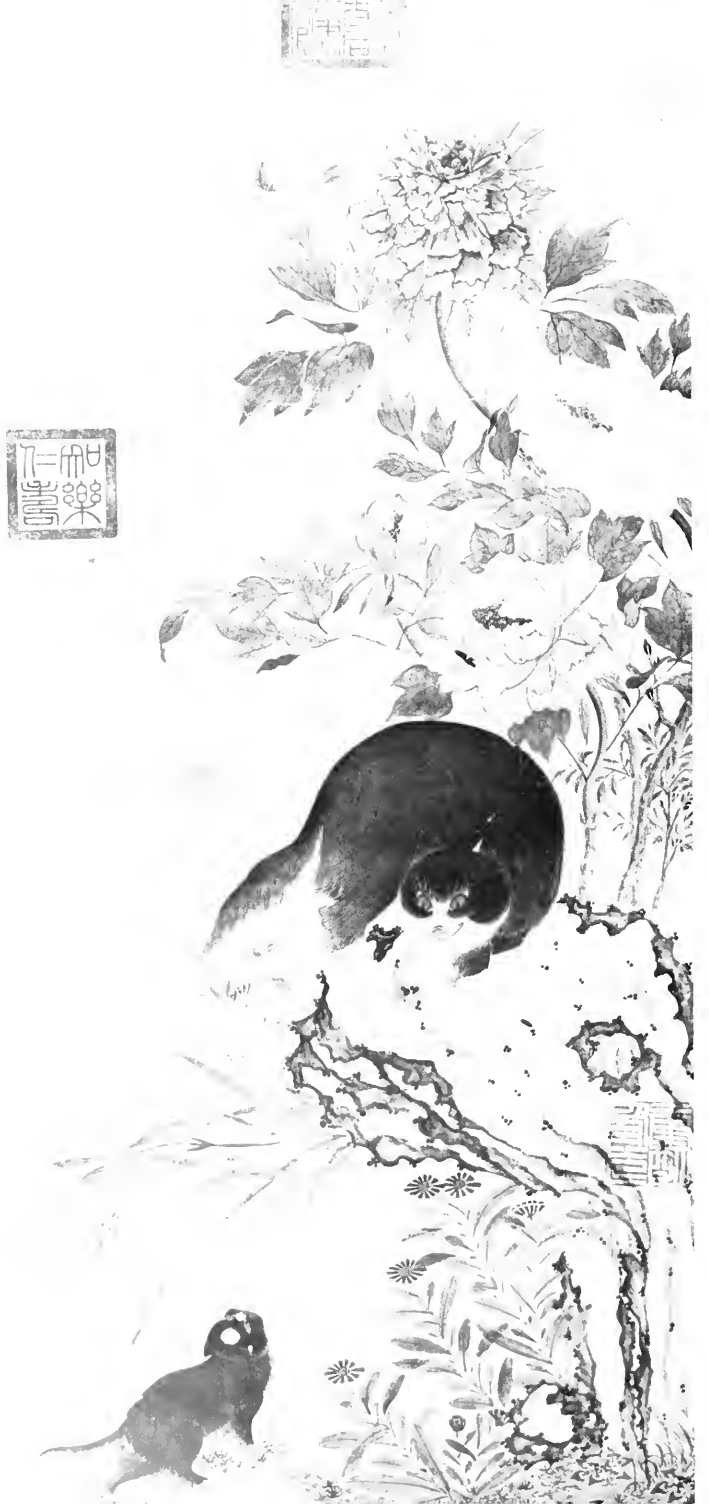
Early European painters placed cats in the parlor, near the hearth, or on the threshold; but always in human company. The domestic character of the cat was plainly evident, and the animal was symbolic of homey comfort, tranquillity, and ease. Chinese cat paintings, on the other hand, never show cats together with man, nor indoors, and rarely in the proximity of human abode. It is the animal itself, for its own sake, that interests the Chinese artist. He portrays it not as a servile animal, not from the utilitarian point of view as a mouser, but as an exquisite creature of nature, free and independent in a natural setting, and attracted by birds, flowers, or insects. This is not merely an imaginative conception; it rests on accurate observation: cats, especially on a fine summer day, are fond of taking long forays into the woods and fields, basking in the sun, observing with keen eyes, and of course, hunting for prey. It is obvious that they have an appreciation for nature; and it is this quality that the Chinese painters have recognized and commented on in their art.

Cat and butterfly by Yun Yuan-fu (18th cent.). On silk. Cat. No. 116068. (Photo by Herta Newton)

T'ang Dynasty (618-906)

According to a catalogue of the Emperor Hui Tsung (reigned 1101-1126), compiled about A.D. 1162, Wei Wu-tien was the first artist to portray cats. Wei was a renowned animal painter who worked at the court of the Emperor Ming Huang (eighth century). Three of his extant pictures are devoted to cats: "Playing

A tortoise-shell cat framed by peonies and chrysanthemums peers suspiciously at a rooster above. On paper. The painting is a copy of an earlier one by Hua Yen, a seventeenth-century artist; the copyist has modestly omitted his own name. The legend reads: "May you be promoted one grade in your official career! May your steps reach the Phoenix Mountain! Painted in the year yi-wei (which may be 1715, 1775, or 1835, as the cycle is not given), in the last decade of the melon month. Painted in the district of Po-ling, in the inn where the fairies assemble, beneath the east window, in imitation of a subject by Sin-lo shan-jen." Cat. No. 11b080. (Photo by Herta Newton)



Cats," "Mallow Plants and Cats," and "Cats Playing in Rocky Hills."

Tiao Kwang, also known as Kwang-yin, is classified by some historians as a T'ang Dynasty artist; others assign him to the Five Kingdom period (907-960) on the false assumption that he settled in Szechuan Province in A.D. 936. He did not, however, move to that region until several decades later. Thus, T iao indeed lived at the end of the T'ang, although his lifetime may have extended into the Five Kingdom period. Among his cat pictures are paintings of sporting cats with rocks, peach blossoms, or bamboo.

Five Kingdoms (907-960)

Perhaps the most distinguished artist of the Five Kingdom period was Huang Ts'uan. A disciple of Tiao Kwang, Huang was at one time represented in the Chinese imperial art collection by nearly 400 works; 13 of these portrayed cats. Huang Tsuan's second and third sons were both cat painters. The latter, Huang Ku-tsai, painted nine cat pictures that found their way into the imperial collection.

Other notable cat painters of this period included Li Kwei-chen, a Taoist priest who also excelled in painting oxen and tigers; and Li Ai-chi, who was mainly a landscape painter. While Ai-chi's contemporaries adhered slavishly to the convention that cats appear beneath flowers, he was the first to paint them amid medicinal herbs and sprouts. Each of the eighteen examples of his brush that have come down to us show kittens rather than

A sassy little pug dog and a black cat, back-arched, exchange felicitations. On paper. This is one of numerous paintings that bear the seal of the dowager empress Tz'u-hsi (1835-1908) and which were done by her court painters to be given in her name. Cat. No. 116177

full-grown cats. They are titled variously "Playing Cats amid Medicinal Herbs and Sprouts," "Sporting Cats," "Mother Cat and her Young," "Intoxicated Cats," "Mother Cat and Young Playing," "Wasp and Cat," and so on.

The Venerable Master Ho (Ho Tsun-shi), a prolific painter, was represented in the imperial collection by 34 cat pictures. An early account describes Ho at some length:

"It is unknown where he came from. In the Lung-te period (A. D. 921-23) he lived on the sacred Mountain Heng (in Hunan province) without revealing his name. His sole pleasure was to play with brush and ink. He painted flowers and rocks, and moreover was an expert at painting cats. These pictures elicited due praise from his contemporaries. His cats sleep and wake, walk and sit, congregate and play, disperse and run away, watch rats, catch birds, lick their chops, and gnash their teeth—all this found expression in his pictures. The cat's behavior was caught by him in a manner unsurpassed and faultless.

"He used to say that a cat resembles a tiger in all but two respects: the size of the ears and the yellow color of the eyes. But what a pity that the Venerable Master did not develop his

A white and black cat is intrigued by two butterflies just out of reach. On paper. Signed by Shen Chen-Lin (died about 1908) and dated "On the 13th day of the winter month of the year ting-wei (1907). The flowers on the cliff have been asleep for a long time. Alas, that the butterflies have come back." Cat No. 116112. The Chinese expression for "cat and butterfly" is the same as that for "the age of ninety years." Thus, the gift of a painting with this motif carried the wish that the recipient live to a ripe old age. The Museum also has from this artist a painting of a pekinese dog (dated 1862) and two scenes illustrating incidents in a novel (dated 1890).

Cat with captured bird, a common motif. On silk. Probably from the Ch'ien Lung period (18th cent.).

talents and did not advance to the painting of tigers! He stopped at painting cats. His actions apparently did not conform with the conventional itinerant hermit, yet I think that his love for wandering and playing has a parallel with the life of cats."

Sung Dynasty (960-1279)

Hui Tsung (reigned 1101-1126), the last emperor of the Northern Sung, and the most famous artist-emperor, is generally believed to have executed at least one cat painting. Some authorities, however, doubt that any of the numerous paintings attributed to Hui Tsung (and which bear his seal) were actually done by him. The Hui Tsung style, in any case, is distinctive for its rather decorative nature, simple style, and small format.

The foremost of Sung cat-painters was Wang Ning, who specialized in flowers, bamboo, birds, and animals. Parrots and cats were his favorite subjects. Only one of his paintings found its way into the imperial gallery—"Lion-cat on an Ornamented Garden Seat," which was remarkable for the intrusion of human artifact.

K'i Su was noted as a painter of flowers, bamboo, and birds; but oxen—especially fighting bulls—and kittens were his forte. At one time the imperial collection included 44 works by this artist.

Su Hi, who distinguished himself with paintings of flowers and insects, was represented in the imperial collection with six cats combined variously with peonies, bees, butterflies, and spinach.

Su Ch'ung-lu, a grandson of Su Hi, showed some originality in painting cats together with day lilies—a flower worn by women who wish to bear sons. In such cases the cat was intended as an emblem of fertility. The theme of the day lily was perpetuated by Chao Ch'ang (11th century), who is known to have done at least nine cat paintings, two of them depicting this flower. He also portrayed cats together with pomegranate flowers, another symbol of fertility and child-blessing.

I Yuan-ki, who flourished in the latter part of the 11th century, drew his animals from life, rearing and studying them in his garden. In this respect he was unique, for traditionally Chinese artists worked from mental images.

Nearly seven centuries have passed since the end of the Sung Dynasty—the "golden age" of cat painting. It is not improbable that by the end of that era many thousands of paintings of this genre had been produced. Few, unfortunately, have survived. Typically, Chinese paintings were done on the most impermanent of materials—silk or paper—materials that were easily destroyed by water, fire, mildew, vermin, or that simply deteriorated chemically with the passage of time.

Berthold Laufer, 1874-1934

The foregoing essay on "Chinese Cat Painting," by Berthold Laufer (1874-1934), is from a manuscript dating from the 1920s or early 1930s that was only recently found among Dr. Laufer's papers.

One of the most distinguished scholars ever to serve on the Field Museum staff, Dr. Laufer was curator of the Department of Anthropology from 1915 until his death in 1934. He had joined the Museum in 1907 after serving briefly with the American Museum of Natural History and Columbia University in New York City. A native of Cologne, Germany, he was awarded a doctorate in anthropology from the University of Leipzig in 1897. Between 1899 and 1904 he led expeditions for the American Museum among tribal peoples of Siberia and North China. Later, for Field Museum, he led two more expeditions to the Far East: the Mrs. T. B. Blackstone Expedition to China and Tibet (1908-10) and the Marshall Field Expedition to China (1923).

At the time of his death Laufer was generally acclaimed as the greatest living authority on peoples of the Far East. He was skilled in a number of Asian languages, including Chinese, Japanese, Manchu, Mongol, Tibetan, Malay, Pali, Sanskrit, and Persian. His intellectual interests were as far-reaching as his writings were prolific. Laufer's most influential work, *Sino-Iranica* (1919), traced the migration of cultivated plants from Persia to China and the contribution of the Persians to Chinese culture; it also dealt with drugs, animals, and minerals. He regarded *Jade* (1912)—a storehouse of information about Chinese archaeology and religion—as his most important work. He also wrote on matters as diverse and esoteric as Chinese clay figurines, Mongolian literature, the prehistory of aviation, the history of the pineapple, cricket fighting, pigeon whistles, and the history of eyeglasses in China. At the time of his death he had completed more than 800 pages of a work on the history of cultivated plants.

"Chinese Cat Painting" was brought to light by Dr. Hartmut Walravens, of the University of Cologne, who recently spent several weeks at Field Museum studying the papers of Dr. Laufer.

Ray A. Kroc Environmental Education Program

The Ray A. Kroc Environmental Education Program, Spring 1974, will focus on human impact on the environment. Topics include land, populations, pollutants, ecological research, energy, and the future. Program elements consist of field trips, lectures, films, workshops, and courses designed to inform citizens about important environmental questions facing them now and in the future. This program is being made possible by the Ray A. Kroc Environmental Fund, which recently was established at Field Museum by his friends to honor Mr. Kroc, chairman of McDonald's Corporation, on his 70th birthday. Other events of this new program will be presented in coming months and years.

To encourage participants to translate concern and knowledge into action, follow-up reading information and lists of environmental organizations will be provided. All programs take place at or originate from Field Museum.

Saturday, April 6

Course: **"Nature Photography."** The first session in a series of 6, to be held on successive Saturdays, April 13 through May 11. The course will cover basic problems of nature photography, exposure, focus, lighting, close-ups, composition, and trouble shooting. Designed by amateurs with some knowledge of photography and who have a single lens reflex camera. Four lectures and two field trips. Limited to 40 persons. A $10 fee holds advance registration, and covers all expenses other than students' film. William Burger, Field Museum, project director. North Meeting Room, 2nd floor, 9:30 A.M.

Film: **"Multiply and Subdue the Earth."** A provocative study of land usage and planning, film narration by Ian McHarg, author of the best-selling book *Design with Nature*, produced by NBC-TV. Lecture Hall, 10:30 a.m. and 1:00 p.m.

Adult field trip: **"Planned Communities."** Tour of 2 Chicago-area planned communities: Four Lakes and Park Forest South. Limited to 40.* Gunnar Peterson and Wayne Schimpff, Open Lands Project, leaders. North Parking Lot, 9:00 a.m.

Saturday, April 20

Field Trip for High School Students: **"Indiana Dunes."** Introduction to the skills of backpacking, survival, reading the landscape, and ecological relationships. Limited to 30 students, ages 15-18.* James Bland, leader. North Parking Lot, 9:30 a.m.

Sunday, April 21

Lecture: **"Alternative Paths to the Future."** Willis H. Harman, Stanford Research Institute. James Simpson Theatre, 2 p.m.

Saturday, April 27

Course: **"Urban Streams."** First session in a series of 6, to be held on successive Saturdays, May 4 through June 1. Course will include seminars, field trips, and research in water flow problems, resilience of biological populations in water, and research techniques in the city. Limited to 40 persons, 15 years or older. A $15 fee holds advance reservation and covers all expenses. Donald Myers, Gary Milburn, biologists, EPA, project directors. Ground Floor Classroom, 9:00 a.m.-12:30 p.m.

Film: **"Insect War."** A BBC film exploration of research techniques and findings in man's battle with insects for food crops. Lecture Hall, 10:30 a.m. to 1:00 p.m.

Sunday, April 28

Film: **"Insect War"** (Repeat). Lecture Hall, 11:00 a.m.

Symposium: **"Ecological Research at Field Museum,"** by Field Museum staff. Henry Dybas, entomologist, "Cicada: Strategy for Survival"; Lorin Nevling, botanist, "Implications for Change in the American Tropics"; Robert Johnson, ichthyologist, "Aspects of Oceanic Ecology"; Robert Inger, assistant director, science and education, moderator. James Simpson Theatre, 2:00 p.m.

Saturday, May 4

Film: **"Time of Man."** How man adapts to his environment is analyzed and the changes resulting from adaptation and discovery in several societies are investigated. Lecture Hall, 10:30 a.m. and 1:00 p.m.

Sunday, May 5

Film: **"Time of Man"** (Repeat). Lecture Hall, 11:00 a.m.
Lecture: **"Energy for the 70s,"** Philip H. Abelson, editor of *Science*. James Simpson Theatre, 2:00 p.m.

Saturday, May 11

Field Trip for Young People: **"Hidden City."** First session in a series of three (remaining sessions held on Saturdays, May 18, 25). Field studies of plant and animal populations in park and lakefront areas near the Museum. Limited to 15 students ages 8-12. A $2 fee holds advance registration. Gerald Jacob, University of Chicago, leader. North entrance, 10:00-11:30 a.m.

Saturday, May 18

Adult Field Trip: **"Ecological Communities."** Introduction to variety of ecological communities within Palos Park Forest Preserve. Limited to 40 adults.* Harry Nelson of Roosevelt University and John A. Wagner of Kendall College, leaders. North Parking Lot, 9:00 a.m.

Saturday, May 25

Adult Field Trip: **"Kennicott Grove."** Explore natural history of the site, the impact of developers, and learn historical background of this prairie grove in the northwest suburbs. Limited to 40 adults.* Gunnar Peterson and Sara Segal of Open Lands Project, leaders. North Parking Lot, 9:00 a.m.

*Reservations will be confirmed when received. A $4 fee to cover lunch and transportation also holds advance reservation.

Subsequent programs, through June, will be announced in the May and June *Bulletins*.

For further information call Carolyn Blackmon, 922-9410, ext. 361 or 363.

FIELD BRIEFS

Students See Electron Microscope in Action

Photo by G. Henry Ottery

They've never seen a microscope like this one before. Fred Huysmans, technician in the Museum's scanning electron microscope laboratory, shows students from New Trier East High School, Winnetka, why the new microscope is such an important research tool at Field Museum. These students and their classmates also toured the Division of Invertebrates

Members' Nights, May 2 and 3

Field Museum's annual open house for all members will be held on Thursday and Friday evenings, May 2 and 3. Scores of interesting activities, exciting displays, and demonstrations will be featured from 6:00 to 10:00 p. m. on both evenings.

Some events will take members "behind the scenes" in the departments of anthropology, botany, zoology, geology, education, and exhibition; others will occur in public areas. They will include an exhibit of pottery and a demonstration of pottery-making techniques, a lecture and slide show on life as it was more than 600 million years ago, and a stunning display of exotic butterflies and moths.

There will be a weaving and spinning demonstration, a crafts workshop, a surprise children's tour, and a film on the reconstruction of Japanese and Chinese paintings.

Staff members of the Botany Department will also show two special projects, "Terraria: From desert to bog—low maintenance gardens under glass," and "Dwarf vegetables—a garden in your window box."

A program of entertainment will be presented at regular intervals throughout both evenings in Stanley Field Hall.

Collegians Translate Museum Guides into Spanish

Photo by G. Henry Ottery

Six Spanish language majors from Lake Forest (Ill.) College recently participated in an internship program at the Museum. They were responsible for translating into Spanish the Museum's visitor guide, a general information brochure, and two children's journey guide sheets, and devised a self-guided tour highlighting the Museum's Latin American exhibits. Shown working with the students are Prof. George L. Speros, chairman of the college's Department of Foreign Languages, and Marie Svoboda, coordinator of the Museum's Raymond Foundation. The students (l. to r.) are: Rebecca Moore, Middletown, R.I.; Gari Kaufman, Santurce, Puerto Rico, Miguel A. Guzman, Bronx, N.Y.; Jeanne Erderig, Milwaukee, Wis.; Lisa Savin, Evanston, Ill., and Terry Garias, Bogota, Colombia

Grand Canyon Geology Field Trip for Members

August 16-24

A few places remain open on this exciting river trip focusing on the geology of the Grand Canyon. Most of the time will be spent on rubber rafts traveling down the Colorado River and on inner-canyon hikes. The nine-day course will be conducted by Dr. Matthew H. Nitecki, associate curator, Department of Geology.

Cost of the course is $700, which includes all expenses (air fare, boat fare, meals, and one night's lodging—double occupancy). A $200 deposit is required to hold your reservation. Camping supplies (sleeping bags, blankets, etc.) are available at destination for an additional $20 to those who do not wish to take them along, but should be requested prior to departure. For further information, please write or phone Mrs. Madge Jacobs, 922-9410, ext. 343.

Erratum

In the article, "Carbon Monoxide-the bright side to the pollution coin" (February 1974 *Bulletin*, p. 6) appeared the statement "... if 4.1 billion tons of CO are being put into the atmosphere each year, and the steady state amount is only 530 million tons, then around 3.6 billion tons of it are being broken down each year."

In order for a *steady state* to exist, the inflow rate and the outflow rate must be identical and 4.1 billion tons must be broken down each year also, not the 3.6 billion tons as stated, otherwise the atmosphere would annually acquire an additional 530 million tons. I thank Mr. J. W. Knoderer of Bloomington, Indiana, for spotting this error. —*Edward J. Olsen, curator of mineralogy*

Relative's Pottery Displayed

Photo by James Swartchild

While viewing one of the Museum's American Indian displays, visitor Mrs. Norma Ami, a Hopi Indian from Polacca, Ariz., thought she recognized a pot as having been made by her grandmother, "Butterfly" Poolie. Closer examination confirmed it.

Journey Highlights City Creatures

Photo by G. Henry Ottery

Animals that have made their homes in the concrete environment of the big city are the subject of the Museum's Spring Journey for Children, "City Creatures." These youngsters are among many who every day pick up a journey sheet at the information desk and take the self-guided tour of Museum exhibits. "City Creatures" continues through May.

Volunteers Honored at Reception

Photo by James Swartchild

Mr. and Mrs. Sol Gurewitz, Chicago, chatted with Museum President Blaine J. Yarrington (right) during a reception honoring the Museum's 143 volunteers. Mr. Gurewitz logged more than 600 hours of work in the Department of Anthropology during 1973. Altogether, volunteers gave 27,989 hours of service.

Antelope, gerenuk, or gazelle?

Sirs:

Heaven forbid that the Museum should be in error in naming an animal, but in your issue of February 1974, on page 9, there is a picture captioned "Drought in the Serengeti: Gazelles strip leaves from low branches." Unless I am sadly mistaken, the two animals in the picture are gerenuk, and the manner in which they are feeding is typical of that species whether or not there is a drought. My wife and I were in East Africa just a year ago, and we saw any number of these animals, and this is their normal feeding operation. We thoroughly enjoy the *Bulletin*, and it is fun to catch you in an error.

William O. Kurtz
Winnetka, Illinois

The animals in the photo are, indeed, gerenuk, defined in one source as "gazelle-like antelope." The gerenuk is also known as "Waller's gazelle."— Ed

On Carbon Monoxide. . .

Sirs:

Your new February issue was most helpful to me with its lead article, "Carbon Monoxide: the Bright Side to the Pollution Coin." My magazine was one of those which in recent years perhaps over-emphasized the dangers of carbon monoxide attendant upon our American fascination with the automobile. Dr. Olsen's article gives me great personal relief, and if I can manage to get its message out to United Methodist ministers over the nation, it should help a good many others also. Thanks for a good issue, and a generally interesting magazine throughout the year.

William C. Henzlik (Rev.)
Editor, *Today's Ministry*

Sirs:

Thank you for (the extra copies) of Dr. Olsen's article. The copies will be put to good use; our boys will especially find Dr. Olsen's (article) useful. One copy will go to Tanzania, East Africa where my missionary cousin is working with the Sonjo tribe and helping a medical doctor in research. Another copy will be sent to another cousin, Dr. Poulin, a perma-frost scientist in Bethesda. And still another copy will go to our friend in the Navy in Aerospace. Then we will hoard a couple copies until someone is properly appreciative.

Mrs. Robert L. Jorgensen
Glenview, Illinois

Sirs:

On "Carbon Monoxide, the Bright Side of the Pollution Coin":

First: Accepting the figures as given by Dr. Olsen, I do not agree with his statement that "The man made production of carbon monoxide is an insignificant factor in the amount of this toxic gas in the atmosphere." We recently returned from a tour by automobile . . . In Mexico City, where we stayed for two weeks, the pollution was so bad that half the time we saw the sun through a halo, and all of the time our eyes smarted and teared from the acrid fumes in the air. In Los Angeles (in southern California in general) and in Chicago within a radius of one and one-half miles from State and Madison streets, the same conditions prevail to a much lower degree. Now, if, as Dr. Olsen states, the duration of the carbon monoxide molecule is about ten days, then, except during the rainy season and on windy days, there was always a ten-day accumulation of carbon monoxide which was emitted from automobile exhausts, along with the acrid fumes, and I do not call that quantity "insignificant."

Second: Dr. Olsen states that "several yards of pipes and tubes, etc." were needed to reduce engine emitted pollutants, and that they affected adversely the engine performance. This has been the insistent argument of the automobile industry against the standards to be applied in 1975 and thereafter, which, they say, will be impossible to meet. I don't buy that. We bought a 1972 Plymouth Valliant in November of 1971. Last September I had it tuned up and took it through the testing lanes operated by the Department of Environmental Control. The tests showed 41 PPM of hydrocarbons and .2 of one percent of carbon monoxide against the "impossible to meet" 1975 standards of 250 PPM for hydrocarbons and 1.5 percent for CO.

Third: Reduction of engine-emitted pollutants need not reduce gasoline mileage; on the contrary, since it requires maximum operating efficiency it *must* be accompanied by increased mileage per gallon. We drove 11,500 miles at an overall average of 26.1 mpg. I kept a record of mileage between fills, dividing amount of fill into intervening mileage, and mpg varied from 23.4 in cities and increasing altitudes to 30.0 for 1,600 miles of decreasing altitudes and some west winds eastwards out of Los Angeles.

Here's to smaller cars and cleaner engines *without* "gadgetry."

Sam Hirsch
Chicago, Illinois

Regarding Mr. Hirsch's first point: After pointing out that man was responsible for only 6.5 percent of the atmosphere's carbon monoxide — "an insignificant factor" — Dr. Olsen went on to state, "This is not to say that CO is not a hazard under many circumstances. Before it disperses and decomposes it can be concentrated in toxic or near toxic amounts. Certainly during rush hours at street level on major avenues in the canyons of Chicago, New York, and other large cities CO can temporarily rise to serious levels. Weather conditions can occasionally retard the dispersal of auto exhaust for several days."— Ed

On Spanish prehistoric art. . .

Sirs:

I was very interested in reading in the October issue your article on Spanish Prehistoric Art. I was interested to read about Maria, who was the discoverer of Altamira. In 1926 I went across Spain fourth-class on the train and walked to her house in order to have her describe this discovery. Unfortunately she told me honestly that she remembered nothing about it! In the Department of Anthropology there is a fine series of photographs from the Laguna de la Janda where I rode on a pony beside the Abbe Breuil, also in 1926, and visited many rock shelters and caves.

Henry Field
Miami, Florida

Henry Field was Field Museum's curator of physical anthropology 1937-41.—Ed

Museum to be Rededicated To Meeting Future Needs

A rededication of the Museum, now undergoing rehabilitation, has been scheduled for the first week of June, in commemoration of the 53rd anniversary of the Museum's opening at its present location.

The occasion will focus attention on the Museum's current efforts to ensure that its facilities and services will enable it to continue its prominent roles as researcher, collector, educator, and exhibitor in decades to come and into the 21st century. The renovation and modernization programs that will make this possible are being financed by the Museum's $25-million Capital Campaign, scheduled to conclude this fall. It is the Museum's first capital campaign, providing the first major renovation programs for its present building. It will also provide for the preservation of the architecture of one of Chicago's earliest and most distinctive institutional structures.

In recent years especially, the institution has increased special programming and services that respond to the cultural enrichment needs of modern urban populations. The Museum will rededicate itself to meeting this need and others.

Rededication plans call for removing the Museum cornerstone at the north entrance stairs, and placing within it documents relating to the building rehabilitation program and the Capital Campaign.

The outdoor site of the rededication will further focus attention on the rehabilitation program, as the stairs are undergoing waterproofing and rebuilding prior to the construction of new centralized administrative offices beneath them. The south entrance stairs, also, are being rebuilt.

Other work in progress includes construction of eight new emergency exits as well as freight and passenger elevators; preliminary work for the conversion of the center west lightwell into new storage, lab, and office facilities for the Department of Zoology; and the installation of a new security key system.

Among already completed projects are new facilities for the Department of Exhibition; the installation of the scanning electron microscope laboratory; and conversion of the coal-fired boilers to natural gas.

To continue for many years, the ambitious rehabilitation program is being financed on a matching basis by the Museum, which is soliciting donations, and by the Chicago Park District, through its bonding authority. The Museum must still raise nearly $2 million of its $12.5 million share, and is appealing to its members for further gifts.

CAPITAL CAMPAIGN CAPITAL CAMPAIGN

Western Electric Presents Campaign Gift

Upon presentation of the second installment of Western Electric's $30,000 gift to the Capital Campaign, Museum Director E. Leland Webber explains construction plans for new passenger elevators to Wyllys E. Rheingrover, general manager of Western Electric's Hawthorne Works (center), and Jack Wier, the company's director of industrial relations.

Photo by G. Henry Ottery

APRIL at Field Museum

Exhibits

Opens April 20

Contemporary African Arts Festival, the first comprehensive exhibit of its kind in the United States, features the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as music, films, lectures, dances, and other events. Through November 3, Hall 27. See p. 8 for special events.

Continuing

Edwin Janss Jr. Underwater Photography, an exhibit of exciting color prints. Through September 8. Hall 9.

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature. "A Sense of History" presents a graphic portrayal of the Museum's past, and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

Children's Program

Through May 31

Spring Journey for Children, "City Creatures," a do-it-yourself project for boys and girls who can read and write. It combines Museum exploration with outside activities which are designed to acquaint youngsters with animals that have made their homes in the concrete "wilderness" of the city. Journey sheets in English and Spanish available at entrances.

Film Program

Ayer Adult Spring Film Lecture Series, at 2:30 p.m. Saturdays in the James Simpson Theatre. The April 13 program will also be presented at 7:30 p.m. Friday, April 12.

April 6: "Vanishing Africa," narrated by Lewis Cotlow.
A noted explorer looks at the people and the wildlife of a continent in transition.

April 12 and 13: "Aldabra—Island in Peril," narrated by Ley Kenyon.
The film story of an unspoiled atoll in the Indian Ocean and its diverse animal life.

Join us for coffee after the Friday evening, April 12, film lecture presentation and meet speaker Ley Kenyon.

April 20: **"Alaska Wilderness Lake,"** narrated by Dr. Theodore J. Walker. The total environment of an isolated region is contrasted with thriving urban centers.

April 27: **"Scotland,"** narrated by Bill Madsen.
Views of a picturesque country and its inhabitants.

Sunday, April 7

"Footloose in Newfoundland," free wildlife film narrated by Thomas A. Sterling, presented by the Illinois Audubon Society at 2:30 p.m. in the James Simpson Theatre.

Special Events

Ray A. Kroc Environmental Education Program activities listed on p. 15.

Weaving Demonstration by members of the North Shore Weavers' Guild at 10:00 a.m. to 12:00 noon, and from 1:00 to 3:00 p.m. on Mondays, Tuesdays, and Fridays, in the South Lounge.

Meetings

April 5, 7:30 p.m., Chicago Anthropological Society.

April 9, 7:30 p.m., Nature Camera Club of Chicago.

April 9, 8:00 p.m., Chicagoland Glider Council.

April 10, 7:00 p.m., Chicago Ornithological Society.

April 10, 7:30 p.m., Windy City Grotto, National Speleological Society.

April 11, 8:00 p.m., Chicago Mountaineering Club.

Coming in May

Field Museum's Members' Nights, 6:00 to 10:00 p.m., Thursday and Friday, May 2 and 3.

Hours

9:00 a.m. to 5:00 p.m. Saturday through Thursday and 9:00 a.m. to 9:00 p.m. Friday.

The Museum Library is open 9:00 a.m. to 4:00 p.m., Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410.

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May 1974

Field Museum of Natural History Bulletin

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COVER

Skull of young buffalo (*Bison bison*)

Photo credits

Cover: Dave Walsten. **p. 3:** Compix. **4:** courtesy Kansas State Historical Society. **11:** upper left, John Bayalis, Sr., upper right, lower left, and lower right, G Henry Ottery. **12:** John Bayalis, Jr., **14:** G Henry Ottery. **18:** upper left, David Moore, lower left and right, G Henry Ottery

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Return of the Buffalo

by David M. Walsten

No longer in danger of extinction, the buffalo today thrives on government preserves and private ranches

. . .The causes which led to the practical extinction (in the wild state, at least) of the most economically valuable wild animal that ever inhabited the American content, are by no means obscure. It is well that we should know precisely what they were, and by the sad fate of the buffalo be warned in time against allowing similar causes to produce the same results with our elk, antelope, deer, moose, caribou, mountain sheep, mountain goat, walrus, and other animals. It will be doubly deplorable if the remorseless slaughter we have witnessed during the last twenty years carries with it no lessons for the future. A continuation of the record we have lately made as wholesale game butchers will justify posterity in dating us back with the mound-builders and cave-dwellers, when man's only known function was to slay and eat.

The primary cause of the buffalo's extermination, and the one which embraced all others, was the descent of civilization, with all its elements of destructiveness, upon the whole of the country inhabited by that animal. From the Great Slave Lake to the Rio Grande the home of the buffalo was everywhere overrun by the man with the gun; and, as has ever been the case, the wild creatures were gradually swept away, ...

The secondary causes of the extermination of the buffalo may be catalogued as follows:

- *Man's reckless greed, his wanton destructiveness, and Improvidence in not husbanding such resources . . . .*

- *The total and utterly inexcusable absence of protective measures and agencies on the part of the National Government . . . .*

A buffalo herd grazes peacefully on a government refuge

An 1874 woodcut showing a typical railroad hide yard. Staked hides dry in the sun. Three men in the foreground operate a hide press. Stacked at the right is a bale of hides ready for shipment. Bones piled in the background await shipment to porcelain and fertilizer factories.

- *The fatal preference on the part of hunters generally, both white and red, for the robe and flesh of the cow over that furnished by the bull.*

- *The phenomenal stupidity of the animals themselves, and their indifference to man.*

- *The perfection of modern breech-loading rifles and other sporting firearms in general.*

Each of these causes acted against the buffalo with its full force, to offset which there was not even one restraining or preserving influence, and it is not to be wondered at that the species went down before them. Had any one of these conditions been eliminated the result would have been reached far less quickly. Had the buffalo, for example, possessed one-half the fighting qualities of the grizzly bear he would have fared very differently, but his inoffensiveness and lack of courage almost leads one to doubt the wisdom of the economy of nature so far as it relates to him.

— *The Extermination of the American Bison* (1887) by William T. Hornaday.

Hornaday's protest nearly a century ago against "remorseless slaughter" of the buffalo will come as a surprise to many who assume that environmental concern is a very recent kind of awareness. Fortunately, the efforts of Hornaday and other early-day conservationists saved the day for the buffalo. Numbering perhaps 300 head at the turn of the century, the buffalo has been pulled back from the brink of extinction and gradually been restored. About 45,000 buffalo are currently to be found on federal, state and provincial refuges of the United States and Canada and on private lands.

The buffalo—or "bison," as it is more properly called—had recently been the most populous large mammal in the history of terrestrial life. Curiously, the passenger pigeon—which could well have been the most populous bird species—was slaughtered by man in the groves and forests of North America at almost the same time that the great buffalo herds were being decimated. But those who espoused the rights of pigeons were less vocal than the buffalo-savers; the few pigeons that were left were reluctant to breed, and the species passed forever into oblivion, the last one dying in 1914. (*See* Bulletin, *Sept. 1973.*)

Natural History

Buffalo cows normally mate when they are two years old and bear their first calves, usually singly, at the age of three. Cows retain their fecundity for years and may still bear well-developed calves at the age of 25 or more. Bulls begin to breed when about three years of age and, like the cows, remain fertile for many years. The breeding season normally occurs in July and August. Calves are born the following April, May, or June.

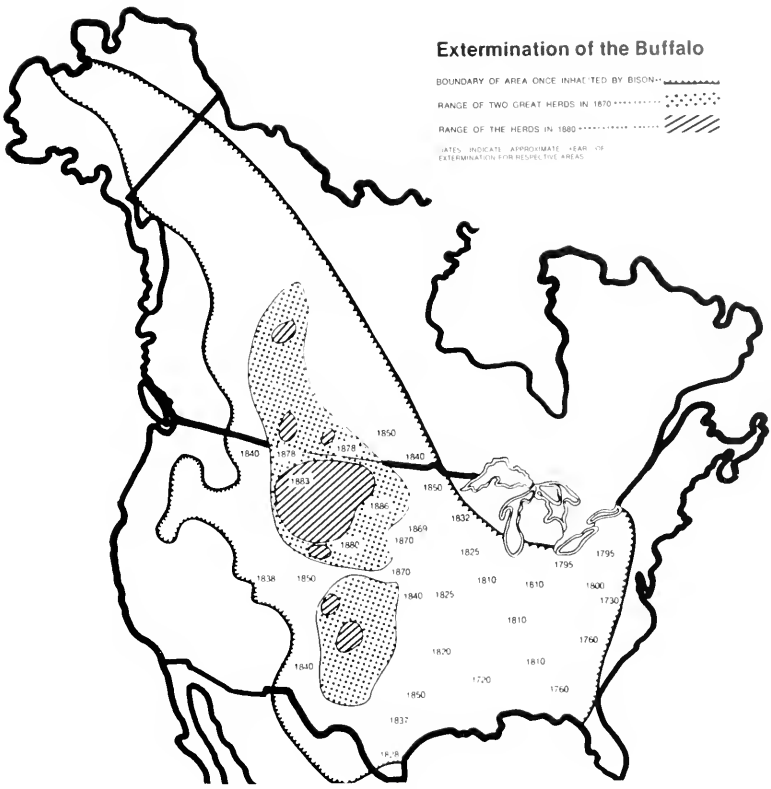
Newborn calves are reddish in color, but after about three months the natal coat is replaced by the dark brown pelage of the adult. Birth weight is 30-70 pounds, but calves grow rapidly and within one year may weigh as much as 700 pounds; two-year-old males may weigh up to 1,100 pounds. Cows reach a maximum weight of about 1,000 after six or seven years; males increase in weight until nine or ten years of age and the average full-grown male weighs about 1,600 pounds. The largest buffalo on record was a ten-year-old bull that weighed 3,340 pounds in 1969. Weight and vigor is normally maintained until the age of about 12 to 15; some animals may live to be 35 or 40.

Distinction is sometimes made between "wood buffalo," which occur generally in woodlands, and "plains buffalo," which occur generally in grasslands. The latter is somewhat smaller and the head is held at a lower angle. Some authorities regard these two animals as separate species.

Buffalo breed readily with domestic cattle, the hybrid being known as cattalo. Females of such a cross are normally fertile, but male cattalo are

not fertile unless they are at least 31/32 domestic. An experiment conducted by Canada's Department of Agriculture demonstrated that hybridization of the two species is not economically practical.

The fossil record suggests that the American buffalo came to North America via a land bridge from Siberia. Some of the early arrivals had horns with a spread of six feet; some had flat horns like those of the gayal of India; others had short horns like the modern buffalo. Over the centuries the animal gradually wandered southward, eventually reaching what is now Mexico, extending southeastward to Florida, and eastward to New York. Into the Pacific northwest the animals apparently followed valleys and mountain passes. They were found in greatest numbers in the great plains of the Mississippi Valley and from Great Slave Lake in northern Canada to Texas. At their peak (probably before the arrival of Columbus) they may have numbered as many as 60 to 70 million.



Extermination

The buffalo was the backbone of the economy of the Plains Indians. The animal supplied the Indians with meat and hides for food, clothing, and shelter. Not surprisingly, the buffalo also occupied an important place in the mythology and arts of these people. When the buffalo eventually disappeared the Indians were forced into new ways of life, and were often obliged to live on paltry handouts from the white man. Between 1730 and 1830 some reduction of buffalo occurred as pioneers pressed ever westward. By 1800 the small herds east of the Mississippi River had virtually disappeared. Systematic reduction of the Plains herds began about 1830, and during the next five decades the great southern herds were obliterated.

Hunters often killed as many as 250 buffalo a day. American Fur Company records show that in 1848 the firm sent 110,000 robes and 25,000 tongues to St. Louis. By 1870, trading in hides and tongues reached vast numbers, and buffalo hunting was the major industry of the region. A St. Louis company bought 250,000 hides in 1871. In 1873-74, auctions in Fort Worth, Texas, were moving 100,000 hides a day.

William F. Cody allegedly killed 4,280 buffaloes in 17 months as he supplied meat for railroad construction crews, earning for himself the sobriquet "Buffalo Bill." Perhaps even more spectacular than Cody's performance was that of Sir St. George Gore, an Irish nobleman who believed in hunting in style. His "safari" contained 27 wagons and carts, enormous quantities of fine wines and foods from Europe as well as a brass bed, a bathtub, and fine rugs. His retinue consisted of forty servants as well as a scientific staff. At the end of his three-year hunting spree (which cost him $500,000) Sir St. George had killed 2,000 buffaloes, 1,600 deer, more than 100 bear, and other large game.

With the southern herds gone, the buffalo hunters turned to the northern herds, and between 1876 and 1883 destroyed them as well. The hunters seemingly did not realize that the buffalo was gone; some stoutly insisted that the herds had only temporarily retreated into Canada and would return.

Fortunately, during the time the wild buffalo herds were being destroyed, a number of small captive herds were being established. Three of these, the Goodnight herd of Texas, the Pablo-Allard herd of Montana, and the Blue Mountain Forest Association herd of New Hampshire became the primary sources of stock for present-day federal and state refuges.

Some herds in the United States and Canada today are descended from four calves that were saved by Pend' Oreille Indians from slaughter in 1873. The Indians had travelled from

the Flathead Valley (in what is now westernmost Montana) to the plains east of the Rockies for their meat supply. one of them, an Indian by the name of Walking Coyote, brought back the four young animals.

Refuges

A number of federal and state preserves that have been permanently established in the west and midwest ensure that the buffalo will never again be threatened with extinction. The animal breeds readily in confined artificial habitats—even zoos—and the main problem in some refuges is keeping the population *down* so that the herd does not suffer from the effects of overgrazing.

The spectacular way in which the buffalo has rebounded from its precarious situation at the turn of the century demonstrates how a relatively small group of conservationists can influence national policy. Today about 25,000 buffalo are on private ranches, about 5,000 are on federal and state preserves, and another 15,000 on

protected lands in Canada.

The first of the buffalo ranges in the United States was Yellowstone National Park where, by act of Congress, buffalo-hunting was outlawed in 1894. In 1902 funds were appropriated to buy 21 buffalo from private herds and supplement the park's existing herd. Today the number of Yellowstone buffalo exceeds 800.

Two Assiniboin Indians Running a Buffalo, *by Canadian artist Paul Kane (1810-71), painted in the 1840s near Edmonton, Alberta*

Near the turn of the century, William Hornaday and other concerned citizens organized the American Bison Society. Together with the New York Zoological Society they pressed the government for the establishment of other protected herds and, as a result of their combined efforts, four national buffalo refuges were created: the Wichita Mountains Refuge, the National Bison Range, the Fort Niobrara Refuge, and the Sullys Hill Refuge. Through public subscription in 1908 the American Bison Society raised funds to buy 34 animals for initially stocking the National Bison Range.

Today the four refuges are operated by the United States Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. The Wichita Mountains Refuge (est. 1907), in southwestern Oklahoma, currently has a herd of some 900 animals; they roam freely over some of the finest grazing land in the United States. To avoid overgrazing, surplus animals are sold each year by auction or sealed bid. The National Bison Range (est. 1908), in the Flathead Valley of Montana, has 300-500 buffalo and an area of about 29 square miles. Elk, deer, bighorn sheep, pronghorns, waterfowl, and shorebirds also share the range. Visitors are permitted on the range from June 20 through Labor Day. For many years the main attraction of the herd was "Big Medicine," a bull that was totally white except for a dark brown crown between his horns. "Big Medicine" died in 1959 at the age of 26. Fort Niobrara Refuge (est. 1913), in northern Nebraska, covers about 30 square miles and provides protection for about 200 buffalo. Texas longhorn cattle, elk, prairie chicken, and sharp-tailed grouse are also found on the refuge. Sullys Hill National Game Preserve (est. 1918), in northwestern North Dakota, provides refuge for buffalo on about 2.5 square miles of rangeland. Elk, deer, and geese share the area with the buffalo.

Buffalo women's society cap, Arapaho-Algonkian Collected in 1903 for Field Museum by George Dorsey Cat. No. 71981

Smaller groups of buffalo are protected in Grand Teton National Park, Wyoming; Wind Cave National Park, in the Black Hills of South Dakota; Platt National Park, Oklahoma; and Colorado National Monument, Colorado.

The largest buffalo preserve is Custer State Park, a 112-square-mile area in South Dakota. The Custer herd, which originated with 25 head in 1914, is maintained at a population of some 1,500. Hunts are conducted each fall to keep the population at a constant level. Some animals are sold live.

The Arizona Game and Fish Department maintains two buffalo ranges where hunts are held each October. Hunting licenses are awarded through a special drawing.

Occasional hunts have also been held in the Big Delta country of Alaska, where introduced animals have easily adapted to the severe environment.

In 1893 buffalo in Canada were placed under the protection of the Royal Canadian Mounted Police. In 1922 Wood Buffalo National Park—a 17,300-square-mile tract—was established in Alberta and Northwest Territories just south of Great Slave Lake. Today a herd of some 15,000 plains buffalo and wood buffalo ranges in the park's grassy plains, boreal forest, and muskeg.

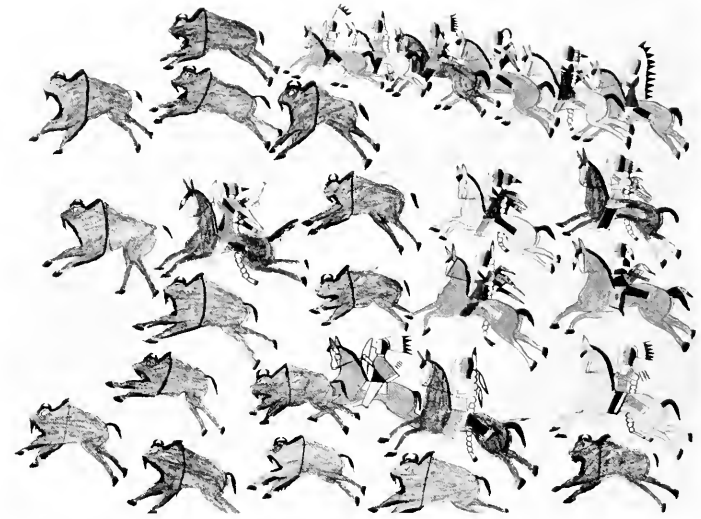
Illinois buffalo

About 185 buffalo are currently to be found in Illinois. Chicago's Lincoln Park Zoo has twelve buffalo, Brookfield Zoo two. The National Accelerator Laboratory at Batavia maintains a herd of about 28. Four privately owned herds in Illinois acccount for another 142 animals, the largest of these consisting of 110 head.

The Metropolitan Sanitary District of Greater Chicago has projected a comprehensive "Prairie Plan," which would include buffalo and other large animals in its realization of a "living museum of native wildlife." An 11-square-mile area recently purchased in Fulton County by the sanitary district is the presumed site for development of the plan.

Commercial and private herds

In 1966 the National Buffalo Association, headquartered in Pierre, S.D., was formed "to help buffalo owners with problems, to disseminate information about the animals, and to encourage the propagation of the national resource." The association publishes a monthly newsletter, *Buffalo Chips*, and a quarterly magazine, *Buffalo*.



Drawing of buffalo hunt by Plains Indian, ca 1880 Colored crayon on notebook paper. Gift of Mrs. A W Fuller Cat No 83999

Founder-president of the association is Roy Houck, whose Triple U Ranch, with more than 3,500 head, is the largest privately owned buffalo herd in the country. Other private herds in the United States and Canada number about 400. A number of ranches sell live as well as slaughtered animals. A young bull brings around $475. About 300 American families keep buffalo as pets, raising them in large backyards or on farms. (Buffalo experts warn that the animals are unpredictable, hence dangerous, and must be approached with caution.)

In 1973 4,000 buffalo carcasses were sold to supermarkets—mostly in the west—and to gourmet restaurants. Animals are butchered when two or three years old; the meat is graded in the same way as beef. According to NBA's Roy Houck, buffalo meat is higher in protein and lower in cholesterol than beef; it is also coarser and darker than beef, and the flavor is more pungent. Currently buffalo meat is slightly more expensive. Buffalo salami and buffalo braunschweiger are sold by the Triple U as well as whole carcasses. The ranch also finds a ready market for mounted buffalo heads, bleached skulls, and buffalo hides. Twenty or more carcasses are sold by the Triple U each year to Chicago's Cafe Bohemia, which serves the meat as buffaloburger, steak, or stew.

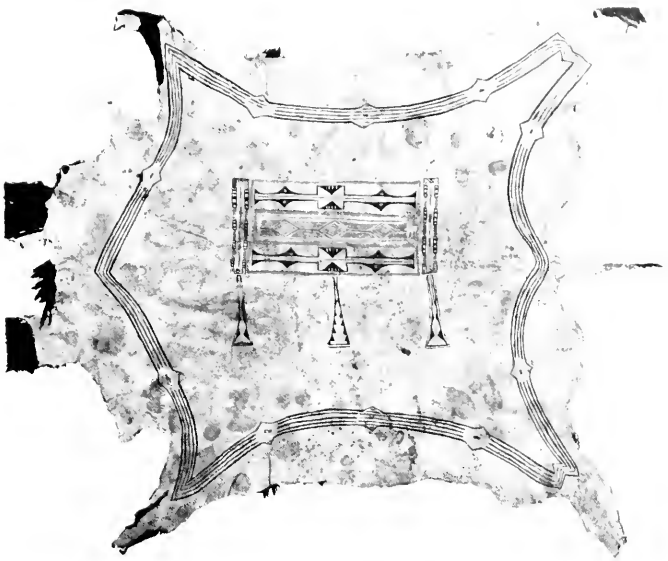
Recognizing the commercial potential of the buffalo, a western supermarket chain recently asked the federal government for the "loan" of its protected animals until the chain could establish from it bigger and better commercial herds. The request was denied.

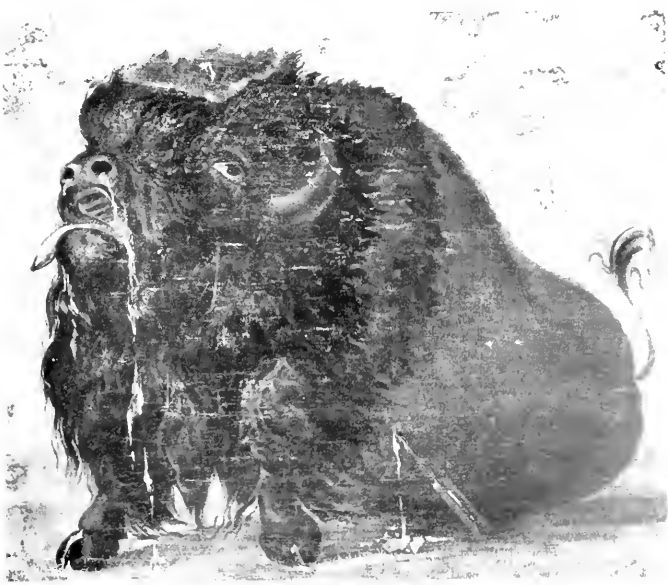
The story of the buffalo's near-demise is eloquent testimony to thoughtless human greed and destructiveness; more important: the animal's subsequent recovery has demonstrated that even a small group of concerned people can turn the tide, can influence federal legislation, and preserve what is worth saving for those generations to come.

Top right. A buffalo skin painted with geometric designs. Nineteenth century, Arapaho. The symbolism of the design is very elaborate. The border as a whole represents a buffalo. The lines along the edges symbolize the skin and hair of the animal, its veins, and the diamond-shaped figures, the pulsations of its heart. In these figures the central spot [red] symbolizes the heart, and the seven lines [yellow or green] symbolize the seven periods of creation. The border as a whole also symbolizes a river on which floats a pemmican [the diamond-shaped figure], this being a reference to an Arapaho legend.

The large oblong figure in the center symbolizes the earth, the line [red and yellow] surrounding it being the horizon. A [red] line symbolizes the sun, a [yellow] line symbolizes the day. The strip [red, green, and yellow] in the center of this design symbolizes the "Path of Life." The three diamonds represent the eyes of One Above who watches human lives. They also symbolize a man, a woman, and animals. The field surrounding the triangles represents the Indian race. The designs above and below this central band symbolize the division between night and day. A long line through the center of each represents the Milky Way. The dark triangles containing four white squares symbolize the buffalo lodge, where the buffalo were once kept imprisoned by a white crow. The white squares represent the buffalo, but they also represent life or abundance, and the Four Old Men of Arapaho myth. The triangles with a [red] spot in the center represent another legendary lodge in which six sisters, who had been sent away from home for their refusal to marry, lived for a long time. The [red] spot indicates the fire in the lodge, the white around it, the light. The long triangular figure below the central design represents a buffalo's tail, the triangles along the edges symbolize hills. The [red] line below it represents the Indian's way of life.

In the perpendicular figures at either end of the large central design the light central strip represents a road. The triangles at either end of this strip represent tipis, the small spots in it, people, and the lines [green and yellow] connecting them, paths. The figures along either edge represent day [yellow], night [black], water and vegetation [green], and Indian race [red]. The long triangular figures below these bands represent the limbs of animals. The unpainted portions of the robe were originally whitened with clay, symbolizing purity. Cat. No. 67758.





Bottom right. Dying Buffalo by George Catlin, American [1796-1872]. Painted on the upper Missouri River 1832, and probably done from sketches made during a buffalo hunt, 21 x 28 inches. Cat. No. 49705. Field Museum has 35 Catlin paintings done between 1831 and 1837.

Ray A. Kroc Environmental Education Program

Listed below are the final offerings in the Ray A. Kroc Environmental Education Program for spring 1974. A new series of programs will be presented this fall.

Saturday, April 27

Course: **"Urban Streams."** First of six sessions to be held on successive Saturdays through June 1. The course will include seminars, three field trips, and research designed to outline outstanding characteristics of water, indicate special problems in water quality in an urban environment, underscore the resilience of biological populations, and introduce course participants to basic measurement of water's properties, using inexpensive tools. Project directors: Donald Meyers and Gary Milburn, biologists, Environmental Protection Agency. Limited to 40 people, 15 years of age or older. A $15.00 fee holds your advance reservation for the course and covers all expenses.

Philip H. Abelson, May 5 lecturer

Film: **"Insect War."** This remarkable BBC film examines the various techniques man employs in his battle with insects for possession of food crops. Lecture Hall, 10:30 and 1:00.

Sunday, April 28

Repeat film: **"Insect War."** Lecture Hall, 11:00.

Symposium: **"Ecological Research at Field Museum,"** featuring Field Museum scientists. Entomologist Henry Dybas discusses "Cicada: Strategy for Survival"; botanist Lorin Nevling presents "Implications for Change in the American Tropics"; ichthyologist Robert Johnson speaks on "Aspects of Oceanic Ecology"; and anthropologist Bennet Bronson will explore "Man and His Environment in Ancient Asia." Moderator: Robert F. Inger, assistant director, science and education, Field Museum. James Simpson Theatre, at 2:00 p.m.

Saturday, May 4

Film: **"Time of Man."** A reminder to man that he is one of nature's more recent innovations, this film also intimates that man may be one of nature's mistakes since he not only adapts to, but often changes his environment, sometimes with deleterious effects. Lecture Hall, 10:30 and 1:00.

Sunday, May 5

Repeat film: **"Time of Man."** Lecture Hall, 11:00.

Lecture: **"Energy for the 70s."** Philip H. Abelson, editor of *Science* magazine and president of the Carnegie Institution of Washington, D.C., speaks on the decade's energy outlook.

Saturday, May 11

Field trip for young people: **"Hidden City."** Fully booked; reservations closed.

Saturday, May 18

Adult field trip: **"Ecological Communities."** Fully booked; reservations closed.

Saturday, May 25

Adult field trip: **"Kennicott Grove."** Fully booked; reservations closed.

Saturday, June 1

* Field trip for young people: **"Prairie Life."** A study of the vegetation of Markham Prairie. Leaders: Phil Hanson and James Bland, Field Museum. Limited to 30 students, ages 15 through 18. Group will assemble in the north meeting room, second floor, at 9:30.

Saturday, June 8

Adult field trip: **"Chicago Portage Site."** Fully booked; reservations closed.

* Field trip for young people: **"Rocky Glen."** Rocky Glen in DuPage County has a wide variety of ecological communities: pond, river plain, and stream. Field study activities will be included in the trip. Leader: James Bland, Field Museum. Limited to 30 students, ages 15 through 18. Meet in north parking lot at 9:30.

Saturday, June 22

Adult Field trip: **"Reserving the Future."** Fully booked; reservations closed.

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* Reservations will be confirmed in order of receipt and payment. A $4.00 fee covers lunch and transportation, and holds your advance reservation.

Send your choice of program, name, address, phone number — and fee, where applicable —

to: Field Museum — Environmental Program
Roosevelt Rd. at Lake Shore Dr.
Chicago, Il. 60605

For further information call Carolyn Blackmon, Field Museum, 922-9410, extension 361 or 363.

Field Museum's Members' Nights will feature many special activities. Shown here is a small sampling of what is in store for visitors on those evenings.

Top left: A demonstration of how large mammal skins are prepared in the tanning area.
Top right: A do-it-yourself project: "Dwarf vegetables—a garden in your window box."
Bottom left: A discussion of current scientific research on fossil bighorn sheep.
Bottom right: A demonstration of pottery-making techniques.

The hours for the open house are from 6:00 to 10:00 p.m. in public areas and from 7:00 to 10:00 p.m. behind the scenes. Duplicate programs of all events, including entertainment in Stanley Field Hall, will be presented during the two evenings.

The cafeteria and lunchroom will be open from 6:00 to 8:00 p.m.

Chartered busses designated "Field Museum" will leave from the southwest corners of State and Jackson, and Michigan and Jackson, at frequent intervals after 6:00 p.m. on these two nights.

For the convenience of those who come by automobile, lights have been installed in the parking lots.

members' nights, may 2-3

an interview with john white

coordinator of Field Museum's Native American Program

Field Museum's Native American Program, set up last year, is an attempt to utilize the Museum as a cultural resource for the Indian. Coordinator of the program is John White, who is of Cherokee and Scottish descent. He began college at Bacone Indian School in Oklahoma, and received his M.A. in a combined education-anthropology program at the University of Chicago; currently he is a Stanford University doctoral candidate.

Editor: John, I understand that your program here is a real innovation; in fact, that it's something of an experiment. What was the basis for setting up the program?

White: My coming to Field Museum was—as you say— an experiment, to see if it would be possible to make the Museum responsive in certain ways to the community, and to search for ways to revitalize the present-day North American cultural scene. The W. Clement and Jessie V. Stone Foundation, which is providing about half the funds for the program, also supported a field trip that I made in 1972 to Europe to study environmental approaches to teaching about a culture. The present program consists essentially of observing various niches in the Chicago community and determining which would be the most productive in the development of educational programs for Native American children. There are now programs at Newberry Library, at Circle Campus, at two Indian centers, at an Indian high school, and at an elementary school—so there are a number of different niches within the Chicago scene.

Ed.: What other organizations in Chicago will you be working with in the program?

White: We are working largely with an Indian elementary school program that is an extension of William C. Goudy School, on the north side. The program will involve maybe 50 to 75 Native American children through the sixth grade; half a day will be spent at Goudy and half a day at the Indian school. Half the children will attend the Indian school, which is a block and a half away, in the morning; the rest of the students will attend in the afternoon. Evening programs are also planned. Goudy chose to become involved because the school had a serious dropout problem.

I hope to be able to develop a mini-museum within a library complex at this Indian school, with changing exhibits of Indian artifacts of various types, each exhibit featuring artifacts of a particular tribe, employing various techniques for observing material and for recognizing different relationships. A new exhibit would be installed perhaps every month.

The main thrust of this program is to reinforce a positive identification for the Indian children, and we want to get them involved in whatever ways that can be meaningful with respect to Indian culture—to build up that aspect. A

secondary aim will be remedial. The staff will consist of one full-time teacher and two teachers' aides. All the staff persons will be Indian. The program is strictly voluntary for the students. There will also be a buddy day. One day a week a student can bring a buddy and that will be the mechanism by which non-Indians will be able to see what the program is all about.

I have been teaching a Native American art and culture course for the Indian program at Chicago Circle Campus of the University of Illinois. I spend one day a week over there and have the students at the Museum for one day each week. Right now we are making composition replicas of Indian masks in the Field Museum collection. These masks will go out as a kit, which will include a set of Northwest Coast stories. These will be presented in such a form that they can be used by a narrator and the masks can be worn by students in acting out the stories. There will also be some audio-visual material—a three-minute tape, for example, and perhaps slides, and so on. What I am interested in is injecting material in a way that gives people an appreciation of a particular culture as well as some conception of the context—a true, meaningful context.

Ed.: There is an interesting variety in the program's dimensions. Could you comment on requirements you may have for staff to assist in these various areas?

White: Recently I had a long discussion with a woman who noticed that I was with the Museum's Native American Program. She said that she had been a collector of Indian basketware and jewelry, knew a lot about it, and had taught in the Uptown area where she had had Indian students. She wanted a job with our program and wondered if there were any positions open. I said, "Yes, I have a spot for a teacher and one for a half-time secretary, but I am searching for an Indian for the positions." The woman got very upset and said, "You mean just because I'm *not* an Indian I couldn't qualify? It looks like racism in reverse." So, we got into a rather lengthy discussion. I tried to explain to her that the Indian students need role models—models they can follow. People model themselves to a very great extent on persons who they have to deal with in their day-to-day activities.

Ed.: What were your reasons for becoming involved in the Museum program?

White: Basically it was my own growing concern with the value of traditional Indian culture and the importance of recirculating the traditional values—so that these elements may enhance the individual's self-esteem as well as enrich the cultural scene prevailing in the Indian communities. What has been happening to Native American culture for 150 years or more could be compared to vandals coming into a library and stealing the best books.

In the recent past it was possible to find Indian people in the community who could recite incredibly detailed accounts of historical occurrences of more than 150 years ago—even going back before the American Revolution—accounts marked with great detail, great richness. These included religious accounts, creation stories, origin myths of one sort or another concerning various animals. But today, accounts of these same events are usually greatly abbreviated. The reason for such truncation is that where traditional communities have broken up, actual attempts have been made to achieve such a fragmentation; for example, Indian children have continually been sent away to boarding school and kept there for as long as ten years or more. Usually these children had left home speaking no English at all would eventually return to their parents speaking only English. This is a highly effective method of destroying the natural means of transmitting one's heritage. What amazes me is not how things have deteriorated in so many ways, but that any of the Indian heritage has managed to survive at all!

Ed.: I understand that work is being done on preparing a catalogue of the Museum's Indian artifacts. How will it be used in your program?

White: Native American students from Circle Campus and non-Indian volunteers are currently working on the catalogue. Essentially it will consist of a card file; the cards are being typed from the Department of Anthropology acquisition catalogue and will be arranged according to tribe. After the catalogue is set up we will determine to what extent the material will be supplemented by photographs of individual items. We will then decide how to make that material available. Most Indians are interested in knowing what examples of craftwork from their tribe are in the Museum's collections. Until now museums have not served those people whose culture is entombed there.

I think it's important to recognize the fact that the Museum can be regarded as an expression of European culture; how the labels are written; how the material is put out, and so forth. If you get people to the point where their identity is secure enough, then they can view exhibits as though the material simply represents extremely fine examples of traditional arts and crafts. The manner in which museum exhibits are usually set up is extremely revealing for it shows the way in which European Americans become cultured. It's not random: it's part of a cultural patterning. Indian culture is past tense like the Neanderthals and the dinosaurs.

It's been revealed to me more and more that there are whole areas of expertise—insights that anthropologists have developed in their study of various cultures that really bring home the basic problems

within American society. But there is actually no integration into any of this. Anthropology is seen as the study of bizarre cultures—some other place, some other time. I went into anthropology for a far-out thing—to get spiritual power. Because it's part of Cherokee tradition—which is my heritage—that one studies and learns as much of different cultures as he can. Everyone views the world through his own eyes and no one can hope to gain more than a fragmentary picture. If he wants to develop himself he's got to be exposed as much as possible to other cultures. I have gone into anthropology not only for what it can help me to understand about my own cultural background but about other cultures as well.

Ed.: Your academic background of anthropology combined with education is rather unusual. In what ways does this particular approach enable one to be more insightful in dealing with social problems?

White: I have been impressed with the fact that, with very few exceptions, human beings do things in culturally patterned ways, and this applies to all cultures, including contemporary American culture. We are conditioned to believe that only *other* people have superstitions, but *we* have *science*! Our way is the right way. Others have just stumbled along in an empirical way. Usually the adjective "empirical" is a put-down.

If a person really knew what he was doing he would be able to project it beforehand, rather than just deduce what was happening afterward. So, it seems to me that one can't even begin to face the problems of subcultural groups within a place like contemporary United States without realizing that when children (or adults) are coming into school they should be made aware that what they are being taught is a particular cultural bag; it's a particular configuration of cultural patterning, a way of looking at the

John White demonstrates weaving techniques of the Salish Indians (British Columbia) to members of the North Shore Weavers' Guild. He has also scheduled Museum workshops in weaving techniques that were used in northern Europe during the Iron Age.

world, a way of looking at other people. And it's very different from anybody else's. What happens is that kids come into programs set up by those of other cultural groups and very quickly are convinced that their whole way is inferior, that there is something wrong with them.

There's a community of Indians in northern Mexico who 200 years ago were in the Great Lakes area. A Kickapoo group, they are an Eastern Woodland tribe—now numbering perhaps 900—who left the United States for Mexico around 1830 to get away from the European settlers. They still live in a wigwam village and their culture is as close to intact as you could possibly hope to find anywhere. Kickapoo culture has done very well in enabling the people to move from a wild rice-growing area in the north to Mexican desert conditions. Their language, culture, religion, are all still strong, and it's an incredible thing. The group visits continually with a Kickapoo group back in Oklahoma and has had a conservatising influence on them. So it would be better to compare that community with the Chippewa community, say, in northern Minnesota, where essentially traditional religion, culture, crafts have completely fallen apart. The fact that it hasn't occurred with the transplanted group throws out the window the idea that cultural decay is a natural matter of course—it's not. When people stop speaking a language, it's not because they no longer need it or because it's no longer functional, or anything like that. It's because the language had a negative value placed on it. Speaking that particular language had low status. People picked up on that and stopped speaking the language. No language dies; it's killed. And it's not a natural state of affairs. It's a state of affairs that occurs in an unnatural situation.

Ed.: What is your interpretation of the rather recent phenomenon of Indian culture catching on particularly with young non-Indians?

White.: During my first several months as a graduate student at Stanford I had inquiries from literally dozens of students who were trying to satisfy their personal needs by identifying with Indian culture. I said, "Look, you're never going to be an Indian. Put your roots down in your own tradition—everybody's got them. If you want to have a situation where you're as close to the environment as you can get, where you're producing your own sustenance, where you're taking part in all these activities, instead of destroying it—All you have to do is investigate your own culture of four or five generations back and you're right in it. And then it will be genuine. But any attempt to mimic or borrow in this way from Indian culture can only result in something artificial.

I feel that mankind's cultural roots are of great importance, that they can be a source of great strength. We have come to put down the past, we think it is a millstone hanging around our necks, the cumulative sins of our grandfathers. We search for a time when man became differentiated from the animals because we are afraid of the animal within us. We try to run counter to nature's laws rather than to flow with them; our ancestors knew better. We have become a clever people but we have lost the wisdom and strength that enabled our forefathers to survive many ice ages. For that we should honor them, not ridicule them. The sad thing is that we have come to ridicule without knowing it.

books

A Manual of Mammalogy with Keys to Families of the World

By Anthony F. DeBlase and Robert E. Martin. Wm. C. Brown, publisher; 329 pp.; spiral bound. $7.95

Dr DeBlase, who is Field Museum's chief of security and visitor services, as well as a mammalogist, and Mr. Martin, of Texas Tech University, have produced a manual unique in the mammalogical literature. It is not only a handy guide for the student and generalist, it is the first family key of worldwide scope to appear in such a format

The opening 79 pages comprise a remarkably concise introduction to mammalian anatomy. Following sections on systematic methods and methods of keying are equally lucid and well presented The volume also has chapters on "Identifying Mammal Sign," "Recording Data," "Collecting," "Specimen Preparation and Preservation," and even chapter-length discussions of methods for collecting parasites of mammals, cranial measurements, and how to find what you're looking for in the scientific literature An ample bibliography—mostly of publications within the past decade—and a 15-page glossary of terms round out the fringe benefits of the manual. The keys, 127 pages in length, also contain hundreds of black and white illustrations and information on fossil forms and distribution. A remarkably comprehensive and attractive manual — *Ed*

Museums of Natural History and the People who Work in them

By Patricia M. Williams
St. Martin's Press; 120 pp., $5.95

Today there are about 5,000 museums in the United States. Collectively they employ from 15,000 to 20,000 full-time professional workers At least 400 of these institutions are natural history museums. A recent publication of the American Association of Museums states " that better educated recruits for museum employment are needed in a period of rapid change characterized by new technological developments, such as computerization of records of multimedia exhibits, and by new attitudes toward museums that show keen awareness of each community's educational and social needs." It further states that there are creative and talented young people available if only they can be reached and informed of the opportunities open to them at museums.

Mrs. Williams' book is an excellent means of informing young people of the variety of careers available in museums. These institutions are now in a good position to compete with institutions of higher learning in recruiting for staff positions With the current shortage of teaching jobs, many graduate students have decided to investigate museum careers.

Drawing on twelve years of professional experience at Field Museum, the author has created a concise, nontechnical, and humanistic picture of museum people, past and present; they are viewed as integral parts of a functioning museum. The book is particularly valuable as a behind-the-scenes tour of Field Museum. Mrs. Williams includes a brief definition and description of natural history museums in general, and traces the history of museums from private collections, or "cabinets of curiousities," to moderately cluttered houses of things, and finally to their emergence as important community centers of education and research.

The main section of the book deals with collections: "the true wealth of a museum." These collections consist of objects of aesthetic, historical, or scientific importance. As survivors of the past or as extensions of the present, they can tell us much about the natural world or—if artifacts—about the people who created them. There is an intangible something called "spirit of place" that denotes the uniqueness of a landscape, civilization, or place—in this case a museum. I have always felt that this term was appropriate for certain museums that I have visited, and it must have something to do with the collections, and the knowledge that these are linked mysteriously to a chain of generally anonymous people who found, studied, transported, and cared for them before they were finally placed on exhibit. Museum curators, educators, and exhibit designers often devote their working lives to studying or using collections. Collections of objects are what museums are all about.

Using the organizational framework of the Field Museum, the author explains in detail the roles of the various people in the anthropology, geology, botany, and zoology departments. These are the scientists, or curators, who collect, care for, and study the collections, perhaps assisted by a conservator who prevents or retards the deterioration of specimens and repairs them when necessary These are also the people who answer questions from the public, who are involved in research, writing scientific monographs, teaching and serving as consultants to students, or speaking before ladies' luncheons

And there are other nonscientific personnel who are essential to a large natural history museum: taxidermists, scientific illustrators, preparators, secretaries, accountants, and many more. Of increasing importance in today's museums are the education departments. The educational responsibility of museums is vast, complex, and touches every aspect of our intellectual life. Among the programs and services available at large museums for various age groups are film series, guided tours, workshops, field trips, and much more.

The book concludes with a 31-page listing, by state, of the country's major natural history museums, with brief descriptions of each, their university affiliations, collections, and, in some cases, special programs

— Sue Maxwell, instructor in museology for the Gifted Program Office of the Chicago Board of Education.

Athapaskan Adaptations: Hunters and Fishermen of the Subarctic Forests

By James W. VanStone
Aldine Publishing Co.; 145 pp., cloth $7.50, paper $2.95

This study by a noted anthropologist at the Field Museum is the first full-length book to encompass all of the Northern Athapaskans. It is a brave venture and a highly successful one based upon years of archival and field research. The theme running through the book involves the adaptive strategies by which various Athapaskan groups have accommodated to the natural and social environment in pre-contact times and throughout the historical period. It is a study in cultural ecology in the *Worlds of Man* series edited by Walter Goldschmidt. Although raising many issues of theoretical importance to the study of hunters and gatherers in

general, it is, as VanStone notes, designed to suit the needs of undergraduates and professionals alike. While relatively short and necessarily general, the book presents a considerable amount of information.

The common language stock of Northern Athapaskans serves to define the parameters of the western Subarctic, an area stretching from Hudson Bay to central Alaska. While there are ecologically-derived cultural variations within this immense area, there are also numerous and likely ancient similarities common to all groups. After a long period of adaptation in central Alaska and the Yukon, Athapaskan-speakers spread rapidly in a southeasterly direction after 700 B.C., and in the process accommodated to a variety of environments. Given this fact, it is not surprising that the western Subarctic forms a cultural continuum where precisely defined tribal entities are lacking. Although five ecozones can be defined for the area at large, VanStone is careful to point out that there have been significant floral and faunal changes within the historical period. Some of these were caused by climatic shifts but others were brought about by the ravages of the fur trade and the introduction of firearms.

The first five chapters deal with the pre-contact situation. Following a discussion of subsistence practices and their settlement correlates, VanStone launches into the important issue of social organization. Although band size and organization are flexible, a matrilineal/matrilocal substratum is clearly evident which is interpreted to be ancient. However, since three centuries of involvement in the fur trade have blurred or obliterated aboriginal social conditions, there remain many unresolved questions. Additional historical research may help resolve some of these issues. Nevertheless, it is evident from VanStone's discussion of religion that despite Christian influences, much can still be learned about past beliefs and practices. The same applies to information on the life cycle. The question of cross-cousin marriage remains enigmatic but certainly this practice is congruent with unilineal organization. Omitted from discussion are the systems of kin terminologies which although modified by historical factors, could shed light on aboriginal social organization.

In discussing the history of contact, VanStone gets maximum returns from the historical data. The tremendous impact of the fur trade has been consistently underestimated in most studies of Subarctic Indians but not in this one. For instance, one learns that trade goods were carried far beyond the range of face-to-face relations with Europeans through Indian middlemen. The wholesale slaughter of beaver and other game during the period of rivalry between the Northwest Company and Hudson's Bay Company combined with European diseases had far-reaching effects on socio-economic organization leading to trading post dependency, reduced mobility, and individualism in social relations. While VanStone's analysis of the effects of the fur trade on Indian culture is very good, his periods do not conform to the data he presents. His early contact period (1700-1850) and stabilized fur trade period (1850-1940) are much too long, at least for the eastern half of the area. Actually, early contact and indirect trade ended when traders began moving into the interior during the 1770s to establish direct trade relations. The period between the 1770s and 1821 marked another era involving trade company rivalry, while the period between 1821 (when the Hudson's Bay Company absorbed the Northwest Company) and the time of treaties perhaps marked another era. It would then have been better had shorter periods been defined reflecting changing adaptive strategies. VanStone's discussion of Northern Athapaskans in the modern world based upon first-hand field experience at Snowdrift and elsewhere, however, is excellent.

The final chapter is a summary of adaptive strategies. The key to understanding Athapaskan survival techniques in a changing world is to be found in a flexible and accommodating organization based upon a highly specialized knowledge of the environment. This flexibility, VanStone cogently argues, accounts, in part, for deep-rooted cultural-ecological similarities found throughout the Northern Athapaskan area.

In the appendix, VanStone stresses the need for more intensive field studies to provide basic ethnographic and linguistic data which are lacking. For purposes of historical research, and perhaps unknown to VanStone, I add that there remains an enormous quantity of archival materials available in the records of the Hudson's Bay Company. This latter type of research is still in its infancy and when combined with field studies of the type mentioned, may help provide answers to the many important issues raised in this study.

In sum, this is a very valuable book which will help raise Northern Athapaskans from the obscurity which they have too long suffered. It is valuable not only for its insights on adaptive strategies among hunters, but also because it corrects several misconceptions about the nature of social organization. Finally, it is an important study since VanStone pinpoints the crucial issues still deserving further research.

— Charles A. Bishop
Department of Anthropology
State University of New York at Oswego

Athapaskan Indians hunting moose near Nulato, Alaska, 1868

field briefs

Rocky Meets Steven

Rocky the timberwolf and Steven Gonzales, Riverside, met during the Museum's wolf workshop in March. Rocky accompanied conservationist John Harris, who presented the program that also included a film. The program was a Raymond Foundation presentation.

WAIT Radio Honors Three

Radio station WAIT, which daily salutes persons for outstanding contributions to their community, recently cited three Museum personnel. Blaine J. Yarrington was saluted upon being elected president of the Museum, and Mrs. Anthony DeBlase and Mrs. Alice Schneider were honored for their hundreds of hours of volunteer work at the Museum during 1973.

Starfish Manual by Emperor Hirohito

Kings, queens, and emperors have occasionally visited Field Museum in person. Less frequently they have written books that have ended up in the Museum library. That is what has happened, however, with *A Book of the Sea-Stars of Sagami Bay* by Japan's Emperor Hirohito, a widely recognized amateur marine zoologist. The book is a gift to the Museum from the Japanese ambassador to the United States on behalf of the emperor. An earlier book by him on the seashells of Sagami Bay was also recently added to the Museum library.

The new work describes 85 species collected by the emperor during the years 1927-1972 from the waters of Sagami Bay (a body of water several hundred square miles in area just south of Tokyo-Yokohama), and from other coastal waters. It is a technical treatise, primarily of interest to collectors and zoologists, but since many of the species discussed occur elsewhere in the world, the book is not of interest solely to those concerned with Japanese coastal fauna. The English text is 114 pages (including bibliography). Two color plates and 16 black and white plates of photographed specimens and many line drawings supplement the text.

Join Us at Grand Canyon

There's still time to reserve your place for the members' geology field trip to the Grand Canyon, August 16 to 24. The exciting nine-day study of the area, while floating down the Colorado River on rubber rafts, will be conducted by Dr. Matthew H. Nitecki, associate curator, Department of Geology. Total cost is $700. Call Mrs. Madge Jacobs, 922-9410, for details.

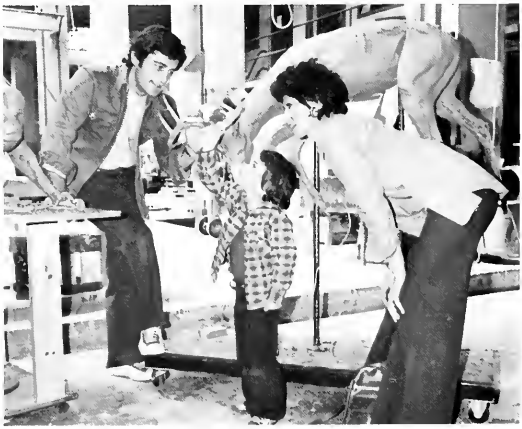
African Arts Book Ready

Robert Plant Armstrong's interview with Akin Euba, in the March *Bulletin*, with an introduction based on the "Contemporary African Arts Festival" exhibit script by Helen Chandra, was extracted from the book, *Contemporary African Arts*, by Maude Wahlman. Published in conjunction with the festival, the 120-page book is comprised of many articles, illustrated with 132 photographs — 12 in color. The book may be purchased for $5.00 at the main Museum bookshop or at the festival shop adjacent to the exhibit.

Examining African Festival Shop Artifacts

Three members of the Women's Board, part of the committee for the Dinner and Festival of Contemporary African Arts held April 18, examine artifacts available at the festival shop. From left are Mrs. Maurice P. Geraghty; Mrs. B. Edward Bensinger, Women's Board president, and Mrs. Robert C. Gunness, committee chairperson.

Museum Entertains the Entertainers



When actor James Farentino and his wife, actress Michele Lee, brought their son David, 5, to Field Museum recently, the Museum's stars — mummies, dinosaurs, and cave men — fascinated them all. But for them the big attraction was the taxidermy studio, where they observed a deer in the process of being mounted.

Words Spoken 80 Years Ago Ring True for Rededication

The day was June 2, eighty years ago. The scene was the north steps of the Museum, where a platform had been erected to support persons whose names would be inscribed forever in the history of this institution. At 2:30 p m. Museum President Edward E. Ayer led a small procession onto the platform. The dignitaries looked out at the seats occupied by Museum trustees and employees below the platform. They looked further out over the assemblage of eight to ten thousand. Following a divine blessing by Rev. Frank W. Gunsaulus, Ayer extended a cordial welcome, and Museum Director Frederick J. V. Skiff delivered his dedication address.

> *There has been gathering head in this western land of ours during the more recent period of its history a mighty power for civilization. Neither ancient, medieval, nor modern times present a wider intellectual horizon, a period so alive to the demands of progressive humanity. The annals of centuries do not contain such evidences of a quickened higher culture and uplifting of education forces as have been evoked within the past few years on the shores of the lake that sweeps this park. — Frederick J. V. Skiff*

In the great halls of the building behind these gentlemen the extensive collections, which had been donated by World's Columbian Exposition exhibitors or secured by purchase, stood in scientific and systematic arrangement, their installation sufficiently complete in detail. Everything was in readiness for commencement of the preliminary work for which the Field Columbian Museum had been established, "great work unselfishly performed."

> *As an example to be followed it must also have an enduring influence. The spectacle of a great work unselfishly performed incites to like undertakings. The knowledge of what men have done for the community in which they live impels others to do as well in other directions.*
>
> *Not only in our time but in the long hereafter will men tell the story of the origin and the purpose of this institution with that quickening of the soul which is fruitful of great results. While it shall endure it will be the well-spring of other noble enterprises for the benefit of mankind. — Edward G. Mason*

Edward G. Mason, president of the Chicago Historical Society, reclaimed his chair on the platform. President Ayer then arose, and with raised gavel said, "I now declare the Field Columbian Museum open." The invited guests spent the remainder of the afternoon among the collections.

Now, eighty years later, the origin and the purpose of this institution are foremost in the minds of Museum officials as they prepare to rededicate Field Museum. On June 4, another platform will be constructed at the Museum's north end (the original, of course, was at the north end of the Museum's original home, in Jackson Park), dignitaries will assemble, words will be spoken, and assembled guests will depart with the knowledge that Field Museum will, more than ever, be able to meet what Skiff called "the demands of progressive humanity."

> *Another effort is inaugurated to carry forward this purpose, to meet the growing needs of a highly developed people, to gather up the truths of the sciences and the triumphs of the industries and preserve them as a perpetual benefit to mankind. As Columbus devoted his life to the exploration and extension of the world, so does this [dedication] ceremony vitalize an analogous idea, a broader knowledge and more penetrating vision. — Frederick J. V. Skiff*

Throughout the eight decades since its dedication, Field Museum has existed to increase and to disseminate knowledge of natural history in the world at large through its research and collections. And, through its exhibit and educational programs, it has striven to enhance in individuals the knowledge of and delight in natural history. That the Museum has achieved no small measure of success in these endeavors is a tribute to its founders, leaders, employees, and supporters.

And to these aims the Museum has always directed its financial resources, even to the point of neglecting the building in which they were tirelessly being carried out. The 53-year-old edifice is showing its age, and must be renovated to meet the increasing demands of scientific study and public utilization — the demands of today and those of the 21st century. And it is to these demands that the Museum will be rededicated.

In order to build for the future the Museum, in 1971, began raising funds for renovation and rehabilitation, the first capital campaign program in the Museum's history. The Museum set as its goal the acquisition of $25 million during the three-year campaign. Half of that amount is being raised by the Museum through private donations; the other half is being generated on a matching basis by the Chicago Park District through its bonding authority. The Museum must still raise $1.4 million of its share. When the building's original cornerstone is opened to receive documents pertinent to the current renovation program, attention will be called to the need for general support from the community, including the Museum's members, to bring the campaign to a successful conclusion this September.

> *It means much at the present. It means more for the future. — Edward G. Mason*

And this future can be assured only with the continued support by the Museum's friends. Without their understanding and financial assistance during this period of renovation, rededication of the Museum to this future would be impossible.

A festive air prevailed on opening day of the Museum at its original home in Jackson Park, June 2, 1894.

MAY at Field Museum

Exhibits

Continuing

Contemporary African Arts Festival, the first comprehensive exhibit of its kind in the United States, features the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as music, films, lectures, dances, and other events. Through November 3. Hall 27.

Special May programs are:

Films in exhibit area:

Daily at 1:30 p.m.
May 1-3: "The Tuareg," "Nawi," and "Masai Warrior"
May 4-10: "The Dry Season" and "African Village: Guinea"
May 11-17: "Malawi: Two Young Men" and "Women Up in Arms"
May 18-24: "The Ancient Africans" and "In Search of Myself"
May 25-31: "The Creative Person: Leopold Sedar Senghor" and "The Swamp Dwellers"

Fridays at 7:30 p.m.
May 3: "Black Girl"
May 10: "Mandabi"
May 17: "Emitai"
May 24: "Borom Sarret" and "Tauw"
May 31: "Black Girl"

Sunday, May 26, at 4:00 p.m.
"Benin Kingship Rituals" and "Gelede"

Ayinla Puppet Workshop - Students' Demonstration 10:30 a.m., May 4, James Simpson Theatre.

Batik Demonstration by Samuel Njunuri of Kenya at 10:30 and 11:30 a.m. and at 2:00 and 3:00 p.m. Saturday, May 11, Stanley Field Hall.

Dance and Drum Performance with Ladji Camara of Guinea at 10:30 and 11:30 a.m. and at 2:00 and 3:00 p.m. Saturday, May 18, Stanley Field Hall.

Edwin Janss Jr. Underwater Photography, an exhibit of exciting color prints. Through September 8. Hall 9.

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature. "A Sense of History" presents a graphic portrayal of the Museum's past, and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

Children's Program

Through May 31

Spring Journey for Children, "City Creatures," combines Museum exploration with outside activities. The free do-it-yourself project is designed to acquaint youngsters with animals that have made their homes in the concrete "wilderness" of the city. All boys and girls who can read and write may participate. Journey sheets available at entrances.

Special Events

May 2 and 3

Field Museum's annual Members' Nights feature a special program of entertainment, films, and behind the scenes activities in the scientific departments from 6:00 to 10:00 p.m.

Ray A. Kroc Environmental Education Program activities listed on p. 10.

Through May 31

Weaving Demonstration by members of the North Shore Weavers' Guild at 10:00 a.m. to 12 noon, and from 1:00 to 3:00 p.m. on Mondays, Tuesdays, and Fridays in the South Lounge.

Meetings

May 8, 7:00 p.m., Chicago Ornithological Society
May 8, 7:30 p.m., Windy City Grotto, National Speleological Society
May 12, 2:00 p.m., Chicago Shell Club
May 14, 7:30 p.m., Nature Camera Club of Chicago
May 16, 8:00 p.m., Chicagoland Glider Council

Hours

9:00 a.m. to 6:00 p.m. Saturday through Thursday and 9:00 a.m. to 9:00 p.m. Friday.

The Museum Library is open 9:00 a.m. to 4:00 p.m., Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

Guinean drummer Ladji Camara performs in Stanley Field Hall on May 18.

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Managing Editor G. Henry Ottery
Editor David M. Walsten
Staff Writer Madge Jacobs

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COVER

Tibetan graveyard ghouls in dancing posture. Brass, about 6 inches high. Collected in Tibet by Berthold Laufer in 1909. Catalogue No. 122157.

Photo Credits

Pp. 8-9: William C. Burger, **11:** Katherine Krueger; **15 and 17, top:** G. Henry Ottery, **18:** Rod Crimshaw; **19:** John Bayalis, Sr.

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Highlands on the China-Tibet border. Inset, Berthold Laufer as a young man.

Journey into Tibet

pluck and persistence win out in a young curator's struggle to reach the mountain fastnesses of a hostile people

". . . There is now available a fund which I can devote to ethnological investigation in the Philippines. . . . I am very anxious that you should take charge of this investigation, making representative collections of the different tribes. . . . there is no reason why you should not at once enter upon the work." George A. Dorsey, then Field Museum's curator of anthropology, was writing to a young specialist in Asian ethnology, Berthold Laufer, assistant at the American Museum of Natural History. The year was 1906. Laufer's main interest, however, was the peoples of China and contiguous areas —not the Philippines. In his letter to Dorsey he replied that he could only accept a position in an "East Asiatic department."

"I have studied Tibetan language, history, and religions now for nearly fifteen years," continued Laufer (then 32 years of age), and am thoroughly familiar with all the problems in the field of Central Asia, which, in my opinion, is the only area in Asia still to be explored. . . . England, France, Germany, and Russia vie with one another in expeditions to that region, while only this country remains inactive. Americans should certainly not wait . . . ►

Impressed by Laufer's credentials (a Ph.D. from Leipzig) and experience (two recent expeditions to Asia), Dorsey succeeded in raising support for an expedition to Tibet and China. The sponsor: Mrs. T. B. Blackstone, widow of a railroad magnate. Her initial guarantee for the venture was $18,000.

Meanwhile, Field Museum saw fit to offer Laufer a permanent post as assistant curator in Asiatic ethnology. Laufer accepted the proposal and, on January 7, 1908, he left New York by steamship. The "Mrs. T. B. Blackstone Expedition to China and Tibet, 1908-10" was underway.

Laufer's time in China and Tibet was to be fraught with physical hardships, the intransigence of local officials, thievery, and even dog bite. But through it all, his letters brim with confidence, good cheer, and enthusiasm for his mission. The hundreds of items that Laufer acquired during the Blackstone expedition remain one of the most important collections of Tibetan and Chinese ethnological materials in the world today.

The following selected letters, written to Dorsey and to Mr. F. J. V. Skiff, then director of Field Museum, reveal some of the triumphs—and defeats—that Laufer experienced as he sought antiquities and other artifacts in and near Tibet.

Calcutta
June 28, 1908

Dear Mr. Skiff:

. . . My original intention was to reach Tibet by way of Darjeeling and Sikkim. This plan, however, was thwarted through the Anglo-Indian government which not only refused to grant me a passport for the visit of Tibet, but even forbade me expressly and officially to cross the boundaries between Sikkim and Tibet, and even to cross from Sikkim to Bhutan. Without making any mention of my intended visit to Tibet, I applied through the medium of the U.S. Consul-General of Calcutta, to the Anglo-Indian Government for a passport granting me free movements in Sikkim, as a passport of the local Government subjected to many restrictions is required. Following is a copy of the reply sent by "The Deputy Secretary to the Government of India in the Foreign Department" to the U.S. Consul-General of Calcutta:

> . . . The Government of India, regret, that permission to visit Bhutan cannot be accorded, and the permission to visit Sikkim is given only on the understanding that Mr. Laufer will make no attempt to enter either Tibet or Bhutan. . . .

On the receipt of this letter, I decided to abandon my original plan, and not to risk the funds of the Museum in a venture which might have been liable to result in a failure. I did all that could be done under the circumstances in Darjeeling and neighboring territory, closed my work there, and shall sail from here on June 30 for China to work my way through the interior of China to the frontier of Tibet, and I am fully confident of a final success in this manner. . . .

In China, Laufer approached Tibet from the northeast, collecting antiquities as he traveled. He secured a choice selection of Ming and K'ien Lung bronzes, but it was necessary to conserve funds for purchases in Tibet.

Cheng-tu fu, Szechuan
May 4, 1909

Dear Dr. Dorsey:

. . . It was with some difficulty that I could hire pack animals here to continue my journey; after ten days' search, a caravan of eight mules is brought together, and I hope to make an early start tomorrow morning for Ta-tsien-lu, 12 days' journey from here. This city, 9,000 feet high, is entirely Tibetan, though still in Chinese territory; from there, three roads lead into Tibet. . . . As I am informed that the two first roads are occupied by Chinese troops, on account of rebellions in eastern Tibet, which do not allow foreigners to pass, I have decided to choose the third road which is very little travelled, but somewhat out of the way and difficult. . . . At all events I am sure that nothing will discourage me in my attempt. If I find the roads blocked from this province, I shall march straight northward to Sining in Kansu Province and try by way of Kokonor.

Ta-tsien-lu,
May 27, 1909

Mr. dear Dr. Dorsey,

I have now reached the point when the plunge into the unknown has to be made. I am on the border of Tibet, and within a week I hope to jump into Tibet. And not only that, I have good hopes to reach Lhasa within about two months. I met a Norwegian missionary, Mr. Sorensen, who is planning a trip to Lhasa, and I have arranged to join his party. The plan is based on an agreement which he made with the head of a Nepalese embassy . . . who promised him safe conduct to Lhasa. We are going to meet this embassy at Chamdo, Eastern Tibet, about one month journey north-west from here. Up to this point, however, we travel on a different road to avoid all suspicions. I leave on the 29th of May, and Mr. Sorensen will follow two days later. In Lhasa we hope to be all right. I hope to remain there as long as possible, . . . gathering as much material as I can, then return northeast to the Kokonor and Sining in Kansu (about 10 weeks' journey from Lhasa). It may certainly be that our plan will meet with a failure; the Chinese or Tibetans may stop us and force us to retreat. They are awfully suspicious and watch every foreigner here with greatest care. I am daily besieged by soldiers and other spies who report all my doing to the Magistrate. I have already had a diplomatic exchange of notes with this gentleman, and taken pains to assure

him that I have no designs on Tibet. I do not make any preparations here in the Tibetan inn where I am put up, but have everything done in the mission through the missionary, as that there is no talk about it. You must be prepared, of course, that you can't get any news from me for about 6-8 months, . . . Under all circumstances, I beg you to consider this letter as *strictly confidential and private*, and not to give out a single word of my plan to the press or to any outsider, as this news would then reach England, and the British Government may wire straight to Syangtse to stop me or put me in trouble, and this might give a blow or a sudden end to my work. For this reason, I should not even have to send letters from Lhasa to the British P.O. of Syangtse but I will entrust Mr. Sorensen with letters who is going down to Darjeeling.

I collected about 100 Tibetan specimens here, some fine old paintings, silver ornaments, and brassware; this border town with a mixed Chinese and Tibetan population is not a very favorable field for collecting. Nothing is manufactured here; it is merely the centre for the Chinese tea-trade with Tibet.

I am sending this letter to my brother at Cologne [Germany] who will forward it to you. I fear that my mail outgoing from here may be tampered with by the officials, especially if they see that a letter is addressed to the Field Museum which they know is my place of business. . . . ►

Right, 19th-century Tibetan painting collected by Berthold Laufer in 1909. Only the left panel of a pair was acquired. The painting depicts a 9th-century Buddhist monk, Abhayakara Gupta, and one of the many legends concerning him. On one of his journeys he visited a king (left center) who was about to sacrifice 100 humans in honor of a deity. Moved by the suffering of the intended victims, the monk (right center) invoked Buddha for their deliverance. Suddenly a cobra wrapped itself about him, aiming his fangs at the terrified king. Without hesitation the king set the 100 men free. (Cat. No. 121277.)

Chamdo, East-Tibet
July 19, 1909
12,000 feet high

My dear Dr. Dorsey:

I have been "stopped" here officially by order of the Chinese Government through their representative official of this place, and am forced to return to China, as hard as it is after all the efforts I have made. But I am satisfied inasmuchas I have made a route never undertaken before by a foreigner and entered places never seen heretofore by a white man. Indeed I am the first to have advanced so far and come to this town, to the greatest surprise of all Chinese and Tibetans. I have also secured good and highly interesting collections all along the road. I return tomorrow to Derge, and have not yet decided how to proceed from there. It will depend on a deliberation with the officials there. The present political situation is very grave, there is a war going on in the state of Derge, and another war seems to be soon imminent southward from here. The fact that I am prevented from proceeding to Lhasa does certainly not mean that I am discouraged, or that my work will suffer in any way. The whole east and north-east of Tibet still lies before me, and there is plenty of work to be done there for me during the next months. As soon as I reach the nearest Chinese P. O., I shall send you a detailed report regarding the whole affair. I have three Chinese documents relating to it, a printed instruction issued by the Viceroy of Szechuan . . . in regard to my humble self, and a letter of the official here explaining the circumstances and his action toward me. I am going to send these documents to the American legation of Peking, . . .

The journey from Taysienlu to this place (1½ months) was splendid, and I think I have learned something about Tibet and Tibetans. I am doing well and in good spirits, and continue to "work and not to despair."

Travel in Tibet was not all hardship. Here Lauler is guest at tea in a nobleman's home.

Sungpan, North-Szechuan, West-China,
November 15, 1909.

Dear Dr. Dorsey:

In herewith submitting to you my third account, I beg to apologize for the long delay which has been caused in the transmission of it, due to my excursion into the wildest parts of Eastern Tibet, lasting over six months. Now that I have reached, two days ago, the first Chinese place which offers postal communication, I hasten, above all, to send in to you my account. . . .
To make [it] intelligible to one who is not familiar with the intricate currency system of China, I wish to note that the standard money used throughout China is the Tael which, however, it must be understood, is not a coin, but a fixed weight (1 Chinese ounce) of lump-silver. As each locality has a different standard of weight, it hence follows that there are as many different taels of local value, and further as from ten to twelve various grades of silver are distinguished, each place may have as many various kinds of taels differentiated according to the quality, the more or less pure composition, of the metal; Peking, e.g., has no less than 7 different taels, also at variance with each other in regard to weight, and it depends upon the nature of the transaction, the character of the goods in question, and the agreement of the parties concerned, as to what sort of tael may be used. In going from province to province, therefore, a loss in exchange is naturally involved; further small losses arise from the weighing off of silver owing to the many different scales and to the pretension of the people of every village that they are just the only ones on this earth in the possession of the correct ideal balance, and that the buyer's balance must certainly be wrong, and moreover from the change of silver into small copper-coinage (so-called cash). Every province has special rules and customs

concerning this business which depends on two facts, the ever varying price of silver and the supply of copper coins. In large centers of commercial activity, the exchange may reach 1400-1500 copper-cash (less some percentage for the banker's commission), in out-of-the-way places and villages where a copper stringency is apt to be quite frequent, 12-1300, and may be at bad times as low as 900/1000. Nobody, therefore, in China, can say with mathematical certainty what his money is worth, the purchasing power of the tael fluctuating every day and in every locality. All this difficulty is enhanced by the introduction of silver dollars, of which there are three kinds, Mexican, Hongkong, and Chinese issued by provincial mints; they are generally used in the treaty ports only, but not in the interior, and abhorred by the mass of the people. Each place has a preference for a special kind of dollar and discounts the others with 10 per cent and even more or refuses at all to accept them; a Szechuan provincial dollar, e.g., is no good in Peking or elsewhere. It is a sad, but true fact that in travelling over China you may be liable to change a hundred dollars so many times, till not a cent of your money is left. . . .

Sungpan,
Nov. 16, 1909

Mr. dear Dr. Dorsey:

. . I have not had any chance to write to you since I left Chamdo; it has been a very trying and arduous journey full of incidents and adventures provoked not by me, but by the aggressiveness of the Tibetans. I have trodden many unbeaten tracks and had a most interesting experience in visiting five independent Tibetan States ruled by their own Kings. . . . My collections . . . illustrate the whole culture-life of the East Tibetan tribes. I have gathered a mass of personal information, as well as Tibetan and Chinese documents bearing on their languages, religion, history, and art, and am prepared to write a monograph on this region which will comprise at least three volumes. . . . The choice pieces in this collection [include] . . . a dozen large matchlockguns with ornamented silver, brass, or iron work. One of these had

(Continued on p. 12)

Altar image of the Buddhist deity Gama (Mahakala). Clay, nine inches high. Collected in Tibet by Laufer in 1909. Catalogue No. 122139. On exhibit in hall 32, case 3.

wildflower guides

for the chicago area

by William C. Burger
photos by the author

In early spring, before the leaves expanded, our woodlands showed off their fine new carpet of wildflowers. Now, as the forest floor grows darker with shade, the spectacle of flowering moves into meadows and fields. Many lawns and vacant lots have already been covered by a blaze of yellow dandelions, which soon transform into a stubble of naked stalks, their parachuted seeds having joined the wind. But in our native prairies the passing months provide a continuing spectacle. Each week sees new species presenting a new display, while flowers that have already bloomed begin to build the seeds that must themselves bloom in years to come.

This visual spectacle is one of the many joys of summer. The sight of beautiful flowers also can present a challenge—the challenge to identify and learn the names of these flowers. Plant names are what we need to know in order to communicate meaningfully about them. Once we know the names we can readily determine whether the plants in question are rare or common, native or introduced, edible or poisonous, and so forth. But names can be problems. What is known as "marsh marigold" in one area may be called "cowslip" somewhere else; and so it goes with "trout lily" versus "dog tooth violet," "blue flag" versus "wild iris," and so on. Sometimes the unpronounceable scientific names are little better. They are supposed to be the same all over the world, but that doesn't keep one scientist from calling the plant a species of *Azalea* while another calls the same plant a species of *Rhododendron*.

Thanks to widely available books on plants there is more uniformity now than ever before, and there are a great number of books which can help us to find the common as well as the scientific name for the wildflower that has caught our eye. Here are just a few:

The wood lily (Lilium philadelphicum), *with its bright orange and yellow petals, graces wet meadows and open woods in late June and early July. (½ natural size)*

For the person with little background in botany the easiest book for flower identification is probably *A Field Guide to Wildflowers,** by Roger Tory Peterson and Margaret McKenny (Houghton Mifflin, 420 pp., $5.95). The flowers are arranged by color and the 1,344 illustrations are simple and easy to compare.

For someone who already knows the plant families quite well but is unfamiliar with our midwestern and northeastern flowers there is *The New Field Book of American Wild Flowers** by Harold William Rickett (Putnam's, 414 pp., $4.95). This guide has more than 700 drawings of plants, 96 in full color.

*Wild Flower Guide** by Edgar T. Wherry (Doubleday, 202 pp., $5.50) describes more than 500 species; 236 are illustrated in black and white drawings, 192 in full color. The above three guides are all concerned with plants of the northeastern and midland states.

Smaller, less expensive books with narrower coverage and fewer illustrations are *Illinois Wild Flowers** by John Voss and Virginia S. Eifert (Illinois State Museum, 256 pp., $2.25, paperbound) and *Flowers that Bloom in the Spring** by V. S. Eifert (Illinois State Museum, 48 pp., 40¢, paperbound); the latter is also concerned just with the Illinois flora. All of the above books will fit into a larger jacket pocket and so are easy to take along on a nature walk. The former illustrates each species with a black and white photograph; the latter illustrates each species with a black and white drawing.

If you should come across a plant that is difficult to identify, and you find yourself looking for a thorough reference, you should probably be prepared to visit your school or public library and be ready to wade through a welter of technical terms. My personal favorite of such comprehensive

Dr. William C. Burger is associate curator, Department of Botany.

In our area the prickly pear (Opuntia compressa var. microsperma) *grows only on sand dunes and behind the beach. The flowers are bright yellow.*

Wild bergamot (Monarda fistulosa) *is a native plant that often covers fields with pale lilac or whitish flowers in late summer.*

reference works is the three-volume *New Britten and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada* by Henry A. Gleason (Hafner, $40.00). In this massive work every species of higher plant that is discussed is also illustrated, and not only are the "flowers" included, but also grasses, sedges, trees, and shrubs. The illustrations together with technical keys and descriptions usually tell you what you are looking for. By way of contrast, I find it very difficult to use a book that many consider to be the last word in the northeastern flora: *Gray's Manual of Botany*, 8th ed. (American Book Co., 1,632 pp.). The difficulty is the lack of illustrations to let you know if you have used the keys correctly and if you are on the right track.

Another large, comprehensive work is *Wild Flowers of the United States** by H. A. Rickett (McGraw Hill), of which the two-volume section "The Northeastern States" ($65.00) concerns the flora of our area and presents summary descriptions together with attractive color photographs.

Persons who are concerned solely with Chicago-area plants will find *A Guide to the Flowering Plants of the Chicago Region*, by Floyd Swink (160 pp.), of interest if they are lucky enough to locate a copy in their library. The book is nearly out of print and can now be obtained only from Mr. Swink, who is plant taxonomist at Morton Arboretum. A revision of his more comprehensive *Plants of the Chicago Region* (445 pp.) is soon to be published.

When one knows the name of a particular plant he is in the advantageous position of then being able to explore a great variety of other books and publications to learn more about a particular wildflower. Books such as *Human Poisoning from Native and Cultivated Plants*, by Hardin and Arena (Duke University Press), *Using Wayside Plants*, by Coon (Hearthside Press), and *Edible Wild Plants of Eastern North America* by Fernald and Kinsey (Idlewild) may be of special interest to many people. However, eating wildflowers and other wild plants is something you should do only if you are lost and starving or if you are really serious about losing that extra weight in a hurry.

* *Available at Field Museum Book Shop (10% discount to members).*

Queen Anne's lace, or wild carrot (Daucus carota), *is a European immigrant that covers roadsides and disturbed fields in summer.* (½ *natural size*)

Spiderwort (Tradescantia virginiana) *blooms in late spring and early summer, often along roadsides, on gravelly banks, or on edges of woods.* (*Twice natural size*)

The Story of a Fish Quarry

by Katherine Krueger

For most people, spring is a time for romance, gardening, or house-cleaning. But for the geologist, the advent of warm weather means a return to the field, where he gathers the specimens that are the core of his livelihood. What great fun it seems to go off each year for a month or more, to work under blue skies, away from the crowded vistas and cacophony of the city. Fun it is, but how many people realize that it is also hard physical labor, often performed under adverse weather conditions?

What really goes on during an expedition? Each field party faces somewhat different obstacles, but let us follow the history of a field project that began in April of 1973, and terminated the following September—that of Hesler Quarry in Parke County, west central Indiana.

Dr. Rainer Zangerl, chairman of Field Museum's Department of Geology, has done a great deal of field work in Parke County, and is very familiar with the paleontology and stratigraphy of the Pennsylvanian black shales in that region. While scouting around for outcrops that might contain fossils, he noticed some fossilized fish in the rock outwash from a series of gullies. Suspecting that the hill from which the gullies ran bore more of the same, he questioned the proprietor of the farm, Mr. Bennie Hesler. Such is standard procedure in the field — to secure permission from a land owner to work on his property. The Heslers, who have cattle, were more than happy to have a quarry dug on their land. They would use it for a pond when the work was done. In addition, they were enthusiastic about having a scientific venture going on practically at their doorstep.

Katherine Krueger is custodian of collections, Paleontology.

The project was funded by a National Science Foundation grant, which made possible plenty of field assistance from many individuals throughout the project's duration. Mike Williams, a Ph.D. candidate from the University of Kansas, is, like Dr. Zangerl, working on cartilaginous fishes of the Pennsylvanian black shales. Under the NSF grant, he was a full-time field hand. Four other students offered their services as volunteers and were able to work briefly on the quarry: Kathy Elbaum of the University of Chicago, Mickey Indianer and Jeff Davison of Antioch College, and Bill Krueger of the University of Illinois at Chicago Circle. Orville "Gilly" Gilpin, Field Museum's chief preparator of fossils, was at the quarry from April to September. Dr. Eugene Richardson, curator of fossil invertebrates, Mike Williams' wife Ortrud, and I each did a week's stint at the site. Dr. Bertram Woodland, curator of igneous and metamorphic petrology, was also lured there for a day, to investigate an interesting seam of cone-in-cone (calcareous concretions with characteristic conical or partly conical structures). Behind the scenes but indispensable, Dr. Zangerl's wife Ann shopped, gardened, and cooked huge dinners for the crew, during the entire 24-week period.

What did all the others do at the quarry? The bulk of the labor fell on the three "permanent" field workers: Dr. Zangerl, Gilly, and Mike. The shale was exposed only in the V of a tiny stream running through a narrow valley. The men had to strip the topsoil, the glacial cover, and some drab shale of Pennsylvanian age from the valley walls, in order to expose the black shale thoroughly on either side of the stream. A bulldozer and later a slip scraper (a road-building rig) were used for this project. Mr. Gerald Garrard, a friend of the Museum who had helped to excavate Logan Quarry (also in Parke County) in 1957, supervised the excavation of Hesler Quarry. The space to be cleared was about 30 by 20 yards in area; the project took about two weeks of full-time hard labor. The "waste" soil from the stripping project was used to build a dam for the Heslers' future pond. A culvert was placed along the stream path before the dirt was dumped, in order to keep the quarry well drained. Later Mr. Hesler would put a standpipe (an elbow-shaped attachment) on the culvert, to regulate the pond level.

Once the shale was exposed, more backaches lay ahead. The layers of shale had to be pried apart (shale is naturally fissile; that is, it tends to split along its bedding planes), broken up into pieces that could be handled, and resplit for careful examination. The top layers of the shale exposed by the bulldozer were not fossiliferous (fossil-bearing), so they had to be

completely removed before the productive layers could be reached. (Dr. Zangerl knew this from previous stratigraphic work in the area; thus he saved the crew from wasting hours splitting much unproductive shale.) Chisels were wedged between layers of shale wherever there was a gap, and sledge hammers drove them deep into the bedding planes. Then a pickax was used to pull up a sheet of shale. Sometimes natural joints in the rocks would cause a piece to come off in a manageable slab, but when that didn't happen, a whack with the sledge hammer would provide man-made "joints." A crowbar was used to push up slabs so they could be carried to a worktable. Rubble from the top layers of unproductive shale was shoveled into a wheelbarrow and hauled off to the dam. A broom served to keep the quarry surface clean.

Fancy field equipment included a gasoline-powered rock saw, used to make accurate cuts into a slab when irregular breaks might have risked damage to a specimen. A generator-powered vacuum cleaner gathered up the black dust produced by the saw.

The crew built a wooden worktable, benches, and a shed for the equipment. Slices of productive (they hoped!) shale were carried to the table, and split into extremely fine sheets, in the search for specimens. Brick hammers were used to drive series of knives into the slab. These knives were converted into thin chisels specially for the black shale quarry work. The end of a blade was first broken off, then the squared-off tip was honed to a sharp edge. The knives were positioned around a block to make it split evenly. The rewards for all these efforts were fragments of cartilaginous fishes from 300 million years ago. According to Dr. Zangerl, decomposition by bacteria had rendered them nearly flat in appearance, even before the great weight of overlying sediments had been deposited. Sometimes an entire fish would turn up — a rare event that made all the hours of fruitless labor suddenly worthwhile.

The specimens were each marked with a yellow pencil, to indicate their level of occurrence. At the end of the day they were given tentative identifications and field collection numbers. This information was logged in a notebook. Then the specimens were wrapped in old newspapers, for shipping.

In April mornings the crew worked in bitter cold and in summer everyone fried in the heat of the sun. The black shale held the heat and made an oven of the pit, where a breeze was seldom effective. Field time is limited and therefore precious; so weekends were workdays, because rain always meant a forced holiday.

Twice during the summer, torrential rains turned the quarry prematurely into a pond. Plant debris clogged the culvert and the small area filled up overnight. Murky water covered the tools but fortunately didn't reach the generator, perched safely on the worktable, which was on higher ground. The power saw in its metal case floated off and filled with water. The crew's only recourse was to enter the water — chin-deep at the center — and to poke around for the culvert with a shovel. Once the culvert was found and cleared, the pond drained in two hours. But there was still trouble ahead. The saw had to be dismantled for cleaning, and for a long time afterward it remained temperamental. A thick patina of pollen, fuzz, fallen leaves, and clay coated the shale exposures and had to be scraped off before operations could resume.

On good days, one could enjoy the buzz of cicadas, the blue sky, a view of the surrounding forest, and the clean air. Cattle would wander up to drink at a nearby water hole, providing noon-time diversion for the workers. At the top of a nearby hill lay an ancient graveyard with tumbled-down, eroded headstones. Reconstructing in our ►

Once the shale is exposed, more backaches lay ahead. The layers of shale had to be pried apart, broken up into pieces that could be handled, and resplit for examination.

imaginations the history of these long-dead settlers was one of our summer pastimes. Lunches consisted of hearty sandwiches, fruit, and hot peppers from a local grocery, all washed down with fresh spring water. The noon fare rarely varied much, but by mid-day, we were all so famished that everything was delicious.

This crew enjoyed many unusual fringe benefits, thanks to the Zangerls, who have some rural property in Parke County. We stayed in a century-old farmhouse on their land, just a five-minute drive from the quarry, so commuting or rising unduly early was no problem. The famed covered bridges of Parke County were all about us as we drove to and from our work. In springtime, ripe strawberries and raspberries were everywhere for the picking. Truly savory well water, which flowed from rocks of Pleistocene age, was used for drinking. But as it was in short supply, we bathed and washed dishes with water from a different, sulfurous source. Mrs. Zangerl grew all sorts of vegetables throughout the summer and supplemented our tightly budgeted meals with these delectables.

Evenings were free from care. After meals we would help to clean up, then chat, while admiring the marvelous variety of insects that were attracted to our lamps — kelly-green katydids, and all sorts of delicate moths. Country sounds surrounded us while a brisk blaze in the fireplace warmed us in the chill summer evenings. Sometimes there were parties wtih neighbors. Mike Williams even got free guitar lesssons from one of them!

The field trip was a success. Fifteen hundred specimens were recovered from it — all contributing to the story of Pennsylvanian life 300 million years ago. When trimmed, tidily labeled, catalogued, and set into boxes for our storage cabinets, they will hardly call to mind the rugged hammer and chisel days when we were working in that hot pit of a quarry! □

TIBET *(from p. 7)*

won such a great reputation among the Tibetans that in many places to which I came the people flocked from near and far and asked my permission to see and admire this gun; all competent judges were unanimous in the opinion that it presents the best specimen of a Tibetan gun ever made. Then I have a large coracle, a boat consisting of a yakhide stretched over a wooden frame which is the only kind of boat known in Tibet and used in crossing big rivers. For the purpose of transportation, it had to be taken to pieces, i.e., the hide to be separated from the frame, and even then I experienced great difficulty in finding suitable porters willing to carry the two pieces on their backs, because of their weight and capacity. . . .*

*The coracle is on permanent exhibit in hall 32.

. . .The foreigner suffers daily from the suspicion of the people and their animosity in general towards foreigners to which they are instigated by their Lamas and the idiotic Chinese officials. With Lamas, I have had very bad experiences; they keep us out of their temples and refuse to sell books or images; they do not even refrain from setting their powerful mastiff dogs at a foreigner or throwing stones at him. I wish to invite the advocates of the theory that the white race rules the world, to a visit of Tibet to experience that the white man finds less consideration there than a dog. Altogether, these people are a fierce and violent lot, always armed up to the teeth and ever ready to draw their swords or to make use of their guns. In one case, I have been openly attacked by a whole gang with brandished knives in front of a royal palace at broad daylight, for no other

". . . these people are a fierce and violent lot, always armed up to the teeth and ever ready to draw their swords or to make use of their guns. . . they do not even refrain from setting their powerful mastiff dogs at a foreigner."

reason, because I politely expressed the wish to see the King and held presents for him in my hands; it was only due to my cool-bloodedness that the affair had no serious consequences. The hatred of foreigners goes so far that they even refuse to sell food to him or fodder for his horse. The principle is to starve him out to make him leave the country as soon as possible. And Tibet is really a land of hunger. During the last four weeks of my journey, I have been in a desperate situation, provisions were all exhausted, and nothing, not even an egg, could be bought; only roasted barley-flour kept us alive, and the portions had to be meted out at starvation rates. . . .

Despite these exciting six last months, I am in the best of health and spirits. The resistance of so many powers has not shattered my energy, but doubled it. I have now learned to be as tough as a Tibetan. My next plan will be to conquer Tibet in an *airship*, as soon as I shall get it. In the meanwhile I will conquer as much land as I can. My journey to Hsining will take over 30 days, I shall make a stay there in the famous lamasery of Kumbum. . . .

T'ao-chou, Kansu, West-China
on Tibetan Border
8,000 feet high
Dec. 15, 1909

Mr. dear Dr. Dorsey:

I am just scribbling this note to let you know that I am doing some great things here in the way of collecting. . . . The best thing I got hold of is an old inscription-stone, . . . It is an octagonal pillar of red sandstone surrounded by a knob carved with a dragon, weighing about a thousand pounds. There is nothing artistic about it, but the inscription is of immense historical value. It is dated A.D. 749, T'ang Dynasty, . . . It relates the conquest of this town by a Tibetan army at that time, and, therefore, fits in splendidly with our Tibetan collection, in that it is suggestive of the eternal struggle going on between these two antagonistic nations, China and Tibet, and even symbolical of the political conditions of nowadays. The writing is considered by Chinese scholars as one of the finest calligraphic specimens of that period I secured the stone at the price of 100 local taels . . . from the present owner, a Chinese Christian. Considering local valuations, this price is somewhat high, but as this man . . . intends to employ this sum for the founding of a Chinese girls' school on foreign and Christian lines, I felt I should act in the spirit of Mrs. Blackstone, if I expended this amount towards this charitable and educational purpose. . . . I have not received any mail now for eight months. I am keeping well, and my work affords me ample satisfaction for any hardships I have to endure. Kindly pardon this pencil scribbling, ink has become a costly material with me. . . .

A year later, the Mrs. T. B. Blackstone Expedition came to a successful conclusion, and Laufer settled down to his post at Field Museum to catalogue and more carefully assess his recent acquisitions. In 1911 Laufer was made curator in Asiatic ethnology and in 1915 he was named curator of the Department of Anthropology. Eight years later he was to make his fourth and last journey to the Far East, the Marshall Field Expedition of 1923. At the time of his death, in 1934, Laufer was generally recognized as the world's leading sinologist. (See also *Field Museum Bulletin*, April, 1974, pp. 9-14.) —Ed. □

"The best thing I got hold of is an old inscription-stone . . . There is nothing artistic about it, but the inscription is of immense value . . ., dated A.D. 749, T'ang Dynasty." The inscription relates to the recapture of the city of Shih-pao, an ancient Chinese stronghold on the Tibetan border. Pillar inscriptions are very scarce in China, the usual form being the stone tablet. This pillar, about five feet in height, is on view in hall 24. Catalogue No. 121938.

our environment

Bald Eagle Population Survey

Stable populations of the bald eagle *(Haliaeetus leucocephalus)* were reported in six regions of continental United States outside of Alaska during 1973, according to the U.S. Department of the Interior's Fish and Wildlife Service. These areas included the northern interior regions of Minnesota, Michigan, and Wisconsin, the Chesapeake Bay area, and sections of Florida and the Pacific Northwest.

The number of active nests actually observed outside of Alaska was 627, with more than 500 young produced. The total number of nests estimated for the area was about 1,000. The bald eagle population in Alaska during 1973 was estimated between 30,000 and 55,000.

In Minnesota 104 active nests were observed, with 113 young produced; Wisconsin had 108 active nests, with 107 young produced; Michigan had 83 nests and 66 young; Ohio had 7 nests and 2 young. The Minnesota population appeared to have posted a gain during the year.

Areas of population decline included the Northeast, the Great Lakes shores, the Southeast (except for parts of Louisiana and Florida), Iowa, Tennessee, Kentucky, and Missouri.

"Coughing" Fish Aid Pollution Studies

A natural response of various fish including trout, salmon, bluegills, and sunfish to certain chemical substances is being utilized to monitor water pollution. As the amount of mercury, copper, and other substances increases in the water, the frequency of a normal gill-clearing process in these fishes also increases. Biologists at the U. S. Environmental Protection Agency's National Water Quality Laboratory in Duluth, Minn., are monitoring the levels of these and other pollutants by means of a polygraph-like device which records "cough" frequency.

Robert A. Drummond, aquatic biologist in charge of the project, believes that the ultimate result of these observations "could be a system for keeping tabs on concentrations of complex industrial wastes entering lakes and streams from waste treatment plants and industry. A sudden increase in fish coughs within a given body of water could trigger an alarm to warn plant personnel that potentially damaging effluent is leaving the plant.

"We're currently looking at the short-term effects of 10 heavy metals and pesticides, and will be comparing the results with the already computed long-term effects. If the comparisons are favorable for this group, we feel the cough frequency test may be valid for other chemicals."

Eight Added to Threatened List

Three mammals, three birds, one amphibian, and one fish have joined the list of Threatened Wildlife of the United States — bringing the total to 109 species. The list, determined by the U. S. Fish and Wildlife Service, includes 53 bird species, 31 fish, 17 mammals, and 8 reptiles and amphibians.

The new members of this exclusive "club" are the northern Rocky Mountain wolf, the eastern cougar, the Utah prairie dog, the Santa Barbara song sparrow, the Puerto Rican whippoorwill, the Mississippi sandhill crane, the Okaloosa darter, and the desert slender salamander.

Some species on the list have been "threatened" by the encroachment of man, some by pesticides, and others by eradication of their natural prey.

Parks Planned for Breeding Shy Animals

A number of scarce animal species simply will not breed in captivity, at least not in conventional zoos. The Père David's deer, native to China, breeds most successfully when it is able to interrelate in groups with normal age and sex ratios. Male antelopes need ritual fighting over a female as a preliminary to pursuing her.

In response to such idiosyncracies, a federally funded farm, divided into 35-acre sections, is being developed at Front Royal, Va. Under conditions as near normal as possible, it is hoped that species such as Père David's deer and the scimitar-horned oryx, native to the Sudan, will do what comes naturally — and incidentally, provide new generations for conventional zoos.

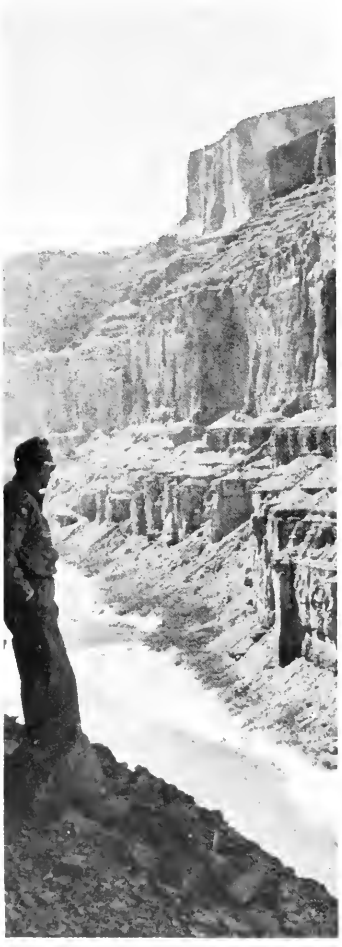
Buffalo Meat Marketed in Chicago

Almost simultaneous with publication of the May issue of the Field Museum *Bulletin* — which featured an article on the "Return of the Buffalo" — one of the nation's largest retail grocery chains began marketing buffalo meat in the Chicago area. National Tea Company placed 100,000 pounds of the meat on sale at its retail outlets in and near Chicago. It was the first time since the turn of the century, reported company spokesmen, that the commodity had been available in Chicago stores.

Members' Nights,

May 2 and 3, were resoundingly successful—12,982 Field Museum members and guests attended the two-evening open house.

field briefs



Grand Canyon

All Aboard for Grand Canyon!

If you want to be among the lucky Grand Canyon explorers, August 16 to 24, sign up now; there are only a few spaces left. Most of this exciting trip (reserved for Field Museum members) will be spent on rubber rafts coursing down the Colorado River. Half-day geological inner-canyon hikes up to four miles are also planned. Dr. Matthew H. Nitecki, associate curator, Department of Geology, will conduct the nine-day tour.

Cost of the tour is $700, which includes all expenses (air fare, boat fare, meals, and one night's lodging—double occupancy). A $200 deposit is required to hold your reservation. Camping supplies (sleeping bags, blankets, etc.)are available at destination for an additional $20 to those who do not wish to take them along, but should be requested prior to departure. For further information, please write or phone Mrs. Madge Jacobs, 922-9410, ext. 343.

Recent Appointments

Field Museum's new coordinator of printing production is Oscar Anderson. He is a native of Jamestown, New York, and a 1970 graduate (B.A.) of the University of Chicago in Near Eastern languages and civilization.

Erich Eilers has been appointed purchasing agent for the Museum. He is a native of Chicago and a graduate of the American Association of Industrial Management.

Phillip Cotton, from Buffalo, New York, recently joined the Department of Education as an instructor. He has a B.S. in art education from Buffalo State College and, like Oscar Anderson, is in a visual education program at Illinois Institute of Technology.

Phyllis Rabineau has joined the Department of Anthropology where, together with Christopher Legge, she is custodian of collections. Miss Rabineau is a native of New York City and holds an M.A. in anthropology from Boston University.

Glenn A. Petersen is Field Museum's new senior sergeant of the Security and Visitor Services Force. He joined the Force in June 1968 and, as senior sergeant, succeeds Donald Underhill, who retired March 31.

Contemporary African Arts Festival

April 20 was opening day for Field Museum's new exhibit of contemporary African art. Among the distinguished visitors who toured the exhibit during opening week was Dr. Ignacio Bernal, director of Mexico's National

Right, Saidu Na'Allah, Nigerian potter, demonstrates techniques in Stanley Field Hall on Saturday, June 22, from 10:30 a.m. to 3:30 p.m.

Museum of Anthropology. At right, Dr. Bernal (rt.) is shown with Dr. Donald Collier, Field Museum's curator of Middle and South American archaeology and ethnology, as they view paintings of Ethiopian artist Skunder Boghossian.

Rededication Reset for June 25

Because of unavoidable delays in the reconstruction of the Museum's north entrance steps, rededication of the building, originally scheduled for June 4, has been rescheduled for Tuesday, June 25, at 11:00 a.m. The rededication ceremonies will take place on the north stairs, where the Museum's cornerstone is located. The cornerstone will be opened to receive documents pertinent to the current $25-million rehabilitation program. The month of June marks the 80th anniversary of the Museum's original opening, in Jackson Park; it has occupied its present building since 1921.

New Women's Board Officers

The new president of Field Museum's Women's Board is Mrs. Thomas E. Donnelley II, elected at the board's annual meeting, May 14. Mrs. Donnelley succeeds Mrs. B. Edward Bensinger, who was elected in 1972. Other new officers elected at the meeting were Mrs. William D. Searle, second vice president; Mrs. Charles Fenger Nadler, recording secretary; and Mrs. Charles S. Potter, corresponding secretary.

Continuing in their respective offices are Mrs. Frank D. Mayer, first vice president; Mrs. Harold F. Grumhaus, third vice president; Mrs. Robert E. Straus, treasurer; and Mrs. Edward F. Blettner, assistant treasurer.

Newly elected members-at-large are Mrs. Robert C. Gunness and Mrs. Henry W. Meers. Mrs. Henry P. Wheeler, Mrs. Edward McCormick Blair, and Mrs. Philip K. Wrigley are continuing as members-at-large.

Shown at right are the new president, Mrs. Donnelley, and her husband. Mr. Donnelley is a vice president of Field Museum's Board of Trustees

letters

Battling Chameleons

The following letter was directed to Dr. Robert F. Inger, assistant director, science and education, who is a noted herpetologist. The subject of the letter, Jackson's chameleon, is a spectacular East African lizard that sometimes measures a foot or more in length; extending forward from its snout are three "horns."

Sir:

Enclosed is photographic evidence that Jackson's chameleon uses its horns in combat: 13 color transparencies of two large males in various stages of combat. This is in reference to your statement on page 94 of your excellent book *Living Reptiles of the World* [by Karl P. Schmidt and Robert F. Inger; Doubleday, 1957]: "The rather dull fact is that there is no evidence that the horns are used in fighting." Well, here's the evidence:

While living in Florida, I kept . . . a pair of adult *jacksoni* (which I named "Ashley Montagu" and "Ruth Benedict") in a rooftop cage. Half of the cage top was covered with a board [the top being a hinged screendoor type]; the other half received direct sunlight part of the day, and when the angle of the sun changed [the light was filtered through a tree]. The season was summer. The specimens were newly imported from Africa, and I would guess had been in captivity less than six months. . . . They had certainly been able to establish their genetic patterns as behavior in the wild, thus, more than likely reinforcing them. The same day I got my pair, a friend obtained a single male *jacksoni*, which he named "Clod." After a month, Clod wasn't looking as vigorous as my two specimens and had been getting little sunlight. I suggested boarding him with my chameleons for awhile to see if sunlight and some company with his own kind would perk him up.

Shortly after putting Clod in the cage, I discovered the two males face-to-face on Ashley's branch where they were doing the broadside leaf-shake number. They rushed each other (slowly) and locked horns. I documented the "battle" with both standard and macro photographic equipment. The fight consisted mostly in the two reptiles pushing each other back and forth on the branch, twisting around the branch, and definitely trying to debranch each other, which Ashley finally succeeded in doing to Clod. Clod made no attempt to resume the battle and appeared exhausted at the end. At no time during the battle was there any serious biting.

Neither animal seemed interested in actually hurting its opponent. One slide shows the defeated Clod with very dark coloration and in a definite posture of submission. He remained in that position for what seemed a very long time, and fearing for his welfare I removed him from the cage. Ruth Benedict remained at the opposite end of the cage during the entire happening, and seemed unconcerned if not totally oblivious to the occurrence. Ashley kept an eye on Clod the entire time he cowered and I thought there might be trouble if I left the defeated male in the cage. My decision to remove the defeated chameleon was based on the theory that he might just cower there in the direct sunlight until it did him in.

For persons who wish to set up conditions in which the same phenomena I photographed might occur, I would suggest the following: Obtain a male and a female that have matured in the wild. Put them in a cage no more than three feet long, two feet wide and high, with bright sunlight and an established territory. It would probably be wise to allow the pair to establish some sort of relationship for about a month before introducing a strange male. When you introduce the second male to the cage (at noon on a midsummer day) place him on the established male's favorite branch. I think that heat in the form of natural sunlight is very important here. It has been my experience that reptiles in general are more likely to revert to extremely wild behaviors when kept in an outdoor terrarium; in such a setting they can get into the hot sun whenever the mood strikes them.

Rod Crimshaw
Portland, Oregon

Scientists are often indebted to nonprofessionals for their chance observations of natural phenomena. Our gratitude to Mr. Crimshaw for his careful reporting. —Robert F. Inger

Horns interlocked, "Ashley Montagu" and "Clod" struggle for possession of a branch.

Members Asked to Participate In Rehabilitation Program

Museum Members who have seen the barricades and construction equipment, heard the sounds of jackhammers and drills, smelled new paint, and perhaps even sneezed in new dust, can realistically visualize Field Museum taking on a whole new enjoyment.

The north and south entrance stairs will be smooth and level; there'll be a ground-level entrance; and there will be eight new emergency exits. New restroom facilities and modern dining areas will make longer visits more comfortable. Large, modern passenger elevators will make floor-to-floor touring easier. Well-lit, air-conditioned exhibition halls will invite closer inspection.

And there's every possibility that a Museum Member can turn to those accompanying him on a Museum tour, and say, "It's great, isn't it? And I helped make it possible."

"Before the end of the summer, we expect to have given each Museum Member the opportunity to participate in renovating the 53-year-old building," said Nicholas Galitzine, general campaign chairman. "We intend to contact each Member for assistance in bringing our three-year, $25-million Capital Campaign to a successful conclusion in September."

The campaign, begun in September 1971, needs an additional $1.4 million to meet its goal. Private gifts in the amount of $12.5 million are being raised by the Museum; a matching sum is being provided through the bonding authority of the Chicago Park District. The Museum has raised $11.1 million of its share, from foundations, businesses, and private gifts.

According to Galitzine, pledges will be solicited that Members may elect to honor over a three-year period. "Preparing the Museum for an exciting future is the reason behind our Capital Campaign," he said, "and it is only fitting that its Members share in that excitement in a very personal way."

He urges Museum Members to think of their gifts in terms of not only updating the Museum's physical plant and providing improved visitor comforts, but in meeting the increasing demand placed upon the Museum's scientific collections and research, and its educational and exhibit programs.

A section of the north portico gets a new base as fresh concrete is hosed in. As part of the Museum's rehabilitation program, storage areas currently under the portico and front steps will be converted into administrative office space.

JUNE at Field Museum

Exhibits

Continuing

Contemporary African Arts Festival, the first comprehensive exhibit of its kind in the United States, features the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as music, films, lectures, dances, and other events. Through November 3. Hall 27.

Special June programs are:

Films in studio in exhibit area:
Daily at 1:30 p.m.

June 1-7	"Gelede," "Africa Dances," and "Heartbeat of Africa"
June 8-14	"New Images," "Abuja Pottery," "East African Wood Carver," and "Talking Drums"
June 15-21	"The Hadza" and "Bitter Melons"
June 22-28	"The Tuareg," "Nawi," and "Masai Warrior"
June 29-30	"The Dry Season" and "African Village: Guinea"

Fridays at 7:30 p.m.

June 7	"Mandabi"
June 14	"Emitai"
June 21	"Borom Sarret" and "Tauw"
June 28	"Black Girl"

Sunday, June 30, at 4:00 p.m.
"Liebalala" and "Under the Men's Tree"

Saturday, June 1
"Coming of Age in Chicago," a ceremony performed by teenagers from high schools and community organizations who have participated in Field Museum's Contemporary African Arts Anthropology Workshop 10:30 a.m. and 2:30 p.m., Stanley Field Hall

Saturday, June 8
"Music as a Bridge Between Traditional and Contemporary Cultures," a demonstration by Phil Cohran of the Black Music Workshop
10:30 and 11:30 a.m. and 2:30 and 3:30 p.m.
Stanley Field Hall

Saturday, June 15
African Songs and Folk Tales by Selina A. Ahoklui of Ghana
10:30 and 11:30 a.m. and 2:30 and 3:30 p.m.
Stanley Field Hall

Saturday, June 22
Pottery Demonstration by Saidu Na'Allah of Nigeria
10:30 a.m. to 3:30 p.m.
Stanley Field Hall

Saturday, June 29
Marimba Ensemble Performance by Dumisani Abraham Maraire (Shona) of Rhodesia
10:30 a.m. and 2:00 p.m.
Stanley Field Hall

Edwin Janss Jr. Underwater Photography, an exhibit of exciting color prints. Through September 8. Hall 9.

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature; "A Sense of History" presents a graphic portrayal of the Museum's past, and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

Children's Program

Begins June 1

Summer Journey for Children, "The Artist's Zoo," a free self-guided tour of Museum exhibits, focuses on animal designs used by Native American and African artists to decorate objects. Youngsters will be given a sketchbook in which to draw and design their own motifs as part of the project. All boys and girls who can read and write may join in the activity. Journey sheets in English and Spanish are available at entrances. Through August 31.

Special Events

Ray A. Kroc Environmental Education Program

Saturday, June 1

***Field trip for young people:** "Prairie Life." The group will visit Gensburg Markham Prairie to study its animal and plant life under the leadership of Phil Hanson and James Bland of Field Museum. Limited to 30 students, ages 15 through 18. Group will assemble in the north meeting room, second floor, at 9:30 a.m.

Saturday, June 8

***Field trip for young people:** "Rocky Glen." The trip provides an opportunity to explore a wide variety of ecological and geological areas at the DuPage County site under the leadership of James Bland of Field Museum. Limited to 30 students, ages 15 through 18. Group leaves from Museum's north parking lot at 9:30 a.m.

*Reservations will be confirmed in order of receipt and payment. A $4.00 fee covers lunch and transportation. Send check with name, address, phone number, and choice of program to:

Field Museum—Environmental Program
Roosevelt Road at Lake Shore Drive
Chicago, Ill. 60605

Meetings

June 7, 7:30 p.m.	Chicago Anthropological Society
June 7, 7:30 p.m.	Chicago Astronomical Society
June 9, 2:00 p.m.	Chicago Shell Club
June 11, 7:30 p.m.	Nature Camera Club of Chicago
June 12, 7:00 p.m.	Chicago Ornithological Society
June 12, 7:30 p.m.	Windy City Grotto, National Speleological Society
June 13, 7:00 p.m.	Chicago Mountaineering Club

Hours

9:00 a.m. to 6:00 p.m. Saturday through Thursday and 9:00 a.m. to 9:00 p.m. Friday.

Beginning June 22 and continuing through September 1, the Museum will be open from 9:00 a.m. to 9:00 p.m. on Wednesday, Friday, Saturday and Sunday. The cafeteria on these evenings will remain open until 7:30 p.m.

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

Field Museum of Natural History Bulletin

Volume 45, Number 7
July/August 1974

Managing Editor G. Henry Ottery
Editor David M. Walsten
Staff Writer Madge Jacobs

CONTENTS

COVER

Wooden mask representing a wolf, made by the Kwakiutl Indians of northern Vancouver Island, British Columbia. (Cat. no. 19174.) Photo by John Bavaris, Sr. Wolves were regarded with mixed awe and dread by Northwest Coast Indians. Because game was always abundant, wolves were never a threat to man; there is, in fact, no evidence that Indians were ever attacked by wolves. The animals were feared because of supernatural powers attributed to them.

Photo credits

Cover, John Bavaris, Sr. 3, UPI Compix. 4, National Film Board of Canada. 5, 9, UPI Compix. 12 (bottom), UPI Compix. 13, John H. Gerard. 14 (bottom), 15, U. S. Department of the Interior, Fish and Wildlife Service. 17, top left, G. Henry Ottery. 19, Oscar Anderson.

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the timber wolf on trial

by Joyce M. Brukoff
and David M. Walsten

The residents of Gubbio, an Italian village were terrorized by a wolf and afraid to venture from the village. St. Francis of Assisi, who had a way with animals, reproved the wolf and it promised to mend its ways. The animal meekly followed St. Francis into Gubbio, where it took up ►

Joyce M. Brukoff is an Evanston writer with a special interest in environmental problems.

Poisoning has been one of the most effective means of slaughtering wolves. The 27 wolves that appear to be taking their ease in the background are the frozen carcasses of animals that attempted to feed on the body of the deer. The deer meat, laced with poison, killed all the wolves and a lynx (rt. center)

residence with the townsfolk. According to another Christian legend, the martyr St Edmund had a wolf as his protector, and in a much more ancient myth Romulus and Remus, founders of Rome, were suckled by a she-wolf.

In most wolf myths of the Western world, however, the rapaciousness and ferocity of the animal are emphasized, so that wherever man and wolf have coexisted there has been an unceasing effort to exterminate the animal. It has been shot, poisoned, trapped, and run by hounds until, in most regions it has been wiped out.

Even today the myth of the ravening wolf is perpetuated. Toddlers learn the story of Little Red Riding Hood and the tragicomedy of the Three Little Pigs along with their bedtime prayers, implanting a villain image that they will remember into adulthood. Prokofiev's "Peter and the Wolf" and werewolf films borrowing loosely from ancient legends reinforce the image.

A myth which remains current, and which has a serious bearing on the public attitude, is that wolves attack man without provocation. Literally hundreds of such stories are known in Europe, none of them substantiated, however. A single documented case of unprovoked attack is known for North America. In Canada in 1942, a railroad worker on a handcar was pursued down the tracks by a wolf, knocked from the vehicle, and attacked for some 25 minutes before three other workers came to his aid. Eventually the wolf was killed, but its persistence in the face of such odds strongly suggests that the animal was rabid. Wolves are, in fact, extremely shy of man and sedulously avoid him.

Geographic range

Until recent times the timber wolf has been one of the most widely occurring of all mammals; within the North temperate zone there is hardly a region where the species has not been found at one time or another. As recently as a century ago, it ranged over most of the North American continent, where it was the dominant predator. Intelligent, strong, courageous, the wolf had the added advantage of a highly developed social way of life.[1] The wolf pack as a coordinated team could bring down large herbivores such as moose, elk, and buffalo that would have been inaccessible to the lone predator.

In spite of such advantages, the range of the wolf gradually receded. Today the last viable holdout of the species in the contiguous United States is in Superior National Forest—a 4,100-square-mile pocket of northeastern Minnesota, where the survivors number only a few hundred.

Beyond this region—according to L. David Mech, wildlife research biologist of the U.S. Fish and Wildlife Service and perhaps the leading authority on the species—only about 50 wolves are to be found.[2] A colony of 15 to 30 individuals lives on Isle Royale (210 sq. miles) in Lake Superior; and a handful are in the forests of Michigan's Upper Peninsula. There are also reports of a few in Yellowstone and Glacier national parks.

The borzoi, or Russian wolfhound, is descended from the Arabian greyhound and was first used to hunt wolves in the early 1600s. The breed is still so employed in the Soviet Union, but poisoning, trapping, den destruction, and aerial hunting are the more common methods of destroying the animals. A decade ago 17,000 professional and amateur wolf hunters were involved in eradication programs in that country. In 1963, the last year for which figures are available, 8,800 wolves were killed there.

Current population estimates for Canada range from 17,000 to 28,000, with wolves found generally throughout the dominion except in the Maritime Provinces, Newfoundland, southern Saskatchewan, southern Manitoba, and in those areas of Ontario and Quebec that are more densely inhabited by man. A top figure of 25,000 is currently estimated for Alaska.

The animal formerly occurred throughout Europe and all of Asia, except in southeast Asia and southernmost India. The distribution over that continent apparently has not diminished during the past century, but there has been a drop in density. In Japan, wolves formerly occurred on the northern island of Hokkaido and on the main island of Honshu. On Hokkaido, the last wolf was seen in the late 1880s. Honshu reported its last wolf in 1904.

In northern Norway, Sweden, and Finland there are reportedly less than three dozen wolves; about ten are thought to occur along Finland's eastern frontier. Some are found in the mountainous regions of Italy, Spain, Czechoslovakia, and Poland. They also occur in the Balkans, where attempts are being made to control them. In the Soviet Union, wolves continue to decrease in number, although they are protected in a few areas such as Kafka Zapovednik, a government preserve in the Caucasus.

In France, during the seventeenth century, a provincial official known as the *grand louvetier* was responsible for keeping down the wolf populations. At that time wolves were found in every province of France. Curiously, a *lieutenant de louveterie* is still appointed in some of the French départments (which have replaced the provincial divisions), although the wolf may now be extinct in that country. ►

In Scandinavian mythology, Fenris the wolf is the brother of Hel (death) and Midgard (a snake). When the world ends, he will end he devours the sun. The god Tyr, sword in hand, has sacrificed his own hand so that Fenris can be tied up. Illustration from an ancient edition of Scandinavian myths.

A few centuries ago the wolf was a serious scourge of sheep flocks in Great Britain. The records of a monastery near Whitby (Yorkshire) record that the abbot's hounds killed 13 wolves from December to March, 1395-96; wolves undoubtedly continued to pose a serious threat to sheep in England—especially in the northern regions—for many years. The last wolf is believed to have disappeared from that country in the latter years of Henry VIII's reign (1609-47). The last documented killing of a wolf in Scotland occurred near Findhorn, Moray County, in 1743; in Ireland the last one was sighted about 1770.

At that time wolves were still prevalent throughout North America, but by 1850 the animal had virtually disappeared east of the Mississippi. Within another half-century it had vanished from the eastern tier of states. In 1915 the federal government initiated a program to eliminate animals detrimental to agriculture. The result was a death sentence for the western wolf, which has since been wiped out, except for those apparent stragglers in Yellowstone and Glacier. Wisconsin conservationists succeeded in obtaining statewide protection for the wolf in 1957, but the move came too late. The animal has been extinct there for more than a decade.

As recently as 1965 the state of Minnesota was offering a $35 bounty on wolves and, during the mid-sixties, as many as 250 wolves were being slaughtered each year. But by 1969 the bounty system had been greatly modified, thanks to a greater public concern for the future of the wolf.

Relationship to other canids

Like the mountain lion, the wolf is known by a variety of names, depending on the locale. Common local names in addition to "timber wolf" are "grey wolf," "tundra wolf," and "lobo." The species is a member of the family Canidae, within the order Carnivora. So it is cousin to the cats, bears, weasels, raccoons, and other animals that are primarily, if not exclusively, carnivorous. More closely related are the coyote, the jackals, the

(Continued on p. 12)

Energy for the 70s

by Philip H. Abelson

For decades the United States has been a land of abundance. Science and technology combined with this wealth gave us world leadership. We became accustomed to an ever-increasing standard of living. The successful program of exploration of the moon contributed to a severe contagion of overconfidence. The idea was generally accepted that if we could go to the moon, we could do anything.

But while everyone's eyes were on the moon, very important changes were occurring here on earth. Our technological supremacy was fading, and our position with respect to raw materials, particularly oil, was decaying rapidly. This change did not go entirely unnoticed. A number of scientists pointed out the dangerous trends as much as a decade ago. However, the general public took no heed.

Instead, environmental concerns took over as a central focus of action and interest.

In 1970, at the moment when domestic production had begun to decline, sudden new demands were placed on oil. The public wanted cleaner air. Oil and natural gas had displaced coal as a source of heat in power plants. Automobiles had become heavier and less efficient. Particularly in demand was natural gas, a very clean fuel used to heat more than half of the homes in this country.

Suddenly it became evident that we were in danger of exhausting this fuel. Gas companies were forced to stop adding customers, and expansion of industrial uses was curtailed. With no further expansion possible in consumption of natural gas, the burden of clean air fell on oil. The consequence was a rapid increase in the use of oil, and this meant an even greater percentage in the rise in imports of oil.

Just prior to the embargo, our use of oil was expanding at the very rapid rate of nine percent per year. Because we are no longer self-sufficient in oil, our imports were increasing at the rate of about forty percent per year. We were importing about thirty-five percent of the oil and its products that we consumed.

The Arabs performed a great service for the American people by demonstrating that there are limits to the availability of oil. But with the end of the embargo many people resumed their wasteful habits. Some recent opinion polls published in *Science* show that the public does not understand the seriousness of our energy problems and that it believes they will be solved in a few years. The fact is that with our present rate of motion we could find ourselves enduring uncertainties of ►

Dr. Abelson, editor of *Science* magazine and president of the Carnegie Institution of Washington, addressed an audience at Field Museum this spring as part of the Museum's Ray A. Kroc Environmental Program. This article is adapted from his address.

supply, inflation and economic dislocations for a decade or more

Oil and its products are essential to our existence in many ways, but a crucial factor is gasoline. Studies have shown that half of gasoline consumption occurs in trips of three miles and less. It appears that when faced with the prospect of walking a little distance or taking public transportation, many people chose to spend hours in line waiting for gas

". . . strip mining and underground mining can be conducted in a way that is environmentally acceptable."

Getting people to cut down on their use of gasoline will not be accomplished by mere exhortation. In an article published in *Science*, Kenneth Boulding says:

"The automobile . . . is remarkably addictive. I have described it as a suit of armor with 200 horses inside, big enough to make love in. It is not surprising that it is popular. It turns its driver into a knight with the mobility of the aristocrat, and perhaps some of his other vices. The pedestrian and the person who rides public transportation is by comparison a peasant looking up with almost inevitable envy at the knights riding by in their mechanical steeds. Once having tasted the delights of a society in which almost everyone can be a knight, it is hard to go back to being peasants. I suspect, therefore, that there will be a very strong technological pressure to preserve the automobile in some form, even if we have to go to nuclear fusion for the ultimate source of power and to liquid hydrogen for the gasoline substitute. The alternative would seem to be a society of contented peasants, each cultivating his own little garden and riding to work on the bus, or even on an electric streetcar. Somehow this seems less plausible than a desperate attempt to find new sources of energy to sustain our knightly mobility."*

In addition to the emotional factors, there are some practical reasons why the automobile has a strong hold on the American public. During the past twenty years this country has built an economy largely based on the assumption that unlimited amounts of gasoline would be available. Agriculture is based on the tractor and other uses of hydrocarbons. Intercity truck traffic now carries most of the goods. Industrial establishments, great shopping centers, and housing have all been located on the assumption that the automobile would conveniently supply transportation. In recent years, construction in this country has been at the level of $100 billion a year. Without the automobile, much of the construction investment of more than $1,000 billion of the past twenty years would be nearly worthless.

Most of us have not thought very deeply of the role that energy utilization plays in establishing the structure of the economy and living patterns. Early in this century, the primary source of energy on the farm was the horse. Given that central fact, much of the shape of rural society followed, including the large fraction of population devoted to farming. Today, take away hydrocarbons and farm machinery and most of us would be starving.

Another pattern that was established early in this century was a mass transportation system based on trains and on the electric streetcar. The existence of such transportation dictated the development of cities, a convergence of transportation on center city, and the location of shops and businesses there.

Furthermore, the location of much of industrial activity was determined by energy considerations. That is, the great industrial activity of Pittsburgh and the Middle West rested on the foundation of coal. Later, the great industrial development of Texas and the Gulf States owed their existence to oil and natural gas.

For the next decade it is likely that we will go on much as we have been, but if we are to avoid a long period of discomfort, we will have to approach our problems more decisively than we have been.

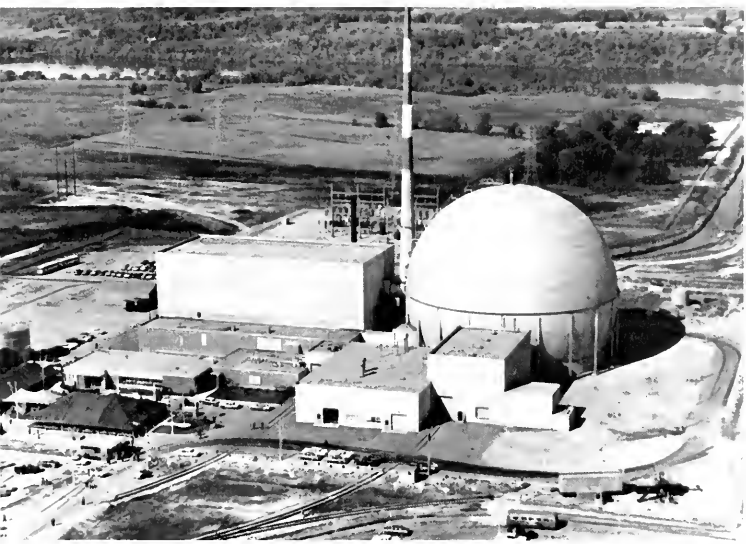
First, the public must understand that there is no easy way out. Because the American public has previously experienced only abundance, it cannot accept the fact of scarcity. At least part of the public wants to believe that the energy crisis was all a hoax. They prefer to think that by chastising the oil companies our problems would all be solved. The oil companies are not blameless, but they also are not magicians. They cannot produce oil where none exists.

The fact is that over the last decades the petroleum resources of the United States have been largely discovered and consumed. In spite of considerable drilling activity last year, new discoveries of oil in the lower 48 states were practically inconsequential.

If we are to work our way out of the difficulties, we must either lessen our demand for oil or increase production from coal and oil shale. An increase in production will be slow. Our quickest way to ease problems is through conservation. We have seen how deeply attached the public is to its automobiles, but the cars need not be the huge specimens that Detroit has been making. Europeans have long used and enjoyed smaller automobiles which consume about half as much gasoline. Already Detroit is working hard to produce such cars. On the way are more efficient motors and lighter cars. Even when such autos are available, however, it will be a long time before their presence is fully felt. Many years must pass before the old cars could be replaced. In addition, there will be those who insist on buying huge gas-guzzlers.

We face, then, a difficult problem in achieving a reduction in consumption of gasoline. In this matter, we could learn a lesson from the Europeans. We could cut demand by

*Science, Vol. 184, No. 4134, April 19, 1974



The stop-the-reactor people have won a few battles, but they have lost the war. For every reactor they have stopped, ten have been authorized. They have mainly succeeded in causing extensive delays. Commonwealth Edison's Dresden Nuclear Power Station (above), near Joliet, Ill., which started producing early in the 1960s, was the nation's first full-scale, privately financed nuclear power plant.

raising the price. To cut demand substantially would require prices for gasoline in the neighborhood of one to two dollars a gallon. One way of proceeding would be to enact a tax of a dollar or more per gallon for gasoline used by motorists. With sharply higher prices, a drop in consumption would occur, and the government would take in about $50 billion in taxes. This could be used to finance a major Project Independence, or, for instance, to cut our income tax.

Another major area in which substantial conservation could be achieved is industry. This activity consumes over forty percent of the total energy this country uses. A substantial fraction of oil and natural gas is used by industry merely to provide heat for boilers and for processing. Hydrocarbons are too valuable to burn in this way, and industry should be put under pressure to reduce its use of hydrocarbons.

The most effective method is through increased costs. Already the higher price of oil is having a profound effect on industry, and many companies are devoting great effort to achieving quick energy savings.

However, getting industry to replace oil by other forms of energy such as coal is likely to be more difficult. But if industry were placed on notice that in the future the burning of oil and natural gas for heat was going to encounter a large and escalating tax, there would be great further activity in conservation of energy and moves toward replacing oil and gas with coal.

An important key to management of the energy problems of the next decade is the question of how to deal with coal. There are the environmental effects of mining. There is the problem of sulfur oxides produced in burning coal. I believe that both strip mining and underground mining can be conducted in a way that is environmentally acceptable. What is required is appropriate laws and regulations, and effective enforcement of them. Such laws can be enacted.

At current rates of consumption of energy, the United States has coal reserves sufficient to meet its needs for about 600 years. Its shale reserves would be sufficient for a comparable period also. However, it is well to consider other means of meeting needs over the longer term.

The three major potential methods are to use thermonuclear reactions, breeder reactors, and solar energy.

Those who have pushed thermonuclear energy have painted an impressive picture of the resources of deuterium of the oceans. In the last two decades, there has been considerable progress toward obtaining the kinds of plasma temperatures and pressures required to attain an output of energy greater than input. However, the best devices are far from that goal. In addition, a recent engineering feasibility study conducted at the University of Wisconsin shows that the facilities needed in a thermonuclear reactor would be very costly per unit output. The point is that large magnetic fields must be maintained over a huge volume. At the same time, the feasible energy density in that volume is low. Thus, even if the thermonuclear people achieve their goal of net production of energy, costs for it will be very great.

Another long-term source of energy is the breeder reactor. But this has not yet been proven entirely practical: it entails very large inventories of plutonium, and is costly. In a day when terrorists are abroad, the breeder reactor is not an altogether attractive bet.

A third source, that will certainly provide at least part of our future energy needs, is the sun. We will harness the sun's energy both directly and indirectly—for example, directly through home heating, solar panels, and so on; and indirectly by use of energy inherent in

(Continued on p. 15)

our environment

Kennicott Grove May Be Saved Yet!

One of the last remaining prairie groves in Illinois may still be saved from the hands of real estate developers if local conservationists have anything to say about it. Kennicott Grove, a 240-acre tract that lies within Glenview Park District just north of Chicago, is the subject of a bill introduced April 17 before the Illinois state legislature. The bill, proposed by Rep. John E. Porter (R-Evanston), would authorize the Illinois Department of Conservation to acquire the land for a state park. Porter estimates the land would cost about $4,500,000. The bill has already received the endorsement of the Agriculture and Natural Resources Committee of the House.

Several large companies in the Kennicott Grove area have indicated an interest in providing funds for purchase of the land as a public tract, if such funds are needed. The Glenview Park District has also expressed interest in acquiring 100 to 125 acres, such a move would be determined by referendum. (For more on the history of Kennicott Grove, see the September 1973 *Bulletin*.)

Public Meetings Held on Migratory Bird Hunting

The first of two annual public meetings to set migratory game bird hunting regulations for the 1974-75 season was held in Washington, D.C. on June 25. Proposed migratory shore bird and upland game bird hunting regulations were discussed. A second conference to discuss waterfowl hunting regulations will be held on August 6.

The June 25 conference heard reports from wildlife biologists on the status of mourning doves, woodcock, bandtailed pigeons, white-winged doves, rails, gallinules, and common snipe. The conferees also discussed a proposed set of regulations setting seasons and bag limits for these birds. Conference participants included regional and state fish and game officials, plus representatives of the International Association of Game, Fish and Conservation Commissioners, the Wildlife Society, the National Audubon Society, National Wildlife Federation, Izaak Walton League, Outdoor Writers Association, and the Wildlife Management Institute.

The public is invited to attend the August 6 waterfowl meeting. Those interested should notify the director, U.S. Fish and Wildlife Service, Washington, D.C., or call (202) 343-6025. Written statements from the public should be sent to the director. To the extent that time permits, the committee will hear oral statements from the public at the completion of the agenda provided written copies are provided for the record.

Pollution "Threatens" Florida Coral Reef

Hen and Chickens Reef—a coral structure covering a few square miles just off the Florida Keys—appears to be dying a slow death, according to Lee Purkerson, Everglades National Park biologist. The reef, which lies in about 20 feet of water 75 miles south of Miami, is already 80 percent dead. Colonies of coral-forming polyps—which make up the remaining 20 percent—are slowly being killed by man, says Purkerson. Silt from dredging activities and the dumping of sewage favor the growth of algae on the coral, which is then deprived of light and food. Death for a reef also means death for the myriads of creatures that live on and around it. Among these are commercially important lobster and yellow tail snapper.

Spot checks of other reefs that make up the 160-mile arc of the Florida Keys reveal that Hen and Chickens is not the only imperiled coral reef. While some appear still healthy, other reefs are nearly dead.

Quieter Jets Sidelined by Fuel Shortage

Fuel shortages brought on by the energy crisis may be adding to the giant energy headache—*literally*. According to a recent study by the Environmental Protection Agency (EPA), some major airlines have replaced fuel-hungry 747s with more economical—but noisier—707s and DC-8s on certain routes.

Gaseous Fuel from Manure

Fuel from dried cattle manure is nothing new—it has been so used in many parts of the world for centuries. Modern technology has put a new twist, however, on this ancient resource. A Colorado firm has come up with a commercially feasible method of extracting methane gas from the manure, and using it to replace natural gas.

Monfort of Colorado, Inc., the world's largest cattle feed supplier, also has a large slaughtering and beef-packing operation—a by-product of which is 450,000 dry weight tons of manure from its feedlots each year. According to company spokesmen, 4,000,000 cubic feet of methane could be produced from the manure daily. The fuel value of this amount would be equal to the quantity of natural gas required to heat 10,000 homes. A Denver engineering firm has been granted an option by Monfort to produce the methane, which in turn would be used by Monfort to heat its packing plant, provide fuel for its tallow-rendering works, and steam-cook corn that is used for cattle feed.

Solar heat would be used to heat the manure to the proper temperature for bacteria growth. The bacteria chemically break down the manure, producing methane.

Cloud Seeding Used as U.S. Weapon in S.E. Asia

Weather modification, as a military weapon, was used by the U.S. Air Force from 1966 to 1972 over North and South Vietnam and Laos, the Department of Defense admitted recently. At a March 20 briefing, the Senate Foreign Relations Committee was given a detailed report of military cloud seeding by DOD officials. Military officers at the briefing reported that cloud seeding had reduced the infiltration of North Vietnamese troops along the Ho Chi Minh Trail, especially in June 1971. They denied, however, that cloud seeding had been responsible for the massive floods that occurred in North Vietnam later in that year.

Chicago Air Getting Cleaner

The amount of airborne dust over Chicago is about 30 percent less than what was measured 5 years ago. According to the Department of Environmental Control, a daily average of 120 micrograms of atmospheric dust per cubic meter occurred during 1969, compared to an average of about 84 micrograms in 1973. (In 1966 a seasonal high of about 133 micrograms had been recorded.)

Since 1969 a progressive drop in the atmospheric dust has been noted. What these figures point to is this: At the present rate of air cleanup it appears that Chicago air will meet the federal air quality standard set for 1975. The target level is 75 micrograms per square meter.

Non-Lethal Poison Deters Sheep-Killing Coyotes

Conditioned aversion to poisoned meat appears promising as a method of controlling sheep-killing coyotes, according to a team of University of California psychologists. Conventional methods of eliminating these predators have been bounty hunting, lethal poisons, and traps, but these methods do not distinguish between sheep-killing coyotes and other carnivores.

Psychologists John Garcia, Walter G. Hankins, and Kenneth W. Rusiniah were able to develop conditioned aversion to lamb and rabbit meat in seven coyotes after lacing it with lithium chloride. The amount of the chemical placed in the meat was sufficient to produce illness in coyotes that ate it, but not enough to kill them. A single trial was enough to discourage the coyotes from feeding again on lamb or rabbit flesh. However, it did not necessarily discourage them from attacking the prey in question.

The researchers propose a two-phase conditioning process. "In phase one, the flavor of food becomes aversive after one illness, [but the coyotes] may still attack. Phase two occurs when the auditory, visual, and olfactory cues from the prey become associated with the aversive flavor, thus subsequent attacks are inhibited. . . . The feeding habits of the mother coyote averted to sheep might be transmitted to her pups via flavor which her diet imparts to her milk and by their early experience with prey she brings to the den."

Eagle "Egg Plant" Successful

Two bald eaglets have hatched in the Maine nests to which they were transplanted as eggs in early May; they were obtained from nests in Minnesota. This was the first such transplant experiment with the bald eagle. The original plan called for six eggs to be transplanted from Minnesota, where the eagle population is healthy, to six nests in Maine, where pesticide pollution has affected eagle hatching in recent years. Only three eggs were taken from Minnesota because of the onset of weather that was not conducive to tree-climbing. The three were delivered to Maine and planted in nests the next day. One egg broke as it was being placed in the nest.

The two eaglets hatched out on May 16. At last report the foster parents seemed convinced that the young birds are their own offspring, and are caring for them normally with daily feeding and close guard of the nest area against possible enemies.

At the time of the transplant the two nests in Maine each contained one egg that had addled or spoiled. These were removed and analyzed by U.S. Fish and Wildlife Service biologists. Examination revealed that neither egg would have hatched in the wild. The shell of one was 31 percent thinner than healthy eagle eggs—the consequence of pesticide ingestion by the female parent. The contents of both eggs showed no embryonic development. The biologists attributed this condition to the presence of residues of dieldrin, one of the most potent of the chlorinated hydrocarbon insecticides. Pesticide residues in bald eagles of Maine and certain other areas have seriously altered the birds' reproductive capability.

Biologists were fearful that the disturbance of the egg-switch might prompt the foster parents to desert the nests, but this fear fortunately was not borne out by the experiment. The parent eagles in Minnesota were left with plaster-filled goose eggs to maintain their interest in the nests. If they continue to incubate these dummy eggs, they will be provided a young bird from a Minnesota nest that hatches more than one eaglet, for many times there is a four-to-six day interval between hatching of multiple egg clutches, and the youngest, or runt, may die because it can't compete for the available food.

Tussock Moths and Weevils to be Fought with DDT

Limited use of DDT has been approved by the EPA for pest control in Washington, Idaho, and Oregon. In all three states the chemical is to be used against the tussock moth. The insecticide will also be used against anticipated pea leaf weevil infestations in Washington and Idaho. Actual use of the chemical will be allowed only where field surveys indicate that infestations of the insect could significantly damage dry pea crops.

Fate of Wild Horses: Freedom or Pet Food?

In January and February, 1973, a herd of about 60 wild horses was driven to the edge of a cliff near Howe, Idaho. Seven animals stampeded over the cliff to their deaths. Others, according to an official government report, had their throats slit by the ranchers who were rounding them up; some had their legs amputated with a chain saw. About 30 horses were shipped to a packinghouse in Nebraska; while there several died of their injuries. Before the survivors could be processed into pet food they had a stay of execution. Today 18 adults of the original herd and one foal are being held near Idaho Falls, Idaho, until official disposition can be made of them. State and federal officials will decide whether the captured horses are, indeed, entitled to federal protection. A June 26 hearing was scheduled in Washington to determine if the 1971 Wild and Free-Roaming Horses Act of 1971 was being enforced.

According to government sources, the ranchers used a helicopter and snowmobiles to round up the horses—both methods in violation of federal law. Nevertheless, the animals eluded several earlier attempts to capture them. The alleged purpose of the roundup was to remove the horses from public lands (thus leaving more grass for grazing cattle), then slaughter and process them into canned pet food. According to the 1971 act, unbranded horses and burros that run free on western public lands are protected from such roundups.

Hands off Emission Control Devices

An Orlando, Fla., auto dealer was recently fined $500 by a U.S. District Court for rendering inoperative a 1972 auto's emission control device. Tampering with such a device by a manufacturer or dealer is in violation of the Clean Air Act. The fine was the first such action taken under the new regulation.

EPA Bans Vinyl Chloride Pesticides

Aerosol pesticides that contain vinyl chloride, have been suspended from further distribution by the EPA. The action taken in late April affects at least 28 products used in food handling establishments, hospitals, homes, and other enclosed areas.

The basis for withdrawal of the chemical is the occurrence of cancer in industrial workers exposed to the substance. Twelve men involved in the conversion of vinyl chloride to polyvinyl chloride, a plastic, have been found to have angiosarcoma, a rare type of liver cancer. Laboratory animals exposed to vinyl chloride have also developed angiosarcoma.

Russell E. Train, EPA head, stated that, while the public health implications of vinyl chloride from short pesticide bursts are undetermined, the link between the gas and the cancer is suspected strongly enough to make it prudent policy to ban further use.

Social organization among wolves is among the most complex in the animal world and in many ways is similar to the social organization of man and other primates. **Above,** *active submission is displayed by one wolf toward other pack members by rolling onto its back.* **Below,** *a dominant wolf is mobbed by lower-ranking pack members who nibble him affectionately. This occurs when the leader returns after a brief absence or when the pack awakens. The dominant wolf may be either male or female.*

WOLVES (from p. 6)

red wolf, and of course, the domestic dog (all members of the same genus, *Canis*). The fox, which is commonly looked upon as a smaller version of the wolf, is more distantly related and belongs to the genus *Vulpes*. Wolves are most clearly distinguished from dogs by the skull structure, particularly the so-called orbital angle—an angle formed by a line passed through the lower and upper rims of the eye socket and a line passed across the skull's top. In dogs the angle is 53° to 60°; in wolves it is 40° to 45°. The close relationship between dogs and wolves is borne out by the fact that the species readily interbreed, producing offspring that are fertile.

The closely related red wolf (*Canis rufus*, formerly called *C. niger*) appears to be intermediate in many respects between the timber wolf (*C. lupus*)—which is usually larger—and the coyote (*C. latrans*)—which is usually smaller. It occurs in southeastern and south-central United States. Some studies suggest that hybridization occurs between the red wolf and the coyote; other studies point to crossing between the coyote and the wolf resulting in a hybrid that has mistakenly been called the red wolf. The so-called maned wolf (*Chrysocyon brachyurus*), of Paraguay, southern Brazil, and northern Argentina, has been described as a "giant fox on stilts." It has extraordinarily long, black legs and is the largest member of the dog family (Canidae) except for the true wolves.

Thirty-two subspecies of *Canis lupus* are recognized by most authorities, although the exact number continues to be a matter of debate. Twenty-four subspecies are recognized for North America, eight for Eurasia. Determination of the precise number is complicated by the fact that subspecies will readily interbreed, or intergrade. Differences in characters such as coloring and body measurements between subspecies are often subtle, and in crosses between subspecies these differences are even less pronounced.

Population studies

Because of the natural shyness of wolves

Facial expression is an important means of communication in the wolf. Sixteen expressions, including threat, submission, suspicion, and anxiety may be recognized. The animal's true emotions, say researchers, are never hidden by a false mask.

and their habit of traveling over great distances in a short period of time, populations for any given area are extremely difficult to determine. A single wolf pack on Isle Royale has been observed to traverse the entire 210-square mile area of the island for each of three consecutive winters. A pack may travel 80 miles or more in a single night.

Recent attempts to determine wolf populations in North America have been made only on Isle Royale; in parts of Alaska; in Algonquin Park, Ontario; and in Superior National Forest. Isle Royale's wolf population varied from 15 to 28 animals during the period 1959 to 1970. The wolf population of a 20,000-square-mile area of south-central Alaska had the remarkable variation of 12 individuals to about 450 during the years 1953 to 1967.

The first systematic attempt to assess the wolf population in Superior National Forest was made by the distinguished nature writer and environmentalist Sigurd F. Olson in 1938. On the basis of observations made during his extensive travels through the forest, and interviews with rangers, trappers, and game wardens, Olson estimated the population at about 250 for a 2,500-square-mile area, or about one wolf per ten square miles.

In the late 1940s and early 1950s M. H. Stenlund was among the first to use aerial observations in arriving at a mean estimate of 240 wolves over a 4,100-square-mile area, or one animal for every 17 square miles.

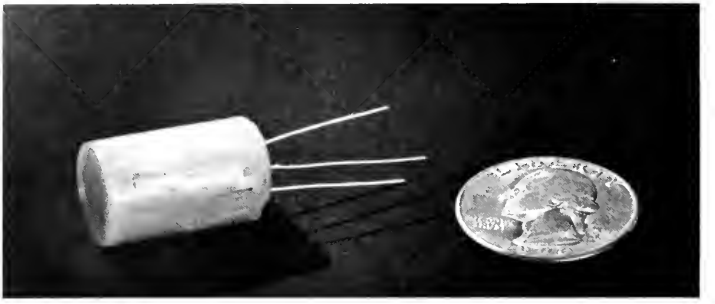
Studies by Mech and L. D. Frenzel, Jr., from 1964 to 1969 made use of aerial tracking of radio-tagged wolves. Their data showed a probable increase in wolves since Stenlund's observations. A 1972 report by V. Van Ballenberghe, which also drew upon data from radio-tracking, showed 79 wolves for a 720-square-mile area, for an average density of one wolf per 9.1 square miles.

The most recent, and probably the most thorough, wolf census for Superior National Forest includes data collected as recently as June, 1973, by Mech and Frenzel. It shows an estimate of 9.9 to 10.9 wolves per square mile.

Other figures of interest in the 1973 Mech report[3] were a mean pack size of 5.9 to 6.8 wolves, with a maximum pack size of 13. Some wolves had separated from their pack to lead precarious, solitary lives. But in the Superior National Forest, says Mech, "the lone wolf is an insecure and temporary member of the population, having a much lower survival rate than permanent pack members."

In Minnesota a wolf pair will mate in February, with an average of five or six pups being born in late April. If conditions are favorable, the survivors are full-grown by fall. They remain with the parents through the winter, and normally do not go their separate ways until a second litter appears the following April. As early as February, or even sooner, pups may separate from the parents.

During the second winter the pack consists of the parents, the new pups, and whatever yearlings that have not dispersed ➤



The tiny radio transmitter (above) attached to the wolf by means of a collar transmits an interrupted "beep" that can be monitored from an aircraft up to 35 miles away. A typical battery, the size of a pen-light battery, may supply power for as long as 18 months. The units are manufactured by AVM Instrument Co., of Champaign, Ill.

A wolf captured near International Falls, Minn., receives an ID tag attached to the ear before being released in Michigan's Upper Peninsula.

or died. Each year the cycle is repeated—new pups being born, older pups dispersing—but with the pack size remaining about the same from one year to the next.

The primary prey in Superior National Forest is the white-tailed deer (*Odocoileus virginianus*), a secondary prey is the moose (*Alces americana*). Studies in 1959 showed a deer density of 166 per square mile in a 213-square-mile section of the forest close to Lake Superior. The estimated wolf population for the area was one pack wolf per 5.3 square miles, or about one wolf for every 880 deer.

A decline in the wolf population during 1971-72 is interpreted by Mech as

> linked closely to a general decline in numbers of deer that is occurring throughout midnorthern and northeastern United States and south-central and southeastern Canada, apparently caused by maturing forests and an increasing predominance of conifers.
>
> Although a gradual decrease in the deer population of northeastern Minnesota has been underway for two or more decades, the most drastic decline in recent years took place in the winter of 1968-69, when the area experienced the deepest snowfall on record. The drop in wolf numbers from 1971-72 to 1972-73 was most apparent in the area of the forest that was historically the poorest deer range, primarily the eastern half of the Boundary Waters Canoe Area. . . . During the winter of 1971-72 there were virtually no deer present in some 300 to 500 square miles of the Superior National Forest and in an even larger area in 1972-73.[4]

Mech contends that "even with relatively high deer populations in Superior National Forest wolves will not increase beyond a density of approximately one wolf per 9.9 to 10.9 square miles in early winter."

The maintenance of peak wolf numbers, he asserts, is to be predicated on restoration of higher deer densities. This, in turn, depends on the rejuvenation of forests, that is to say, replacement of some of the coniferous growth by edible broad-leaf understory—smaller trees, shrubs, and herbaceous plants.

Wolf "transplant"

In a project funded by the Huron Mountain Wildlife Foundation, the National Audubon Society, and Northern Michigan University, two male and two female wolves have been transplanted to Michigan's Upper Peninsula in an attempt to permanently reestablish the species in that area. David Mech and William Robinson, professor of biology at Northern Michigan University, are conducting the experiment.

The wolves were trapped this past December and January near International Falls, Minnesota, and flown to Michigan in March. Before being released in the Huron Mountain area near Lake Superior, the wolves were vaccinated against rabies, distemper, leptospirosis, and hepatitis, and blood samples were taken. The animals were also given penicillin as a precaution against infection and dosed with vitamins. Their ears were tagged and the animals were fitted with radio collars.

At last report the four animals had traversed a large part of the peninsula. Time will tell whether they can, indeed, adjust to the new territory, raise pups, and develop a viable, self-sustaining pack. If the experiment proves successful, the prospects will be favorable for restoring the wolf to other areas where man, out of ignorance and fear, destroyed it. □

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[1]See *Behaviour of Wolves, Dogs and Related Canids*, by Michael W. Fox, Harper & Row (220 pp.), 1971.

[2]The most authoritative work on the wolf is Mech's *The Wolf: The Ecology and Behavior of an Endangered Species*, Natural History Press (1970), 384 pp.

[3]*Wolf Numbers in the Superior National Forest of Minnesota*, USDA Forest Service Research Paper NC-97 (1973), 10 pp.

[4]*Wolf Numbers in the Superior National Forest of Minnesota*, p. 8.

The four wolves transplanted from Minnesota to Michigan are weighed, measured, vaccinated, and dosed with vitamins before their release.

ENERGY (from p. 9)

such geophysical phenomena as winds, tides, and the Gulf Stream. Initially, at least, people will need to supplement the solar energy with fossil fuels. Ultimately, though, a satisfactory civilization could be based on solar energy.

During the next decade we will move further in utilizing a number of energy sources, but at present progress is slow. A significant part of the present delays is directed to environmental concerns. For example, construction of the typical power reactor today requires ten to eleven years. In Japan, the corresponding time is four years. I am no advocate of nuclear power and, indeed, lean to use of coal instead. As a bystander, it is my opinion that the stop-the-reactor people have won a few battles, but they have lost the war. For every reactor they have stopped, ten have been authorized. They have mainly succeeded in causing extensive delays.

Now, no thoughtful person could want a return to the ruinous practices of a generation ago. We must safeguard the environment, but that does not mean "Stop everything!" Indeed, those who follow such a line are the most dangerous foes of the environmental movement. It seems impossible to obtain energy materials or to use them without some environmental impact. One of the great challenges of this next decade will be to evolve a better method of decision-making in such matters as energy vs. the environment.

We ought to be embarking on a crash basis to construct several prototype plants to obtain clean fuels from coal and shale. An investment of five to ten billion dollars could teach us fast how best to proceed in achieving real energy independence. At the same time, we should be prepared to take realistic steps to cut wasteful burning of hydrocarbons by drastic increases in taxation of and costs for such fuels.

We have in abundance the technical talents and the natural resources to work our way out of the current morass. But the public must understand the enormous magnitude of the problem, and realize that there are no shortcuts or easy solutions. □

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August 7 program:
Art in Melanesia: New Ireland
No. of persons attending _____

August 14 program:
Natural History of the Highlands of Eastern Ethiopia
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This is an opportunity for members of Field Museum to chat informally with our curators, journey with them on their varied explorations, and to have dinner in the pleasant ambience of the exhibit halls. Make your reservations now for our festival of summer evening slide lectures.

• Dr. Matthew H. Nitecki, associate curator of fossil invertebrates, will discuss history as recorded in ancient sedimentary rocks. Fossils of the oldest known organisms are among the most fascinating. Even though the record of early life is difficult to study, recent research has demonstrated that there were forms of life on our planet at least three billion years ago.

• Mr. Loren Woods, curator of fishes, has studied the fish and other aquatic life in Lake Michigan for more than thirty years and has had the unique advantage of studying these forms of life from the decks of commercial fishing vessels. He will speak on the deterioration of fishing in the Great Lakes.

• Dr. Phillip Lewis, curator of primitive art and Melanesian ethnology, will lecture on the art of New Ireland, a large island in Melanesia. Since the early 1950s Dr. Lewis has made a specialty of the art of this region. He has made two extensive field trips to New Ireland, and has studied the collections of museums in Europe and the Pacific area, as well as various collections in the United States.

• Dr. William C. Burger, associate curator, vascular plants, completes the series with an illustrated color slide program on the mountainous areas of eastern Ethiopia, which rise to an elevation of 11,000 feet. The different climate zones of the mountains support distinctive ecosystems. Each zone has its characteristic plants and animals. The life styles of the people living there are adapted to these various zones.

The four programs are scheduled for four consecutive Wednesday evenings (July 24, 31; August 7, 14), beginning at 6:30 p.m. and concluding around 9:00 p.m.

Reservations will be accepted on a first come, first served basis. Applications should be accompanied by full payment of $5.00 per person, covering dinner and the program. Children twelve years of age and older are invited; guests of members are also welcome.

field briefs

Shown at left, during a recent Museum tour, are Dr. [illegible] and Bob Kendrick at exhibit case [illegible] the Department of Exhibition, chatted over a portion of the exhibit model for the Man — His Environment project now scheduled for presentation at the Museum in 1975.

Above, right, Field Associates Mr. and Mrs. William S. Street discuss forthcoming expedition possibilities with Museum staff members. Shown (l. to r.) are Mr. Street, Dr. Anthony F. DeBlase, chief of security and visitor services; Mrs. Street; Dr. Rupert L. Wenzel, chairman, Department of Zoology; Dr. Luis de la Torre, curator of mammals; E. Leland Webber, Field Museum director; Dr. Lorin I. Nevling, Jr., chairman, Department of Botany; and Dr. Robert F. Inger, Assistant director, science and education. The Streets recently returned from a zoological expedition to Nepal. This was their fourth such venture undertaken on behalf of the Museum. Earlier, they conducted two expeditions to Iran and one to Afghanistan. Much of what is known about the mammals of this part of the world is due to the continued support by these loyal friends of the Museum.

Field Museum's Contemporary African Art Festival will be highlighted in July by performances of the Osibi Dance Group (July 13) and Tanawa (July 27). The Osibi, from Ghana, will perform warrior dances, cult dances, and harvest festival dances, as well as recreational dances. Victor Chidley, of the Osibi, is shown below. Tanawa, a Congolese family group of dancers, singers, actors, and musicians, will do traditional and contemporary interpretations of Congolese folklore. A Tanawa drummer is shown at right.

FIELDIANA

is a continuing series of scientific papers and monographs dealing with anthropology, botany, geology, and zoology intended primarily for exchange-distribution to museums, libraries, and universities, but also available for purchase

FIELD Museum's *Annual Report of the Director* for 1895 introduced the series which would one day be called *Fieldiana* as "the medium of presenting to the world the results of the research and investigation conducted under the auspices of the Museum . . ." Since then, more than 1,200 issues of *Fieldiana* have been published

THE series has reflected not only the growth and development of Field Museum, but of the various sciences as well. For example, anthropology was just emerging as a professional discipline in the United States at the time of *Fieldiana's* introduction and some of the most important early anthropologists contributed to the series

ANY title of *Fieldiana*—dated 1895 or 1974—can be examined in the Museum library. All that are not out of print are available for purchase

IN this age of imperative relevance, *Fieldiana* is relevant. It describes and interprets our world and its inhabitants as it was and is. For conservationists of both human and natural resources, *Fieldiana* provides a record of what was so that we can measure what we have changed, improved, or destroyed. *Fieldiana* has been pure science as well—irritating to those who demand "But what can you *use* it for?" but inspiring to those who appreciate and desire knowledge for its own sake

RECENT FIELDIANA PUBLICATIONS

Fieldiana Anthropology

"Nushagak: An Historic Trading Center in Southwestern Alaska," by James W. VanStone, 93 pp., 16 plates, 5 figs. Vol. 62, publication no. 1145. $4.25

"Paleoecology of Hay Hollow Site, Arizona," by Vorsila L. Bohrer. 30 pp., 6 figs. Vol. 63, no. 1, publication no. 1144. $1.25

"The First Peary Collection of Polar Eskimo Material Culture," by James W. VanStone, 50 pp., 12 figs. Vol. 63, no. 2, publication no. 1156. $2.00

"V. S. Khromchenko's Coastal Explorations in Southwestern Alaska, 1822," James W. VanStone, editor, translated by David H. Kraus. 95 pp., 5 figs. Vol. 64, publication no. 1172. $4.25

"The Fauna from the Terminal Pleistocene of Palegawra Cave, a Zarzian Occupation Site in Northeastern Iraq," by Priscilla F. Turnbull and Charles A. Reed. 66 pp., 10 plates, 10 figs. Vol. 63, no. 3. Publication no. 1183.*

Fieldiana Geology

"Osteology, Function, and Evolution of the Trematopsid (Amphibia: Labyrinthodontia) Nasal Region," by John R. Bolt. 30 pp., 5 figs. Vol. 33, no. 2, publication no. 1178. $1.25

"Chesterian (Upper Mississippian) Gastropoda of the Illinois Basin," by Myint Lwin Thein and Matthew H. Nitecki. 238 pp., 103 figs. Vol. 34, publication no. 1179. $11.50

"The Structure and Evolution of Teeth in Lungfishes," by Robert H. Denison. 28 pp., 15 figs. Vol. 33, no. 3, publication no. 1180. $1.25

Fieldiana Botany

"Flora of Guatemala," by Johnnie L. Gentry, Jr. and Paul C. Standley. 151 pp., 20 figs. Vol. 24, part X, nos. 1 & 2. Publication no. 1184. $6.00

"Notes on the Genus *Hygrolembidium* (Hepaticae)," by John J. Engle. 7 pp., 2 figs. Vol. 36, no. 7. Publication no. 1181. $0.75

"Flora of Guatemala," by Paul C. Standley, Louis O. Williams, and Dorothy Nash Gibson. 322 pp., 88 figs. Vol. 24, part X, nos. 3 & 4. Publication no. 1187.*

Fieldiana Zoology

"*Eupomacentrus diencaeus* Jordan and Rutter: A Valid Species of Damselfish from the Western Tropical Atlantic," by David W. Greenfield and Loren P. Woods. 12 pp., 5 figs. Vol. 65, no. 2. Publication no. 1182. $1.00

"*Myoproctalges surinamensis*, a New Genus and Species of Mite Parasite on the Acuchi *Myopacta acouychy* from Surinam (Psoroptidae: Psoralginae: Sarcoptiformes)," by A. Fain and F. Lukoschus. 17 pp., Vol. 65, no. 3. Publication no. 1185.*

"Preliminary Key to the Turtles, Lizards, and Amphisbaenians of Iran," by Steven C. Anderson. 17 pp., Vol. 65, no. 4. Publication no. 1186.*

*Price to be announced.

Orders for Fieldiana should be directed to Field Museum's Office of Publications. Members are entitled to a 10 percent discount. Standing orders accepted. Please specify publication number when ordering.

Funds from Field Museum's Capital Campaign will be used to make the Museum "barrier-free." Plans include a ground-floor entrance, special parking facilities for the handicapped, wide lavatory stalls, and low phone booths and drinking fountains. Large elevators will easily accommodate persons on crutches and in wheelchairs. Stair-climbing for the handicapped will be a thing of the past.

Counting on Members to Push Capital Campaign Over the Top

The $25 Million Capital Campaign for renovation of Field Museum has thrived for nearly three years. During this exciting time of bringing the Museum's story about its modernization needs to prospective donors, many Museum members have in some way become involved in the campaign.

Recently, the Capital Campaign general chairman, Trustee Nicholas Galitzine, reported that $11.1 million of the private gift share of $12.5 million has been pledged. Private gifts for the campaign are being matched with public funds through bonding authority of the Chicago Park District.

The trustees, Women's Board members, and other close friends of the Museum have been a great help in bringing the campaign to within nearly 10 percent of its goal. According to Chairman Galitzine, all Museum members will be solicited during this summer. They may elect to pledge their gifts over a three-year period. It is our hope that every Museum member will become a part of this once-in-a-lifetime effort.

The Capital Campaign funds will be used to update the Museum's physical plant and will help the Museum meet the increasing demands being placed upon its scientific collections, its research, educational, and exhibit programs. We hope that every Museum Member in future years can turn to those joining him on a Museum tour and honestly say, "It makes me feel good to know that I helped make it possible."

JULY-AUGUST at Field Museum

EXHIBITS

Continuing

Contemporary African Arts Festival, the first comprehensive program of its kind in the U.S., features the work of painters, printmakers, sculptors, and fabric designers, as well as music, films, lectures, dances, and other events. Through November 3. Hall 27.

Special July and August events are:

Films in studio/exhibit area:

Daily at 1:30 p.m.:

July 6-12: *Malawi: Two Young Men* and *Women up in Arms*
July 13-19: *Ancient Africans* and *In Search of Myself*
July 20-26: *The Creative Person: Leopold Sedar Senghor* and *The Swamp Dwellers*
July 27-Aug. 2: *Gelede, Africa Dances,* and *Heartbeat of Africa*
Aug. 3-9: *New Images: Abuja Pottery, East African Wood Carver,* and *Talking Drums*
Aug. 10-16: *The Hadza* and *Bitter Melons*
Aug. 17-23: *The Tuareg, Nawri,* and *Masai Warrior*
Aug. 24-30: *The Dry Season* and *African Village: Guinea*
Aug. 31: *Malawi: Two Young Men* and *Women up in Arms*

Fridays at 7:30 p.m.: the films of Ousmane Sembene:

July 12: *Emitai*
July 19: *Borom Sarret* and *Tauw*
July 26: *Black Girl*
August 2: *Mandabi*
August 9: *Emitai*
August 16: *Borom Sarret* and *Tauw*
August 23: *Black Girl*
August 30: *Mandabi*

Sunday, July 28, 4:00 p.m.: *The Hunters*
Sunday, Aug. 25, 4:00 p.m.: *To Live with Herds*

Saturday, July 6:
Contemporary African Arts Lecture Series, co-sponsored by Field Museum and [illegible] State University, begins at 11:00 a.m. for 8 consecutive 5-hour Saturday sessions. The credit course, intended for teachers of African art [illegible] via preregistered, cost basis, is free to the public. Studio, Hall 27.

Saturday, July 13:
Poetry and Music Demonstration with Dennis Brutus of South Africa and Njoki of the Cultural Workshop of North Chicago.
10:30 a.m. and 1:30 p.m. Studio, Hall 27.

Saturday, July 13:
Dances of Ghana by Obiba Dance Group.
[illegible] Stanley Field Hall.

Saturday, July 20:
Coming of Age in Chicago, [illegible] performed by teen-agers from high [illegible] who have participated in Field Museum's [illegible] Africa: Art, Anthropology Workshop.
[illegible] Stanley Field Hall.

Saturday, July 27:
Dance and Drum Performance by Tanawa [illegible] Ensemble.
[illegible] Stanley Field Hall.

Saturday, August 3:
Thumb Piano Music Demonstration by Elkin Sithole (Zulu).
10:30 and 11:30 a.m., 2:30 and 3:30 p.m. Stanley Field Hall.

Saturday, August 10:
"Textiles and African Fashion," a demonstration with Angie Ihejirika of Nigeria.
10:30 and 11:30 a.m., 2:30 and 3:30 p.m. Stanley Field Hall.

Saturday, August 17:
Liberian Dance and Song Demonstration with Tednyma Kumah.
10:30 and 11:30 a.m., 2:30 and 3:30 p.m. Stanley Field Hall.

Saturday, August 24 and 31:
"Coming of Age in Chicago," (see July 20, above).
10:30 and 11:30 a.m., 2:30 and 3:30 p.m. Stanley Field Hall.

Edwin Janss Jr. Underwater Photography, an exhibit of exciting color prints. Through September 8. Hall 9.

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature. "A Sense of History" presents a graphic portrayal of the Museum's past, and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

SPECIAL PROGRAM

Guided tours of Museum exhibit areas leave north information booth at 2:00 p.m. daily, Mon. through Fri., July and August, except Thursday, July 4.

CHILDREN'S PROGRAM

Through August 31:
Summer Journey for Children, "The Artist's Zoo," a free self-guided tour of Museum exhibits, focuses on animal designs used by Native American and African artists to decorate objects. Youngsters are given a sketchbook in which to draw their own motifs as part of the project. All boys and girls who can read and write may join in the activity. Journey sheets in English and Spanish are available at entrances.

MEETINGS

July 5, 7:30 p.m.: Chicago Astronomical Society.
July 10, 7:30 p.m.: Windy City Grotto, National Speleological Society.
August 2, 7:30 p.m.: Chicago Astronomical Society.
August 14, 7:30 p.m.: Windy City Grotto, National Speleological Society.

HOURS

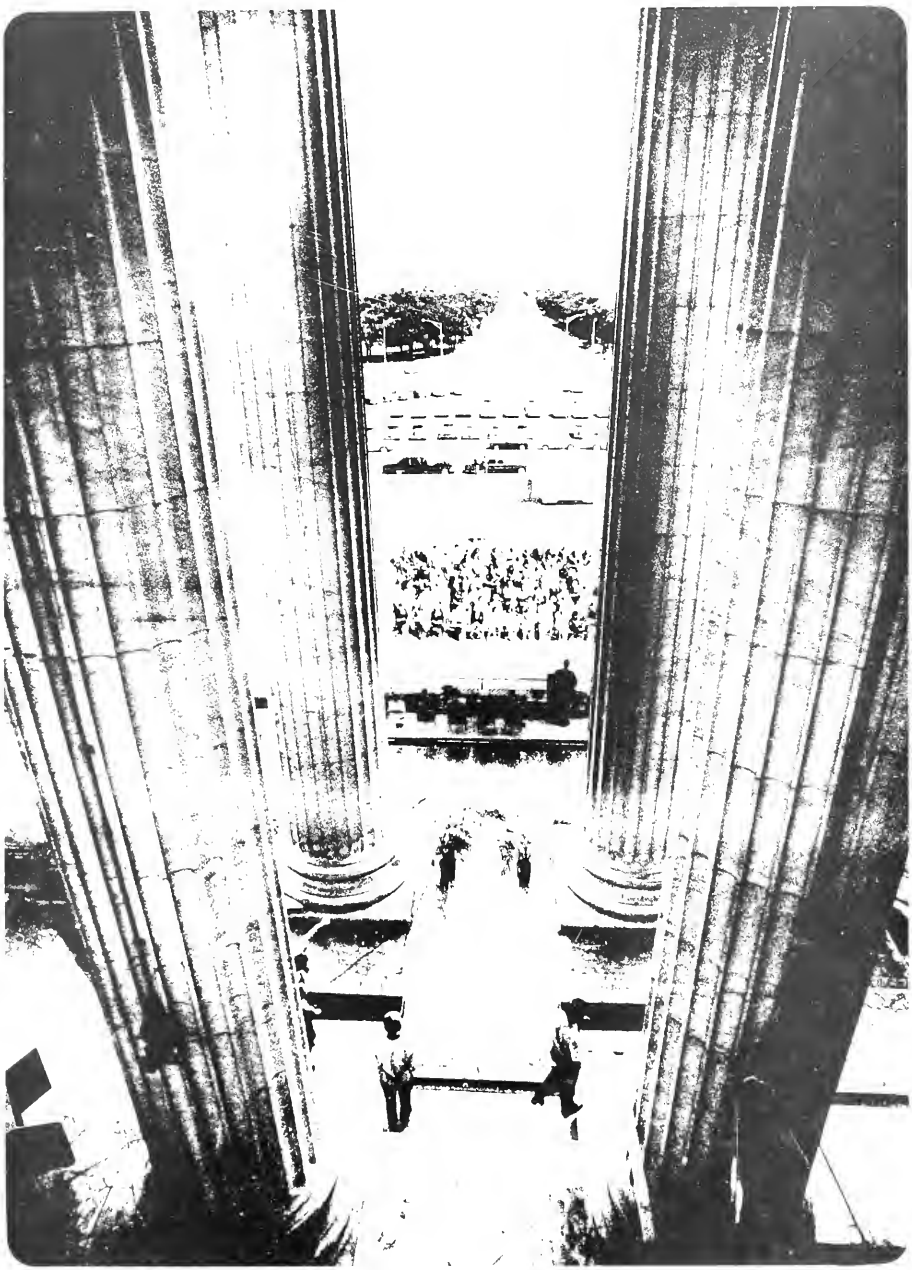
[illegible] 9:00 a.m. to 5:00 p.m., Monday, Tuesday, and Thursday, and 9:00 a.m. to 9:00 p.m., Wednesday, Friday, Saturday, and Sunday. On evenings when the Museum has later closing hours, the cafeteria remains open until 7:30 p.m.

The Museum is [illegible] 2:00 p.m. to 4:00 p.m., Monday through Friday. For [illegible] at reception desk in grand north [illegible].

Museum telephone: 922-9410.

September
1974

Field Museum of Natural History Bulletin



Field Museum of Natural History Bulletin

Volume 45, Number 8
September 1974

Managing Editor G. Henry Ottery
Editor David M. Watsten
Staff Writer Maddie Jacobs
Production Oscar Anderson

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COVER

Field Museum's north portico and Lake Shore Drive, looking north, on the occasion of Field Museum's eightieth anniversary rededication ceremonies, June 25. See pp. 20-21.

Photo credits

Cover: *Chicago Tribune*. 3: The Metropolitan Museum of Art. 4: Oscar Anderson. 8: James Swatchild. 10, top: Barbara Reque, bottom: David Moore. 12-13: Oscar Anderson. 18: John H. Gerard. 20, top: Kent Buell, bottom: G. Henry Ottery. 19, top, bottom: John Bayalis, Sr., middle: Kent Buell. 22, lower left: Oregon Museum of Science and Industry, lower right: G. Henry Ottery.

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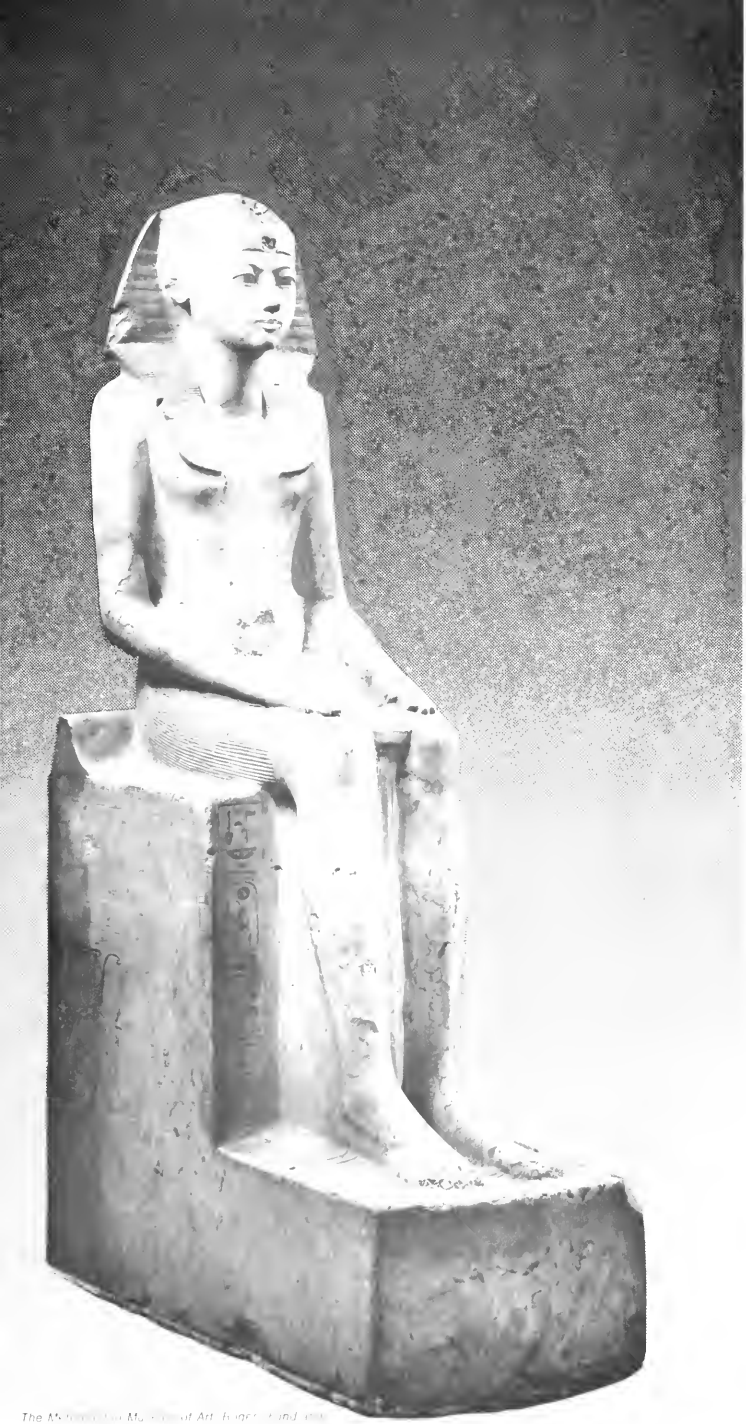


The Metropolitan Museum of Art, Image Archive
Contribution from Edward S. Harkness, 1929

"PHARAOH" HATSHEPSUT

History's First Liberated Woman

by Gerda Frank

IF indeed, as critics of the age proclaim, we are suffering from a dearth of hero figures, this is an appropriate time to put a great female ruler of ancient Egypt, Queen Hatshepsut, back into the limelight. Even though she liberated only herself, without concern for her "sisters," Hatshepsut should be of particular interest to women's lib advocates.

Hatshepsut ruled Egypt from 1490 to 1469 B.C., during the New Kingdom (dynasties XVIII-XX). Her grandfather was the founder of dynasty XVIII—a high point in culture and the arts—which ended with the death of the boy-king Tutankhamen.

The first pharaoh of dynasty XVIII was Ahmose (1552-27). He was succeeded by his son Amenophis I, who died in 1506, leaving no direct heirs. Next in line of succession was his sister, also named Ahmose, who was married to a military man—possibly a relative—named Tutmosis (or Thutmose). According to custom, Princess Ahmose was not expected to rule in her own right, so her husband—by virtue of his chief wife's full royal bloodline—was crowned Tutmosis I. He proved to be a strong ruler and conqueror, and is renowned ►

Gerda Frank, a specialist in Egyptology, is a volunteer for Field Museum's Raymond Foundation and formerly a docent for the Oriental Institute of the University of Chicago.

Bust of Tutmosis III, in case 43, hall J. Replica of the original in the Turin Museum, Turin, Italy. Cat. No. 31358

for having his tomb hewn in rock in a remote valley of the west bank of the Nile at Thebes; there it would be less accessible to the kind of desecration that had befallen the pyramid tombs of his predecessors. The valley chosen by Tutmosis became the burial site of many subsequent rulers and is today known as the "Valley of the Kings."

Tutmosis I died at about age fifty, without a male heir by his chief queen. Of the several children born to her, only one survived: a daughter, Hatshepsut. In order to keep the royal power in the family, Hatshepsut was married when very young to a half-brother—also named Tutmosis—who was the son of Tutmosis I from a secondary wife, and therefore not of full royal blood. He ascended the throne as Tutmosis II. The condition of his mummified body shows that he had been weak and sickly. Certainly he was overshadowed by the strong-willed royal women: his mother-in-law, Ahmose, and his wife, the great Queen Hatshepsut.

Like the king before him, Tutmosis II had no male heir. Hatshepsut gave him only two daughters, Nefrure and Merytre. Nefrure seems to have died in childhood; thus, another dynastic crisis threatened —considering the king's precarious health. Merytre, therefore, was married at a very early age to her half-brother, yet another Tutmosis, who was the son of Tutmosis II by a concubine. When his father died, this last Tutmosis was only ten years old, but already he had probably been appointed co-regent by his father. He now succeeded to the throne of Egypt as Tutmosis III; and Hatshepsut, still a young woman, was appointed to rule for him until he attained his majority.

THE tomb of Tutmosis II and his funerary temple have both been found. They were so devoid of adornment and obviously so neglected that it is reasonable to assume that Hatshepsut had but little affection for her weak husband. She also seems to have resented Tutmosis III—her stepson, son-in-law, nephew—now the only obstacle to the fulfillment of her ambitions. Like her mother, Ahmose, Hatshepsut could only attain the status of a queen. Among her titles were "King's Daughter," "King's Sister," "God's Wife," and "King's Great Wife." Being relegated to playing second fiddle seems to have irked Hatshepsut, and she acted on a bold decision that might well qualify her as history's first "liberated" woman: About two years after her husband's death, Hatshepsut donned male attire, attached the false beard of male royalty to her chin, seized the throne, and proclaimed herself king! When Tutmosis III came of age, she refused to relinquish the throne to him and continued to rule virtually alone under all the titles of male royalty, except "Mighty Bull of Egypt"! Never before or since in the history of Egypt was there another female who posed as a man.[1]

WE can only conjecture what might have been the feelings of Tutmosis III, who nowhere expressed them in writing. Tutmosis III was unlike his father—as he later proved—in that he appeared to be strong-willed and ambitious. Both Hatshepsut and later Tutmosis III dated their respective reigns from the beginning of their somewhat lopsided co-regency. During her 21 years' reign, Hatshepsut proved that she was a woman who could rule as well as—if not better than—most of her male predecessors. But since she lived nearly 3,500 years ago, Hatshepsut could not yet use the modern argument of sexual equality. Being a daughter of her own time, she justified her actions by claiming divine descent.

The pharaoh, it must be remembered, was on a par with ancient Egypt's chief god, Amon of Thebes. Unlike her mother, Ahmose, who had bowed to tradition, Hatshepsut often proclaimed her right to the throne, for only she was of full royal blood. In her great temple at Deir-el-Bahri she had reliefs carved that show Amon in the form of Tutmosis I visiting her mother's couch in order to beget Hatshepsut. This relief is followed by another depicting her own divine birth. The fact that she also claimed descent from her actual father, Tutmosis I, posed no contradiction for her. In fact, she often joined her own cartouche (the royal name carved in hieroglyphs within an oval line) to that of her father, ignoring the fact that he had not been of pure royal blood himself. But then, she simply seems to have preferred her father to Tutmosis II and III.

ON the other hand, Hatshepsut was smart enough to put her own feminine charms to good use: After asserting that she was engendered by the deity, Hatshepsut continued to record that after she, the "divine princess," had grown up, her father, Tutmosis I, entrusted his royal office to her, and that she was acclaimed as "exceedingly good to look upon, with the form and spirit of a god . . . a beautiful maiden, fresh, serene of nature, . . . altogether divine."[2] Hatshepsut's many resurrected statues bear out her claim that she was lovely. Throughout her lifetime of about 59 years she had herself portrayed only in the full bloom of youth.

The matter of Hatshepsut's descent has long been a subject of controversy among Egyptologists. Early in this century, Edouard Naville, a Swiss who first excavated Hatshepsut's temple, got into such violent arguments with the ►

Sandstone sculpture of an official of Queen Hatshepsut. About 18 inches high. On view in case 40, hall J. Cat. No. 105184

[1] *Egypt had two other queens prior to Hatshepsut, but Hatshepsut was the first queen to assume the role of king.*

[2] When Egypt Ruled the East, *by George Steindorff and Keith C. Seele, University of Chicago Press (1965), p. 41.*

German Egyptologist Kurt Sethe about her succession, that the two of them refused to speak with one another and could not even bear to be in the same room.

On one occasion, while both men were working at Deir-el-Bahri, the ground caved in under Naville's field house, and the kitchen—including pots, pans, and the astonished cook—tumbled into the pit. Madame Naville was so distressed that she urged her husband to immediately pack up and return to Switzerland. The Sethes, however, offered to share their own field house while repairs were made, on condition that Hatshepsut was not to be mentioned. The Navilles accepted, and the two couples spent a delightful interlude together. But as soon as the Naville's kitchen was back in working order, they returned to their own field house, and the Hatshepsut feud resumed.

AFTER Hatshepsut proclaimed herself king, she no longer considered her first tomb to be adequate. Accordingly, she ordered a new tomb carved into the rocks of the Valley of the Kings, an unheard-of act for a woman. The entrance was hewn into the cliffs just behind Deir-el-Bahri, in an obvious attempt to have her burial chamber penetrate beneath her mortuary temple. But this idea was abandoned when the rock proved too crumbly. The unfinished tomb, discovered in 1903, contained two sarcophagi, "one altered as an afterthought to receive the body of Tutmosis I which she apparently planned to remove from his own tomb so that they might dwell together in the Netherworld. It is uncertain whether this aim was ever achieved."[1] Hatshepsut's mummy has never been found.

In the light of modern attitudes, we may guess why feelings concerning Hatshepsut ran so high. Human nature has not basically changed over the millenia. Certainly, the men of ancient Egypt could not view Hatshepsut's display of "equal rights' with equanimity. In the king lists following her rule, Hatshepsut's name has been omitted altogether, and the 21 years of her reign assigned variously to Tutmosis I, II, or III. The authors of these king lists obviously felt justified in assigning this embarrassing queen-king to oblivion. In our own time many equal-rights advocates would brand these ancient recorders as "male chauvinist pigs."

But the efforts of those who tried to efface the record of Hatshepsut ultimately proved futile. The forgotten hieroglyphs were deciphered by Jean Francois Champollion with the aid of the Rosetta Stone in 1823. (A replica of this important stone is on view in hall J.)

Thanks to the Rosetta stone and the brilliant work of Champollion, the science of Egyptology was born, and widespread study and excavations followed. Hatshepsut's great temple at Deir-el-Bahri was cleared of the sand and rubble that had concealed it for millenia, and her sculptures and texts again came to light. In the 1920s the American Egyptologist Herbert E. Winlock excavated the quarries north of the ramp leading up to Hatshepsut's temple, and discovered under the rubble a profusion of smashed stone which, after being reassembled, proved to be portraits and sphynxes of Hatshepsut. (Many of these are now on view at the Metropolitan Museum of Art in New York City.) Obviously, a concerted effort had been made to destroy them.

EXCEPT for a minor raid into Nubia, Egypt's foreign affairs under Hatshepsut were peaceful. Could the reputation of this formidable woman have discouraged outlying provinces from rebelling? The queen prided herself justly on the large number of magnificent building projects carried out under her rule. Most renowned is her Deir-el-Bahri mortuary temple, hewn into the eastern flanks of the high cliffs on the west bank of the Nile at Thebes. It was approached by a long ramp leading up from the river, and consisted of several levels fronted with magnificent colonnades, fashioned after the nearby, much more modest temple of Mentuhotep (dynasty XI). Hatshepsut's temple strikes the observer as an early forerunner of the Greek Temples.

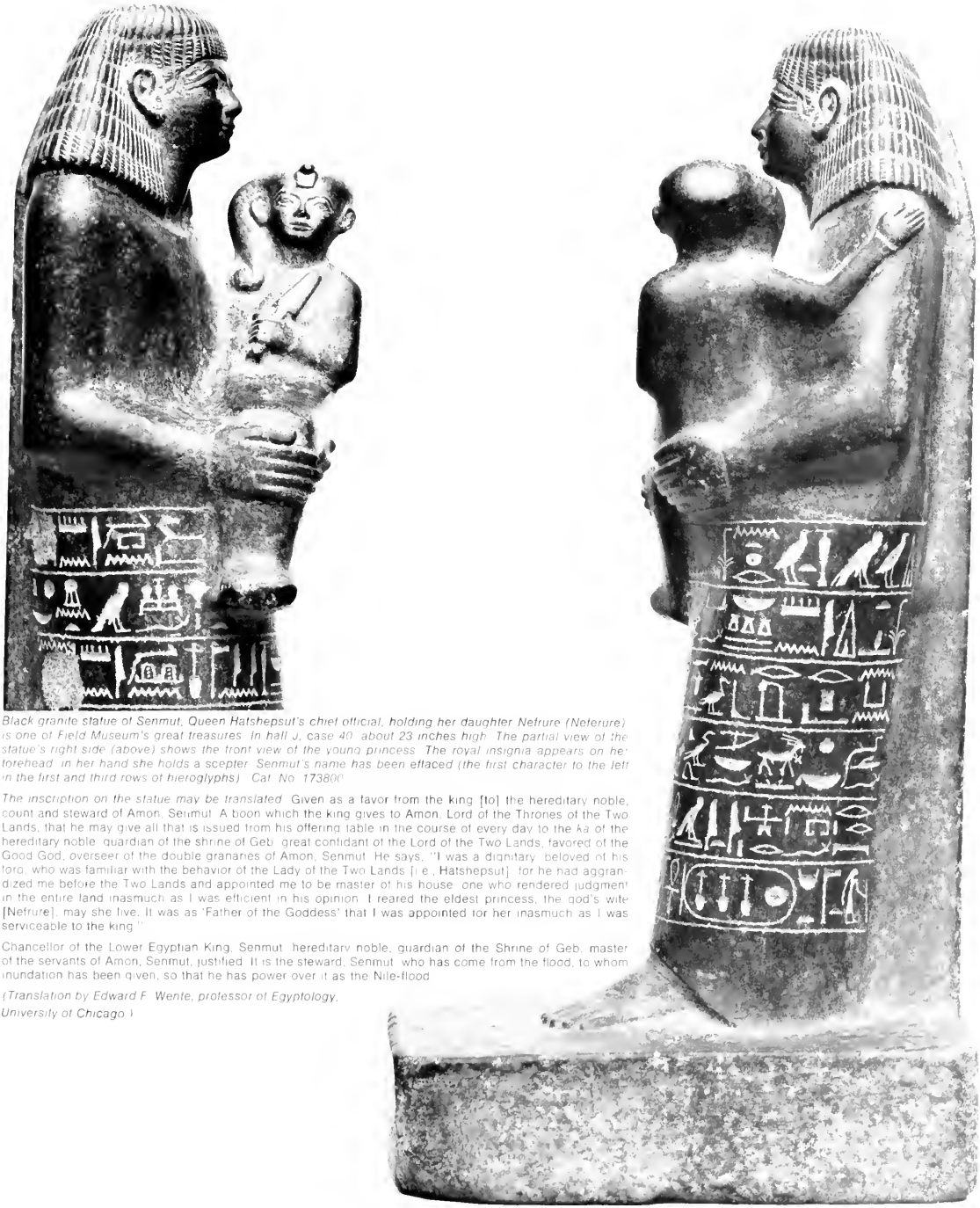
Obviously, no woman alone—no matter how willful and brilliant—could have accomplished all this without the support of powerful men around her. Outstanding among Hatshepsut's male lieutenants were her principle official Senmut—a commoner, his brother Senmen, and one Nehery. One of the few extant portrait statues of Senmut is on view in hall J, case 40.

THE tomb of Senmut's father and mother contain inscriptions that refer to them respectively as "the Worthy" and "Lady of a House." Despite the rather humble origins implied by these designations, the handsome Senmut somehow attained under Hatshepsut a position of unprecedented power and great wealth. Among his twenty or more offices, his chief title was "Steward of Amun," which gave him control of the enormous wealth of the temples. He is also believed to have been Hatshepsut's chief architect. It was extraordinary for him to be entrusted with the office of "Great Royal Nurse" (a startling reversal of the traditional sex roles) and charged with the tutelage of little Princess Netrure, then next in line for the throne. (Nefrure is last mentioned in the eleventh year of her mother's reign, and seems to have died in childhood. Her younger sister Merytre eventually succeeded to the throne as the chief wife of Tutmosis III.)

Field Museum's statue of Senmut, which shows him holding Princess Nefrure, is one of the Museum's great treasures. The black granite statue, about 20

(Continued on p. 12)

[1]Egypt of the Pharaohs, *by Sir Alan H. Gardiner. Oxford University Press (1969), p. 187.*



Black granite statue of Senmut, Queen Hatshepsut's chief official, holding her daughter Nefrure (Neferure), is one of Field Museum's great treasures. In hall J, case 40, about 23 inches high. The partial view of the statue's right side (above) shows the front view of the young princess. The royal insignia appears on her forehead; in her hand she holds a scepter. Senmut's name has been effaced (the first character to the left in the first and third rows of hieroglyphs). Cat. No. 173800.

The inscription on the statue may be translated: Given as a favor from the king [to] the hereditary noble, count and steward of Amon, Senmut. A boon which the king gives to Amon, Lord of the Thrones of the Two Lands, that he may give all that is issued from his offering table in the course of every day to the *ka* of the hereditary noble, guardian of the shrine of Geb, great confidant of the Lord of the Two Lands, favored of the Good God, overseer of the double granaries of Amon, Senmut. He says, "I was a dignitary, beloved of his lord, who was familiar with the behavior of the Lady of the Two Lands [i.e., Hatshepsut], for he had aggrandized me before the Two Lands and appointed me to be master of his house, one who rendered judgment in the entire land inasmuch as I was efficient in his opinion. I reared the eldest princess, the god's wife [Nefrure], may she live. It was as 'Father of the Goddess' that I was appointed for her inasmuch as I was serviceable to the king."

Chancellor of the Lower Egyptian King, Senmut, hereditary noble, guardian of the Shrine of Geb, master of the servants of Amon, Senmut, justified. It is the steward, Senmut, who has come from the flood, to whom inundation has been given, so that he has power over it as the Nile-flood.

(Translation by Edward F. Wente, professor of Egyptology, University of Chicago.)

Department of Education

new and continuing programs

As students and teachers return to the classroom this fall, there is a renewed sense of excitement and anticipation of the year ahead. For many teachers, plans for the year will include one or more visits to Field Museum. In preparation for these visits, a tempting variety of new programs as well as old favorites has been readied by the Education department staff. These programs are described fully in the brochure *Resources for Learning*, copies of which may be obtained free by writing the Raymond Foundation, Field Museum.

Many school and community groups in the Chicago area have instituted programs in conjunction with Field Museum's Contemporary African Arts Festival, which opened in April and is scheduled to close in November. The Museum has provided crafts workshops and dance programs at the Museum as well as at schools and community centers. Teacher programs offer suggestions for learning about African culture in the Museum and in the classroom. Through school and Museum activities, school groups are involved in an ongoing realization of the African cultures.

Continuing programs

- The Ray A. Kroc Environmental Education Program, "Natural and Managed Environments," offers a fall series of field trips from September 14 through October 13 (for details see page 23).

- The Ayer Illustrated Lecture Series will resume in October and continue through April. The theme for this year's series is "Expeditions Unlimited." Field Museum curators will present slides and films of their experiences in the field. Because of building improvements and renovation of the west entrance, the series will be given this season in the ground floor lecture hall. (See p. 17)

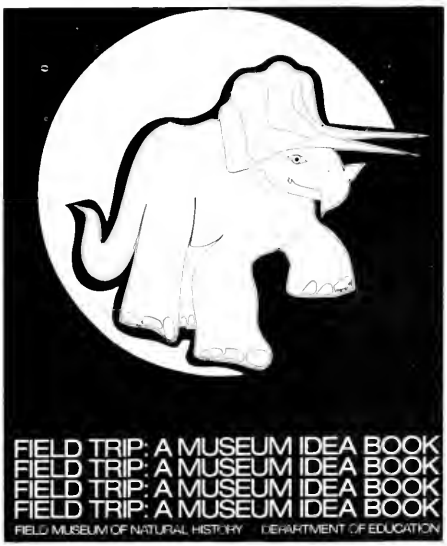
- North Shore Weavers Guild members will weave on the Mexican loom in the South Lounge on Mondays, Wednesdays, and Fridays from 10:00 to 12:00 noon, beginning September 30. Spinners will also demonstrate techniques of the drop spindle on first and third Mondays, also beginning September 30.

- The Contemporary African Arts Festival features a film festival each day of the week as well as on Friday evenings. Demonstrations by African artists are being offered on Saturdays until the end of September.

Contemporary African Art programs

The George Howland Elementary School, 1616 S. Spaulding, in Chicago, has produced its own Contemporary African Arts Festival in connection with its Follow Through Program, a federally funded activity for 200 Howland children in grades kindergarten through third. The children have learned about contemporary African arts and African life by selected reading, by viewing slides and films, and through other

Barbara Reque, Musuem resource consultant, with two children from Howland School



Cover design, Zbigniew Jastrzebski

classroom activities. They have created their own counterparts of African arts, transforming aluminum pie plates, for example, into counter-repoussé panels—just as Nigerian artist Asiru Olatunde has done with aluminum and copper sheets. Olatunde depicts Yoruba folk tales in his panels; so the children, accordingly, have included contemporary American folk heroes in their own pie-plate panels. The children also made beads, masks, tie-dye and starch-resist-dye materials, pottery, and tapestries. Masks made by the children are on view in an exhibit case at the entrance to the Museum's Contemporary African Arts Exhibit hall.

Teachers who "come on their own"

What about teachers who bring students to the Museum on their own? Although more teachers each year request staff-led programs, only about 30 percent of requesting school groups can thus be accommodated; this is because of space and personnel limitations. In order to assist those teachers who do come on their own, the Museum's Department of Education has recently published *Field Trip: A Museum Idea Book*, now available from Field Museum's Office of Publications for $3.00, postpaid.

The book is comprised of six "model field trips"—each offering a different approach to Museum learning—and a "Teacher's Survival Kit." The models, which cover a variety of topics, were developed and tested by teachers from the Chicago area, and have been designed for a wide range of age groups.

"What's That Made Of?," a model trip for primary age children, encourages children to explore ways in which different peoples use various materials in the fashioning of necessary articles. At school the children use materials such as clay, leather strips, and rock in the actual creation of these same articles. When they visit the Museum, the children can relate their own experiences with these materials to artifacts that they see on display.

In order to develop each model, a teacher or team of teachers was invited to "do a field trip and let us watch." The Museum's Education staff observed pre-trip and post-trip activities as well as what took place in the Museum. Many useful approaches were thus developed for planning and implementing a successful Museum visit. All this first-hand information is to be found in outlines of the six trips, and in the book's planning section, "Teacher's Survival Kit."

Field Trip is loose-leaf bound, so that sections may be easily removed for photocopying. Since none of the material is covered by copyright, it is thus available for reproduction in any quantity.

The Education staff hopes that more trip models will supplement the original six, and that teachers will feel free to contribute their ideas for making the Museum an even better resource for learning.

Volunteer opportunities

Field Museum currently has 180 volunteer workers, donating their time, skills, and effort in virtually every area of Museum activity—exhibition, education, curatorial assistance, and so on. Each volunteer gives a minimum of one day per week. Their dedicated efforts are the source of a deep, personal kind of satisfaction—the satisfaction of giving freely within the stimulating ambience of the Museum. The Museum, in turn, gains invaluable assistance; many programs simply could not exist without the support of these dedicated workers.

A case in point is the current Contemporary African Arts Festival. Volunteers have been involved in initial researching of source information for the festival; photographing and cataloguing of artifacts, artworks, and shop merchandise; creating jewelry from African trade beads; teaching children's groups in the exhibit; illustrating the journey "Artists Zoo"; writing descriptions for festival films; and any ►

number of other specialized activities. Volunteers are also flexible and able to adapt to changing needs in Museum programs. Now that the African exhibit has been set up, those volunteers who are not involved with ongoing projects have been relocated to other volunteer assignments within the Museum.

Currently there are volunteer opportunities in a number of areas, including key punching, cataloguing, foreign language translation, specimen maintenance, and membership. A weekend volunteer program designed to give Museum visitors improved service will be instituted in October.

Museum members who wish to participate in the volunteer program may call Carolyn Blackmon, 922-9410, ext. 361, or write her at Field Museum for an appointment.

Native American program

The ancient Egyptians had a ceremony in which they would breathe the breath of life back into something that was apparently dead. We have need of such a ceremony today. Native American culture exists in several forms; there is the culture which has survived in the hearts and minds of traditionalists within the Indian community. There is, in addition, a great store of native culture which over the years has migrated out of the community. The artifacts now seen within the Museum's collections are representative of this phenomenon.

Accounts that appear in obscure anthropological publications are often the words of wise men now long dead, men who wanted their story written down for the sake of their great-grandchildren

Museum Volunteers: *(top, l. to r.) Carrie (Mrs Peter) Anderson and Idessie Bowens assist in the Division of Publications, (bottom, l. to r.) Laurie (Mrs. Richard) Norby and Julie (Mrs J. Thomas) Hurvis help out in the Division of Invertebrates.*

to come. They had the vision to see what was happening, and to know what would be needed years in the future. Native American culture was crushed beneath the iron-shod hooves of the pony soldiers and starved to death by the grafters who became Indian agents. The generation that survived feared what the future would bring, but they conspired to thwart the fates. There was a hope in the heart of the old ones that if their words were written down, they would be saved. So they used the strange field workers who first wandered through Indian country looking for myths and legends to write down. Thus, their words would be saved for a time when they would be needed by generations yet unborn, and unwittingly the white strangers would help them.

Our task is to dig up those words and give them life again. Traditional culture is today like a picture puzzle whose pieces have been scattered. It is surprising how much has survived within native communities, but there are many pieces which have been lost. Some of them are gone forever, some have been misplaced. We must search them out and breathe into them the breath of life.

I feel that it is important for all people to know their roots, to delve deeply into those roots and derive sustenance and strength from them. As our society is not noted for venerating the past, this is no easy process. There is no simple solution. We are living in a time when many of the old Indian values are desperately needed. For example, Native Americans called this earth *Our Mother;* yet, how difficult it is to feel that kinship today. How can we do it? We, the living creatures on this planet, are all equally the creator's work—that should give us all pause for thought.

The task of the Native American program, as I see it, is to explore ways to make traditional culture interesting and accessible. Context is extremely important, for it is the universe in miniature that sets the stage for empathy. It can mean the difference between the words of a holy man appearing "right" and meaningful or seeming alien and bizarre, like the appearance of Christmas in Los Angeles to one with memories of a snowy climate. The program is attempting to obtain support for projects ranging from the construction of a Pawnee earth lodge within the Museum to the erection of a small village of wigwams in a secluded rural area. The Pawnee earth lodge would provide an environmental context within which thirty or forty people could be exposed to various aspects of Native American culture; upon entering the lodge, the museum and the twentieth century would be left behind. In the village, groups of Native American youth, teachers and their families, or selected non-Indian students would live for a week within the context of a living culture with traditionalists and their families as resources.

There is a poem that says

> *Across the years*
> *Our grandfathers speak to us*
> *If we but listen.*

If we all work at it, perhaps the voices of our ancestors will once again be heard.

I would welcome the thoughts of anyone concerning the revitalization of traditional culture.

"When a young man, fasting for spiritual power, saw a vision of a bear charging unharmed into a hail of bullets, it meant many things. It was a promise of protection from the supernatural world. It was also the setting of a life goal, a commitment to instantly rise to the defense of the helpless ones. As the spirit bear charged out of its den into what looks like instant death, so the young man, now a warrior, must defend his community. It was not what the shield was made of that was important, but what it represented."

—John White.

A 19th-century Crow war shield is used to illustrate important aspects of traditional culture in the program for young Native Americans at the Owaiyawa School, the Indian extension program of Gaudi Elementary School in Chicago's Uptown. Cat. No. 71832

Cultural Native American material is being reintroduced to the contemporary scene by means of presentations in the Owaiyawa Indian Program of the Gaudi Elementary School on Chicago's North Side. Ancient war shields and painted rawhide parfleshes (large carryalls), for example, have been used in the Owayawa program to illustrate discussion topics ranging from the nature of spiritual experience to men's and women's roles and relationships in traditional Indian society. Through the anecdotal accounts that accompany many specimens in museum collections, voices long stilled can speak again. A wealth of oral history can thus become a part of living tradition.

The Lelooska Carvers, a group of Native American woodcarvers from the state of Washington, will be at Field Museum September 23 through 27 to demonstrate traditional woodcarving and silverworking. In addition, they will present a program showing Indian ceremonial masks in use. For the Owaiyawa program and at Little Big Horn High School—a Native American extension of Senn High School—the Lelooska Carvers will also demonstrate and teach their craft.

—John White
Native American Program

[illegible] relief discovered in Queen Hatshep[illegible] mortuary temple. Commemorates the [illegible] expedition to Punt (on the Red Sea coast of present-day Ethiopia).

HATSHEPSUT *(Continued from p. 7)*

[illegible] high, was acquired in 1925 from a Luxor antiquities dealer and selected by the famed Chicago Egyptologist James Henry Breasted. Ernest R. Graham and Stanley Field provided funds for purchase of the piece. It is one of only ten Senmut statues known, and one of six showing him with Nefrure.

The princess wears the lock of childhood on her right temple and the royal insignia on her forehead. The name of Senmut, which appeared twice on the right side of his robe, twice on the base, and once on the back, can be clearly seen to have been hacked out.

Senmut's official title of "Superintendent of the Private Apartments, of the Bath, and of the Royal Bedroom" suggests that he also may have been Hatshepsut's lover. Certainly he claimed an unusual relationship to his ruler by insinuating portraits of himself into her mortuary temple. These were carved into hidden niches; four of them have escaped deliberate destruction.

Most remarkable was Senmut's attempt to have himself buried in a crypt under Hatshepsut's temple. Early in his career, he had a large gallery tomb, containing a quartzite sarcophagus, carved high up into the cliffs. Later, in an obvious attempt to be joined again with his queen after death, Senmut secretly built a second tomb. The entrance to this structure descended from the bottom of the quarry in which Hatshepsut's broken statues were later found. Winlock encountered this unfinished tomb when he unearthed Hatshepsut's broken statuary there. A hole in the floor beneath the fragments led into a long, steep staircase; at its far end was the decorated burial chamber, immediately below the front platform of Hatshepsut's temple. Carved on one wall was the figure of Senmut, bowing before the names of Hatshepsut written in hieroglyphs. The unfurnished tomb had never been used. Part of it was carved, and part of it only blocked out in paint. The sarcophagus in Senmut's earlier cliff-tomb was found smashed, with the fragments strewn about. His mummy, like Hatshepsut's, has never been found.

It is possible that Senmut eventually fell out of favor with his queen. The last we hear of him was in the sixteenth year of her reign, from that point he disappears

from history. It is not known whether his desecrated images and tombs were the objects of Hatshepsut's wrath or that of Tutmosis III.

Also on view in Field Museum is a replica of a section of the reliefs found in Hatshepsut's mortuary temple (hall J, opposite the large wooden funerary boat). These reliefs commemorate Hatshepsut's great expedition to the land of Punt, organized by Senmut, and led by Nehery. Hatshepsut sent five ships carrying presents from Egypt, to be traded for potted myrrh trees and other plants destined for her terraced temple gardens. Ebony, ivory, gold, baboons, leopards, and cosmetics were also received in trade. Field Museum's portion of the relief shows the precious cargo being loaded. In several places hieroglyphs have been deliberately effaced.

Hatshepsut's end, like that of Senmut, is unknown. By the time of her death, Tutmosis III was over thirty, and it is reasonable to assume that by then he had become somewhat impatient with his aunt, stepmother, and mother-in-law Hatshepsut. Some scholars have suggested that Tutmosis III may have seized the throne from her and been responsible for the thorough destruction of her records and images, although this theory continues to be a matter of debate.

When he finally ruled alone (1469-36), Tutmosis III became the greatest conqueror in Egypt's history. His empire eventually stretched from the Sudan to the Euphrates. He was the first pharaoh after nearly a hundred years to have a son (Amenophis II) from his chief queen (Merytre-Hatshepsut) survive him and ascend the throne after his death. Hatshepsut's dynastic line thereby continued to reign. A copy of the head of Tutmosis III (from the original in the Turin Museum) is on view in hall J, case 43.

Tutmosis III could safely embark on his far-flung conquests because Hatshepsut had firmly consolidated the country during her own long, wise rule. But perhaps he was largely spurred on to his extraordinary achievements by twenty years of frustration and inactivity under Hatshepsut; perhaps he felt compelled to outdo the woman who had humiliated him.

natural history museums, tropical diseases, and taxonomy

by Bengt Hubendick

THERE was once a young zoologist who was laboring diligently on his doctoral dissertation. It was tedious work, and one day he left his laboratory for a few minutes' break. He strolled through the invertebrate storeroom, glancing casually at shelf after shelf of preserved specimens. One jar, he noticed, contained samples of a type of pulmonate snail (which breathes by means of a lunglike sac), which he knew was still anatomically unknown. His scientific curiosity was suddenly aroused, and he was taken with a desire to discover the internal structure of this mollusk. So, as a sideline, he began studying its anatomy. Some curious and unexpected observations resulted; before he could pursue them further, however, the young doctoral candidate again had to devote himself entirely to his dissertation.

In due course, after gaining his degree, he was appointed to the department of invertebrates at the principal natural history museum in his country. This was just what he had always dreamed of. Half of his time was to be spent on curatorial work (cataloguing, arranging, and otherwise caring for the collection) and the rest of it on research. Now at last, he would have time to resume his study of the pulmonate snails. He examined specimens already in the museum's collection and borrowed other material from museums abroad. Before long, he had gathered a substantial body of information on the subject and written a rather lengthy paper.

The paper was accepted for publication by a scientific journal and the author distributed reprints of it to other snail specialists in an entirely different field—tropical medicine—specialists who were particularly interested in a serious tropical disease known variously as bilharziasis, schistosomiasis, and snail fever. The young zoologist suddenly realized that his snails were of great importance as vectors, or transmitters, of this common disease.

He continued his study of freshwater snails, their anatomy, taxonomy, variation, distribution, and ecology. In the museum laboratory he worked on preserved specimens and, during the summer months, studied live snails. He found that he had become rather knowledgeable in an area that had once been just his sideline. Perhaps he had even acquired a certain international reputation in this narrow field. At least he thought so when a letter arrived on his desk from the World Health Organization (WHO), in Geneva. The letter invited him to participate in a survey team in the Philippines; there he would evaluate the bilharziasis situation and suggest measures for control of the disease. This was an exciting development indeed. The young zoologist had trained himself to do curatorial work on museum collections and to carry out research—predominantly taxonomic research—based on such collections. Now his hard-gained competence might very well prove useful in solving problems connected with a disease that afflicted millions of people.

So he went to the Philippines, became familiar with many aspects of bilharziasis and its control, did ecological field work, and collected material for subsequent taxonomical research in his own museum. Less than six months after

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returning home he was to leave on another trip—this time to Venezuela—to work out the taxonomy of the snails that transmit bilharziasis in that area, and to give a course in his field of research.

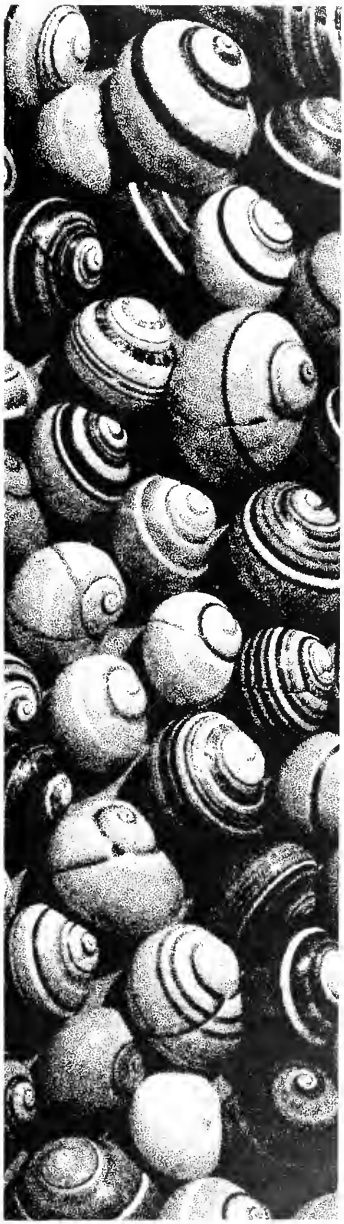
Back at his museum once more, he worked out the body of material that he had gathered in Venezuela. The outcome was a taxonomic paper; he also produced a manuscript for a snail identification guide mainly to be used by public health workers trying to control the disease. The manuscript was not published, but later it was sent to WHO. Ultimately, it did lead to the establishment of the "Pan American Health Organization/World Health Organization Working Group for the Development of Guidance for Identification of American Planorbidae"(!). In the meantime the zoologist—no longer very young—was sent to the west African countries of Gambia and Sierra Leone by the British Medical Research Council, and to Puerto Rico by WHO for further work in medical malacology (the study of mollusks). In addition, from time to time, he attended various professional meetings and congresses.

The working group with the extraordinarily long name required a body of basic information for its work. So, in due course, our zoologist was sent by WHO/PAHO to London, Paris, Brussels, Frankfurt am Main, Philadelphia, Washington, D.C., Ann Arbor, and other cities to examine type specimens* and other materials in museum collections. Such studies were essential for ironing out problems of taxonomy and nomenclature—difficulties that had heretofore made the identification and naming of vector snails virtually impossible. During meetings, discussions, and visits to Europe, North and South America, through a vast correspondence with colleagues around the world, and most of all through further study of specimens in various museum collections, our zoologist continued to work on his identification guide. Thanks to the availability of museum collections in many countries he was, together with some colleagues, at last able to create a workable identification tool for malacologists, public health workers, and other engaged in bilharziasis control.

Zoological classification, or taxonomy, based on zoological systematics and dependent on zoological nomenclature, is often denigrated as a sort of scientific "hobby" or as a nonreputable specialty of limited interest and significance. But pure zoological systematics is, in fact, a most important discipline, because the zoological system is based not on zoological types, but on natural phylogenetic relationships between animals and groups of animals; thus, it presents a picture of organic evolution that has already taken place. In taxonomy the principles of systematics are applied for the purpose of identification and classification. Reputable or not, this is an indispensable process in many areas of zoological research.

The taxonomic worker relies heavily on reference material, such as type specimens, for comparison. He may also be dependent on extensive series of specimens within a species, race, or strain. These series may exhibit significant variations in developmental stages or in sexual dimorphism or polymorphism; intrapopulation or interregional variations may also be expressed.

In environmental research, ecology, parasitology, economic entomology, in virtually any branch of zoology, correct taxonomy is basic as well as essential. If man is to fully understand the ecological system to which he contributes and on which he depends, if he hopes to fully utilize renewable natural resources, if he wishes to defend himself effectively against his ecological competitors, if in fact it is his intention to continue inhabiting this plant, then he must apply his knowledge of taxonomy. ➤



*Individual specimens on which definitive descriptions of a species, genus, or other group are based.

And this includes the taxonomy of plants and microorganisms as well as of animals.

Today man has a good taxonomic understanding of the malarial parasites that affect him—the microscopic sporozoa as well as the mosquitoes which transmit the sporozoa. This knowledge was a prerequisite before effective defense against the parasites was possible. Researchers have also found that the schistosomes as well as the disease-transmitting snails in bilharziasis form intricate complexes of different races and strains, each with its own unique behavior. Susceptibility and resistance vary between these races and strains, and such characteristics may be determined by not just one gene but several. So the taxonomy of these organisms must, perforce, concern itself with the most subtle distinctions between closely related forms. Similarly, it is important to have taxonomic knowledge of other protozoa, flukes, tapeworms, and roundworms that are parasitic in man or in his domestic animals, or which ruin his food supplies, or which are harmful to him in other ways.

Specimens that are studied by the taxonomist must be kept as documentary material. In time, these specimens may have to be reevaluated. New discoveries and further research may reveal information that supersedes previous observations. And changes in nature itself, spontaneous or man-made, may make comparisons between collections from different periods of time highly significant. Where reliable taxonomic information is wanting, zoological investigation often becomes valueless. If, on the other hand, the material is properly documented, specimens can be accurately identified as a matter of routine. Documentary material of this kind is seldom available at universities or most other institutions with scientific departments. It is the natural history museum, almost exclusively, which is the repository of such material. The taxonomist, therefore, relies on such museums for much of his research. These institutions also provide a taxonomic service to other scientific institutions and agencies. This service, which is truly indispensable, involves a wide range of techniques in morphology, morphometry, histology, and even serology. Some museums provide a taxonomic service based partly or entirely on histological and/or biochemical methods.

The natural history museum, then, is today much more than a repository of specimens, where one can spend a delightful afternoon viewing stunning exhibits of exotic specimens. It is a vital part of the world's scientific community, helping in its unique way to advance the frontiers of science.

So our young zoologist, fascinated years ago by some curious preserved specimens, was led into vital taxonomic research—research that proved valuable in man's fight against a serious disease. And still later it was our zoologist's fate to become a museum administrator, and in that role it was quite appropriate that he write this brief essay. □

Clifford H. Pope, 1899-1974

Clifford H. Pope, formerly Curator of Amphibians and Reptiles, died at his retirement home in Escondido, California, early in June. He joined the staff of Field Museum in June, 1940, and retired in December, 1953. The author of numerous scientific publications, Pope was considered to be *the* expert on Chinese amphibians and reptiles. That stature was a result of his having spent five years in China during the 1920s as a member of the famous Roy Chapman Andrews expeditions. But he was best known as the author of several remarkably successful popular books on reptiles. His *Snakes Alive* has probably been read by more young—and some not so young—would-be herpetologists than any other book in the last forty years.

It was perhaps typical of Clifford (it is impossible for those who know him well to refer to him in a more conventional, formal mode) that he converted his interest in keeping and feeding a young Indian python into a means of educating his neighbors out of their prejudices against snakes and into an excellent popular book, *Giant Snakes*.

Clifford H. Pope

Clifford had such a nice facility at this kind of educational activity that he decided, quite sensibly, to end the commuting hassle, retire from the Museum at an earlier than customary age, and devote himself to popular writing.

When he died, a friend writing in the *Escondido Daily Times-Advocate*, said she was certain that Clifford, wherever he had passed on to will, ". . . set about in his low keyed, tongue-in-cheek manner debunking all the myths about serpents being the symbols of evil and the cause of original sin.

"Just as he did for a long lifetime on earth, he will quietly convert the children to the side of the snakes, and then demonstrate to the worried mothers . . . that a snake, freed of the prejudice against him, is the child's friend, to be respected and handled gently."

— *Robert F. Inger, assistant director, science and education*

"Expeditions Unlimited"

Edward E. Ayer Illustrated Lecture Series

The theme for this year's Friday and Saturday Ayer illustrated lecture series is "Expeditions Unlimited 1974-75." Field Museum curators will present slides or films to illustrate their presentations. The Friday programs will begin at 7:30 p.m.; the Saturday programs will begin at 2:30 p.m. All programs will be given in the ground floor lecture hall. Attendance — which is free — is limited to 225 persons. To accommodate those who attend Friday evening programs the cafeteria will remain open on those dates until 7:30.

Reservations may be made by calling 922-9410, ext. 230.

October 18, 19 **"Contemporary African Artists"**
Speaker: Maude Wahlman, consultant, African ethnology

October 25, 26 **"In Search of Sea Serpents"**
Speaker: Harold Voris, assistant curator, amphibians and reptiles

November 1, 2 **"Endangered Cloud Forests of Costa Rica"**
Speaker: William Burger, associate curator, botany

November 8, 9 **"A Native American Looks at Anthropology"**
Speaker: John White, Native American program

November 15, 16 **"Lost Cities of Indonesia"**
Speaker: Bennett Bronson, assistant curator, Asiatic archaeology and ethnology

November 22, 23 **"To Inca Land and Beyond for Birds"**
Speaker: Emmet Blake, curator emeritus, birds

December 6, 7 **"Grand Canyon Expedition"**
Speaker: Matthew Nitecki, associate curator, fossil invertebrates

February 21, 22 **"The Changing Alaska Eskimo Culture"**
Speaker: James VanStone, chairman, Department of Anthropology; and curator, North American archaeology and ethnology

February 28, March 1 **"Natural History of Deep Sea Fishes"**
Speaker: Robert Johnson, assistant curator, fishes

March 7, 8 **"The Tunguska Explosion: Meteorite, Comet, or Black Hole?"**
Speaker: Edward Olsen, curator, mineralogy

March 14, 15 **"Wet Snails in Dry Deserts"**
Speaker: Alan Solem, curator, invertebrates

March 21, 22 **"Veracruz, Mexico: Green Grow the Lilacs"**
Speaker: Lorin Nevling, chairman and curator, Department of Botany

March 28, 29 **"Frog Ecology in the Congo"**
Speaker: Robert Inger, assistant director, Science and Education

April 4, 5 **"Collecting Mosses in Southern Chile"**
Speaker: John Engel, Richards visiting assistant curator, bryology

April 11, 12 **"Ancient Ecuador: Culture, Clay, and Creativity"**
Speaker: Donald Collier, curator, Middle and South American archaeology and ethnology

Anti-Cowbird Program Aids Kirtland's Warbler

The trapping of brown-headed cowbirds *(Molothrus ater)* may be an important key to ultimate survival for Kirtland's, or the jack pine, warbler *(Dendroica kirtlandii)*. Long a rare species, the warbler nests only in jack pine forests of Michigan's lower peninsula, where it is parasitized by the cowbird. The cowbird lays its eggs in the nest of the warbler (among other species). The cowbird fledglings, larger than those of the warbler, get priority at feeding time; the young warblers starve to death.

A 1971 survey showed a warbler population of only 400—a 60 percent decline from a decade earlier. In an effort to combat this precipitous trend, a three-pronged program was begun in 1972 jointly by the U.S. Forest Service, the U.S. Fish and Wildlife Service, the Michigan Department of Natural Resources, and the National Audubon Society. The program entails management of forest lands to provide young jack pines, establishment of additional forest land for the warbler, and cowbird control.

In spring, 1972, 15 decoy traps baited with sunflower seeds, fresh water, and live cowbirds were set on seven warbler nesting areas. Over 2,200 cowbirds were trapped and warbler egg losses dropped in three of the areas from 65 percent to 6 percent. The number of young warblers reaching the wing that year nearly tripled. In 1973, 19 traps were set in the seven warbler areas. More than 3,000 cowbirds were removed from the warblers' areas last spring, and a nest survey showed that not one warbler nest had been invaded in three of the seven areas. A population increase of eight percent was recorded. This year the number of traps has been increased to 23. An upturn in the warbler population to 432 for 1974 suggests that the warbler restoration program is having its desired effect.

Foster Homes for Young Whoopers

One of the rarest of North American birds, the whooping crane *(Grus americana)*, may well be saved from extinction by a current project of the U.S. Fish and Wildlife Service. Only forty-eight of the species are known to survive in the wild. The birds breed in Canada's Wood Buffalo National Park, in the District of Mackenzie, Northwest Territories, and spend the winter on the Texas coast, mainly in Aransas National Wildlife Refuge.

For five years in a row, whooping crane eggs have been taken from the nests and transplanted to Patuxent Wildlife Research Center in Laurel, Md. Seventeen birds have been successfully raised from eggs taken in previous years. In May, thirteen eggs collected in Canada were also taken to the research center. The eggs were removed only from nests that contained two eggs. (The removal of one of a pair of eggs does not seem to materially affect the number of young cranes arriving at the Texas wintering ground. Few families arrive there with more than one chick even though two eggs had been laid.)

Twelve of the captive flock at Patuxent have been paired off in separate areas because they have themselves shown indications of pairing. In spring of 1975 an artificial lighting situation will be set up to achieve synchrony in the male and female cycles. Continual light at normal breeding time tends to stimulate hormonal activity which leads to breeding.

Crocodile Shoes Confiscated by Feds

About $35,000 worth of imported men's shoes were seized recently by government agents when it was determined that the shoes were made from the hide of an endangered species of crocodile. More than 390 pairs of shoes were confiscated, all made from the hide of the Nile crocodile, *Crocodylus niloticus*, one of six crocodile species that is listed by the U.S. Department of the Interior as endangered. The shipments, intended for two importers in Maine and Massachusetts, were seized by special agents of the U.S. Fish and Wildlife Service; a penalty action was also initiated against the importers.

Identification of the species was determined by zoologists who studied the texture of hide used in the shoes and compared samples with museum specimens for the presence or absence of bony material in the scales, and the number and size of the scales.

The forfeited shoes were destined for retail outlets in the United States, with an average price of $90 a pair. The shoes will be temporarily placed in a government

Adult whooping cranes (Grus americana)

Publication cost of this section on "Our Environment" has been underwritten by the Ray A. Kroc Environmental Education Fund.

warehouse along with other forfeited wildlife products which have been illegally imported into this country by commercial firms, tourists, and hunters. Most are made from endangered species and cannot be sold.

Twenty-seven species and subspecies of crocodiles are generally recognized by herpetologists. Six are now on the Secretary of the Interior's endangered species list, which also includes the American alligator *(Alligator mississipiensis)*.

A profitable world trade in crocodile hides flourishes in Latin America, Asia, and Africa. A large percentage of these hides funnel from hunters on these three continents through wholesale export firms to tanning firms in such countries as France, which process, dye, and burnish the hides. The hides are then shipped to Italian manufacturers for the world shoe, belt, handbag watchband, golf bag, briefcase, and luggage market. Commercial processing of these hides is legal in Europe. Some countries in Latin America, Africa and Asia have recently outlawed or limited commercial harvest of crocodilians. Others are investigating regulating the harvest.

The Nile crocodile, which grows up to eighteen feet long, has been hunted to the brink of extinction in Africa because its hide is particularly suited to the manufacture of shoes and other accessories. It has less bony material in its belly scales than most other crocodilians of that area. Those are the only parts used for manufacturing. Hunters have concentrated on taking younger Nile crocodiles of six to nine feet in length before the scales grow too large.

The crocodile fills an ecological niche as the major predator of the waters it inhabits. Its removal from an area greatly disturbs the balance of life. In areas of Africa where the Nile crocodile no longer ranges, for example, the yield of food fish for human consumption has gone down dramatically because the slower-swimming, rough, or bottom-feeding fish that were the main diet of the crocodile have multiplied to the point of forcing more desirable fish out of those waters. The Nile crocodile once ranged over the southern two-thirds of Africa, including Madagascar. Today it is restricted primarily to the Nile River drainage system because man has moved into much of its former range.

Aerial photo of Reserve Mining Company's Silver Bay (Minnesota) plant on Lake Superior. During a normal day's operation, some 67,000 tons of taconite tailings—which contain asbestos fibers are dumped into the lake.

Asbestos-loaded Residues Dumped in Lake Superior

In 1947 the Reserve Mining Company filed for permission to dump residue from its processing of taconite, a low-grade iron ore, into Lake Superior. The proposed mining of taconite was generally hailed as a godsend to northeastern Minnesota, where the depletion of higher-grade iron ores was threatening the region's economy. A few dissenters, however, warned that dumping taconite tailings into Lake Superior would threaten fish life as well as contaminate the water supply of Duluth, Minnesota, and other nearby communities.

In time, Reserve was permitted to operate its taconite processing plant at Silver Bay, and in the mid-1950s it began to dump 67,000 tons of tailings into the lake each day.

Environmentalists grew more concerned about the possible hazard to human life, pointing out that fibers of asbestos, a known carcinogen, were present in the taconite residue and that these were carried by lake currents many miles from the dumping site. What was to become the longest environmental trial in history began in August 1973 and ended the following April, with U.S. District Court Judge Miles Lord closing the Silver Bay plant on April 20. The guiding force behind the court's decision was its determination that the asbestos fibers are indeed a "serious health hazard."

In a memorandum, Judge Lord stated that while the extent of the hazard could not be immediately evaluated—and perhaps not for ten or twenty more years—thousands of persons were being daily exposed to a known carcinogen.

Three days following the court-ordered shutdown, the eighth U. S. District Court of Appeals stayed Lord's closing for seventy days. Meanwhile Reserve was ordered to find an alternate dumping site on land. The company proposed a dumping site in the Palisades Creek area 3½ miles from its Silver Bay plant. This plan, however, was rejected by Minnesota state officials, arguing that the Palisades area was one of unsurpassed beauty and not to be desecrated as a dumping ground.

In July, Reserve stated that it could halt the dumping of tailings into the lake within 28 months. In the meantime, if company operations continue, some 200,000 Lake Superior area residents will continue drinking the asbestos-contaminated lake water.

rededication

The crowd above—and about 200 other persons—turned out at the Museum's north entrance on a cold June 25 to celebrate the Museum's 80th anniversary and current $25-million renovation program at a ceremony rededicating the 53-year-old building. It was a joyous affair that opened with the happy sounds of a dixieland band and closed with a gala picnic luncheon for invited guests in a red-and-white tent on the north lawn.

On hand to honor the Museum's accomplishments and benefactors, with brief remarks, were Colonel Jack Reilly, director of special events in the office of Mayor Richard J. Daley, who presented a $50,000 contribution from the City of Chicago to the Museum's Capital Campaign; Rev. H. Robert Clark, superintendent of schools, Archdiocese of Chicago; Patrick L. O'Malley, president of the Chicago Park District; Frederick C. Roth, administrative assistant to Alderman Fred B. Roti; and Carol Saper, 9 (in photo, below left), winner of the Museum's cornerstone contest, whose illustration depicting a time when all races will live in harmony now rests permanently in the new cornerstone.

Participating for the Museum were President Blaine J. Yarrington and Director E. Leland Webber (congratulating Carol Saper in

Dear Mr. Yarrington,

Thank you so very much for selecting my entry as the winner of the Field Museum Cornerstone Contest. It was a great honor for me that I will always remember.

Please thank the Board of Trustees and your staff and everyone who made this honor possible.

I hope my dream for peace will come true very soon!!

I will never forget you.

Love,
Carol
Saper

photo, above right); Trustees Marshall Field, Nicholas Galitzine, and Thomas E. Donnelley II; Mrs. Donnelley, Women's Board president (in photo, right); and Anthony Patteri, stone mason, who worked on the construction of the present building and continued service to the Museum for fifty years before retiring in 1971. Mr. Patteri (in photo, below) symbolically sealed the new cornerstone into place. Also in the crowd were reporters and photographers from five Chicago newspapers, and a television film crew. They jockeyed for the best views as program participants placed documents into the cornerstone that included *Congressional Record* statements from U.S. Senators Charles Percy and Adlai Stevenson and U.S. Congresswoman Cardiss Collins; resolutions from the Chicago Board of Education, the Board of Commissioners of Cook County, and the Illinois General Assembly; a proclamation from Mayor Daley calling for all citizens to contribute to the Museum's Capital Campaign; and many other documents of recognition.

When in the future the cornerstone is again opened, these documents will attest to the Museum's ever-increasing importance in and impact on the worlds of science and education.

Happy Anniversary, Field Museum!

field briefs

Unusual Birthday Gift for Field Museum

In celebration of its eightieth anniversary in June, Field Museum received an unusual gift from D'Arcy-MacManus & Masius, world wide advertising agency. The firm is devoting its creative services to develop an advertising campaign which will complement the Museum's public relations efforts. Television announcements, newspaper public service ads, and Museum membership promotional materials are being developed by the firm.

William T. Raidt, president, D'Arcy, Division of D'Arcy-MacManus & Masius, commented, "We hope that this advertising campaign will make more Chicagoans aware that one of the world's leading educational, cultural, and scientific centers is right on their own lakefront."

Upper left. Kwasi Badu, of Ghana, and his drum troupe will perform in Stanley Field Hall on September 21 at 10:30 a.m. and 2:30 p.m.

Lower left. Patty Fawn demonstrates traditional Northwest Coast silversmithing techniques at Field Museum September 23 through 27.

Below. When singer-actor John Davidson brought his four-year-old son, John Jr., to the Museum recently, tanner Keith Carson had to convince the youngster that the jaws of this wolf weren't going to nip his nose.

Ray A. Kroc Environmental Education Program

Natural and Managed Environments

Forest preserves and other natural areas show us what Chicago and its environs once looked like. Farms, factories, waterways, and recreation sites show us what has become of the land. How are natural areas faring in the face of megalopolis? How do managed ecosystems interact with their surrounding environments?

The Ray A. Kroc Environmental Education Program for fall, 1974, provides opportunities for all ages to explore natural and managed environments in and near Chicago. Special attention will be given to natural phenomena, the interplay of biological systems, and management of particular ecosystems. Field trips for teen-agers, adults, and family groups, and Museum-based experiences for younger people are offered in this series. Some favorite trips from earlier programs are repeated.

This program is made possible by the Ray A. Kroc Environmental Education Fund, which was established at Field Museum by his friends to honor Mr. Kroc, chairman of McDonald's Corporation, on his 70th birthday. Other events of this program will be presented in coming months and years.

There is a $4.00 registration fee for all programs except the Morning Programs for Young People, for which the fee is $2.00. Reservation is by advance registration only. Environmental Education Program brochures are available by writing Carolyn Blackmon, at Field Museum, or by calling her at 922-9410, ext. 361 or 363.

Junior-Senior High School Field Trips

Trip topics include "Shorelines and Slopes" (Saturday and Sunday, Sept. 14 and 15) to Rocky Glen, DuPage County; "Formations of Sand" (Saturday and Sunday, Sept. 21 and 22) to the Indiana Dunes; "The Farm—an Environmental Experiment" (Saturday, Sept. 28) to Pleasant Valley Farm, near Woodstock; and "Searching for Evidence of the Coal Age" (Saturday, Sept. 28) to a nearby strip mine. All trips are limited to thirty students and all are for junior or senior high, except the "Coal Age" trip, which is for junior high.

Adult Field Trips

Seven trip topics for Wednesdays, Saturdays, and Sundays are to be offered for groups of forty or fifty adults. Topics include "The Last Glacier" (Saturday and Wednesday, Sept. 14 and 18), to Palos Park; "Waterways and Lake Michigan" (Saturday, Sept. 28)—a boat trip along Lake Michigan's southwest shore and Cal-Sag Canal; "Carvings of a River" (Sunday, Sept. 29) to Starved Rock; "Sand and Steel" (Wednesday, Oct. 2) to a steel mill and the Indiana Dunes; "An Ancient Environment" (Saturday and Wednesday, Oct. 5 and 9) to a strip mine and reclamation sites; "Varied Environments of Starved Rock" (Saturday, Oct. 12) to Starved Rock; and "Are Lake Shores Disappearing?" (Sunday, Oct. 13) to the Dunes.

Family Trips

Two trips for families, each limited to forty individuals, will explore the farm and forest. On Saturday, Sept. 21, a produce farm and a dairy farm will be visited, with an examination of how each functions as an ecosystem. On Saturday, Oct. 12, a walking tour will be made through Warren Woods, in Michigan. It will provide an opportunity to become aware of skills for making family trips to natural areas more interesting and enjoyable. These two all-day trips are strenuous and not recommended for small children.

Morning Programs for Young People

Six separate program topics are to be offered for grades 4 through 6; some involve field trips near the Museum, others are workshops in the building. They include "Our Environment: Large and Small," a walking trip (Saturday, Sept 14); "Using Your Senses: An Ecology Workshop," an indoor-outdoor tour (Wednesday, Sept. 18); "The Lake and Its Inhabitants," a visit to the nearby lakeshore (Saturday, Sept. 28); "Who Lives Here?" an introduction to plant and animal life near the Museum with a take-home project for studying neighborhood environment (Sunday, Sept. 29); "Weeds," how to identify local plants (Saturday, Oct. 5); and "Naturegrams," a workshop for making photograms of plants and animals (Saturday and Sundays, Oct. 12 and 13).

SEPTEMBER at Field Museum

EXHIBITS
continuing

Contemporary African Arts Festival, the first comprehensive program of its kind in the United States, features the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as music, films, lectures, dances, and other activities. Through November 3. Hall 27.

Special September events are:

Films in Studio in exhibit area

Daily at 1:30 p.m.

Sept. 1-6:	*Malawi: Two Young Men* and *Women Up in Arms*
Sept. 7-13	*Ancient Africans* and *In Search of Myself*
Sept. 14-20.	*The Creative Person: Leopold Sedar Senghor* and *The Swamp Dwellers*
Sept. 21-27	*Gelede, Africa Dances,* and *Heartbeat of Africa*
Sept. 28-30.	*New Images, Abuja Pottery, East African Wood Carver,* and *Talking Drums*

Fridays at 7:30 p.m., the films of Ousmane Sembene

Sept. 6:	*Emitai*
Sept. 13:	*Borom Sarret* and *Tauw*
Sept. 20:	*Black Girl*
Sept. 27	*Mandabi*

Sunday, Sept. 29 at 4 p.m.:

The Nuer

Saturday, September 7

African Drum Carving by Musa
10:30 and 11:30 a.m., and 2:30 and 3:30 p.m., Stanley Field Hall

Saturday, September 21

African Drum Performance by Kwasi Badu Group of Ghana
10:30 a.m. and 2:30 p.m., Stanley Field Hall

Saturday, September 28

Kora Demonstration by Alhaji Bai Konte of Gambia
10:30 and 11:30 a.m., and 2:30 and 3:30 p.m., Stanley Field Hall

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature; "A Sense of History" presents a graphic portrayal of the Museum's past; and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

Through September 8

Edwin Janss Jr. Underwater Photography, an exhibit of exciting color prints. Hall 9

SPECIAL PROGRAMS

Ray A. Kroc Environmental Education Program resumes with a series of field trips for adults, family groups, and children. (See p. 23.)

Weaving Demonstration by members of the North Shore Weavers' Guild at 10:00 a.m. to 12:00 noon on Mondays, Wednesdays, and Fridays. Spinning will also be shown on the first and third Mondays of each month. South Lounge. Begins September 30.

The Lelooska Carvers from the State of Washington present demonstrations and dances in Stanley Field Hall as part of Field Museum's Native American Program.

September 23 through 26:

9:30 to 10:15 a.m.
Demonstration of Northwest Coast woodcarving and silversmithing

10:30 to 11:30 a.m.
Traditional Northwest Coast dances showing the use of ceremonial masks

1:00 to 5:00 p.m.
Demonstration of Northwest Coast woodcarving and silversmithing

September 27:

9:30 a.m. to 5:00 p.m.
Demonstration of Northwest Coast woodcarving and silversmithing

7:00 P.M. FRIDAY

CHILDREN'S PROGRAM

Begins September 1

Fall Journey for Children, "Fossils in the Floor," a free, self-guided activity, studies ancient animals that are preserved in the Museum's permanent structure. All boys and girls who can read and write may participate in the program. Journey sheets in English and Spanish available at entrances. Through November 30.

MEETINGS

September 6, 7:30 p.m., Chicago Astronomical Society
September 10, 7:30 p.m., Nature Camera Club of Chicago
September 11, 7:00 p.m., Chicago Ornithological Society
September 11, 7:30 p.m., Windy City Grotto, National Speleological Society
September 12, 7:00 p.m., Chicago Mountaineering Club

COMING IN OCTOBER

Ray A. Kroc Environmental Education Program field trips continue.

Ayer Illustrated Lecture Series resumes with "Expeditions Unlimited 1974-75," in Lecture Hall. (See p. 17.)

"In Beauty It Is Begun," an exhibit of the art of Native American children. Through December 1. Hall 9. Begins October 1.

MUSEUM HOURS

Open 9:00 a.m. to 9:00 p.m. Sunday, September 1; 9:00 a.m. to 6:00 p.m. Monday, September 2 (Labor Day); and 9:00 a.m. to 5:00 p.m. Saturday through Thursday and 9:00 a.m. to 9:00 p.m. Fridays during remainder of month.

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

October
1974

Field Museum of Natural History Bulletin

Field Museum of Natural History Bulletin

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October 1974

Managing Editor G. Henry Ottery
Editor David M. Walsten
Staff Writer Madge Jacobs
Production Oscar Anderson

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COVER

"Butterfly," drawing by Marcia Tuplin, 8-year-old Indian girl (Mic-Mac) of Massachusetts and other works of art by Native American children comprise the exhibit "In Beauty It Is Begun," opening at Field Museum October 1. See pp. 16-17.

Photo credits

Page 3, Carl Koford from National Audubon Society. 4, David M. Walsten. 5, William L. Finley, from National Audubon Society. 6, both photos, Sanford R. Wilbur; 7, 9, G. Henry Ottery. 15, Robert Chesness. 16, Linda Larson, 17, upper left, lower left, lower right, Linda Larson. 19, William E. Salyards.

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Future of the Condor recovery or extinction?

by Sanford R. Wilbur

THE ADULT CONDOR lay on the grassy ledge, neck bent over its shoulder, preening its back. Although it was only 4:30 on this warm March afternoon, the wind had dropped, the midday thermals had disappeared, and the soaring day was over. It was time for a rest.

But the young bird nearby wanted no part of that. Approximately ten months old and just learning to get around by itself, this youngster had no intention of going to bed at 4:30. It wandered up and down the grassy ledge, pulling at grass, picking up sticks and rocks, seemingly looking for some kind of action. Not finding any, it returned to the dozing parent's side and pecked lightly at the bare orange neck. The adult lunged halfheartedly at the youngster, and it retreated a moment, then came back and tried another little peck. Same reaction! Here apparently was the fun it had been looking for, and like a mischievous child, it returned time after time to nip at that tempting neck.

After ten minutes the adult obviously tired of its troublesome offspring's behavior. It abruptly flew off, circled once around the ledge, then landed at one of two prominently "whitewashed" pinnacles. The caked excrement showed that condors regularly used those two perches. The youngster, left alone, also took off and circled the rock. Still apparently not ready for bed, it landed at the mouth of the whitewashed cave where it had hatched ten months earlier, looked around there a bit, then flew to a grassy spot not far from the now dozing adult. In one last attempt to prolong the day, the young bird flung itself at the same small pinnacle on which the parent slept, almost knocking both from the perch. But the adult was not to be moved, so the young bird ➤

Sanford R. Wilbur is a wildlife biologist for the U. S. Fish and Wildlife Service and has made a special study of the California condor and other endangered species.

The California condor *(Gymnogyps californianus)* today nests in only a small section of southern California, although as recently as 1855 it nested in Shasta County, in northern California, and three decades earlier was common in Oregon. It has the largest wingspread of any North American land bird, one specimen measuring out to 9 feet 7 inches. The average adult weighs about 20 pounds. The turkey *(Meleagris gallopavo)* often weighs considerably more, but has a much shorter wingspread. The Andean condor *(Vultur gryphus)*, of South America, has a slightly greater wingspread (about 2 inches wider) and averages about 1 pound heavier.

California condors usually do not breed before the age of six. Ordinarily one egg is laid every two years. The average life span is about twelve years. Under normal circumstances, then, one bird may produce about three young in its lifetime. The preferred food is beef (freshly killed); sheep, ground squirrel, deer, horse, and coyote are also favored. The birds may range as far as 25 to 30 miles from the nesting site in a single day in their search for food. There is no evidence that the California condor ever attacks living mammals. The species has but one natural enemy: man.—*Ed*

hopped to the next pinnacle, tucked its head under his wing, and went to sleep.

We untucked ourselves from under the bush where we had crouched for the past four hours, and made our way back down the hill to camp. Two and one-half days of sun, poison oak, bugs, and silent watching had paid off this time.

THE young California condor that U. S. Forest Service biologist Dean Carrier and I watched that March afternoon did not realize its uniqueness. The only condor known to have hatched in 1969, it is one of only about eleven reared from 1968 through 1973. No matter how we evaluate this and other condor-related facts, it is an almost inescapable conclusion that the condors simply are not producing enough young to sustain their population. The problem is especially complicated because it isn't a matter of eggs failing to hatch, or young birds failing to reach maturity. It's entirely a case of most adult condors failing to nest.

After I had discussed this situation at a recent meeting, a waggish newsman wrote that condor reproduction had declined because the old birds have lost their interest in sex! He was being facetious, of course, but in a much oversimplified way he was partially correct. A combination of changes in condor habitat has apparently affected basic condor biology to make the birds less inclined to nest.

We don't completely understand these changes, but studies of various birds and other animals suggest that certain activities will occur only if the animals receive necessary stimulation. If such a stimulus, or "releaser," fails to function normally, expected behavior will not occur. For instance, a pair of condors not in close contact with other pairs of condors (social releasers, in this case) may not be stimulated to begin courtship. Condors with an undependable food supply might not be "released" to begin nesting. Perhaps condors short of food forage far from traditional nest sites. Their drive to mate

Egg of the California condor (third largest), shown with eggs of other bird species (smallest to largest) ruby-throated hummingbird (Arilochus colubria), *chicken, condor, ostrich* (Struthio camelus), *and* Aepyornis, *or elephant bird (plaster cast)—an extinct form*

Remarkable early photo, taken in color, by William L. Finley in 1906 or 1907. A pet of Finley's, the condor appears here in juvenile plummage, in a typical "sunning" pose

and nest may fail to be "released" because of insufficient stimulation by the characteristics of the nest site itself.

Possibly two releasers (if the concept applies to condors)—food supply and nest site—are currently malfunctioning. Food near nesting areas has been scarce in recent years, and, at least partially in response to this scarcity, some condors have been displaced into less suitable nesting habitat. Food shortage is probably also combining with a normal social dominance ("peck order") within the condor population, so that the more aggressive, established birds keep lower-order condors from utilizing the limited food supply that does exist.

We are attempting to solve the problem of food shortage in critical places by a supplemental feeding program. Each week throughout the year, we place animal carcasses (the natural food of condors) at protected sites within the normal feeding range of the nesting birds. Two or more sites are used simultaneously so the birds will not have to rely on only one location for all their food (like garbage-can bears), and so condors lower on the peck order can feed on carcasses not being used by the more dominant birds at favored sites. We hope this will lead to more nesting, more successful nests, and a reestablishment of now partially broken traditional ties with the nesting areas.

Supplemental feeding is only one of a number of protection and management measures, either in effect or being planned, to improve the status of the California condor population. A number of interested organizations including the ►

U. S. Fish and Wildlife Service, U. S. Forest Service, National Audubon Society, California Department of Fish and Game, University of California, and U. S. Bureau of Land Management, are currently preparing and implementing a comprehensive "condor recovery plan." This document outlines all actions believed necessary to return this species to a more secure status, and provides an orderly timetable and priority list for getting the necessary jobs done. Three basic groups of needs —protecting the fifty to sixty condors remaining, increasing their reproductive rate, and preserving enough living space for a secure population—are proposed or are being satisfied through an integrated program of land acquisition, land use planning, food supply enhancement, conservation education, restrictive regulations, law enforcement, and continued basic research into the needs of the species. All the organizations listed above, plus other interested individuals and groups, are actively involved in implementing these actions.

Can we save the condors? At this point, we honestly don't know. We appear to have made great strides in slowing the decline of the species, but right now I believe the condor population is at its lowest and most critical point. The success or failure of our "recovery plan" may be evident within as short a time as five to ten years. It is vital that we get the entire plan operational in the shortest time possible. Equally important is the need to continue to look for other ways to protect and preserve the condor. Even as we implement our current plan, we are attempting to formulate emergency action to be taken should the population continue its decline. The job is far from finished.

Next morning Dean and I were both crouched under our bush at 7:30, just in time to see the first signs of stirring at the condor roost. A 10 o'clock, after

two and one-half hours of waking up by our subjects, condor style— preening, sunning, moving from perch to perch—we saw adult and immature drift out of sight to the north. The young bird flew erratically compared to the parent bird, but it was well on its way to independence. Only if it survived the next five or more years, however, would it begin to share in perpetuating its species because the birds require at least five years to reach maturity. We know it will take much special effort by many people if this bird and the rest of the condors are to make it through. □

In addition to their creek study near St. Charles, Ill., Field Museum Lecturer Jim Bland's students sampled the fish fauna of a small lake. Seining are Julie Yamaguchi (left) and Anita Bellik, taxonomist and volunteer instructor.

OUTREACH: The Long Reach

by G. Henry Ottery

NEAR SUBURBAN St. Charles this past summer, five hardy teenagers—insect repellent on exposed skin, old sneakers on their feet, and voices chorusing "Old MacDonald Had a Fish Farm"—spent several days plodding through and beside a three-mile-long creek. Vials were plunged into the water, then glistened in the sun as analytical eyes peered at their contents; fish swished past, defying the students' seining nets; silt on the creek bottom, churned by human feet, formed dark clouds that flowed lazily yet menacingly downstream.

What chemicals and living organisms were in the water? What accounted for the unexpected presence of northern pike? What were the sources of the pollution? What changes had taken place during the twenty years since a Field Museum scientist last studied the stream?

At their on-site field station and in Field Museum labs and specimen storage areas, the students are answering those and many other questions, under the guidance of Museum staff. They will make their answers available for publication and to the community along with specific recommendations for the preservation of the creek and its wildlife. Their findings may also be fed into a data bank in Toronto, Canada, and be made ►

available to area scientists. Thus, one of the program's unique characteristics is that it has scientific interest and utility.

The program is remarkable in other ways, too. It is not often that students are able to study fish in creeks; and the study is a rare documentation of changes in fish fauna for the Chicago area. It will also provide communities with the information they need to improve their natural water systems. It is a program that a natural history museum, with its unique combination of technical equipment and staff is eminently qualified to sponsor.

For the participants, the study provides a solid introduction into the manner in which Field Museum scientists conduct research and interpret the results for publication; it also gives the students a working knowledge of Illinois fish fauna and the important basics of ecology. This year's pilot program may be expanded next year to include thirty students with the emphasis on urban streams.

This unusual Museum activity, under the leadership of Museum Lecturer James Bland, is one of the varied Community Outreach programs that have excited and stimulated members of the Department of Education since Outreach's inception about two years ago.

"Naturally we're excited," declares Dr. Alice Carnes, chairperson of the department. "It's new, and it has contemporary relevance. Community Outreach takes the Museum's vast resources to communities outside the Museum, where they often have their most profound effect.

"For many years, museums have been serving their communities by sending small exhibit cases to schools, sometimes with descriptive materials," Dr. Carnes continues. "This was—and still is—an important and useful service. In fact, Field Museum's Harris Extension currently distributes such materials to 440 Chicago area schools, libraries, and community organizations. However, museums are now discovering that they can serve the community in other ways. In addition to their collections, museums are making available their staff and expertise, and are sending these out to schools and organizations."

Consequently, Bland may be wading in a creek with high school students one day, and be examining garbage with sixth-graders in their classroom the next. By comparing refuse from their contemporary environments with the kind of refuse discovered at the sites of Stone Age man, the students are actively involved in a meaningful demonstration of how modern man places enormously greater demands on his environment and natural resources. Next, Bland might be watching students turn red-faced as they test their lung capacities to learn the effects of various pollutants on physiological functions.

While Bland's students are happily involved in environmental pursuits, those of Museum Lecturer J. L. Williams who dances under her professional name, Djalal—are discovering the traditions and cultures of their African ancestors. Anansi the spider, an arrogant African folk tale character, figures prominently in one of Ms. Williams' workshops for city children. As she reads the story, the children—their arms, legs, and facial muscles used to exaggerated effect—mime the actions of the characters. And with the opportunity to wear authentic African hats, rooster feathers, sheepskins, and colorful woven fabrics, the students need little encouragement to join in. Following this, they learn games and songs from three Nigerian tribes (in the Ibo, Yoruba, and Hausa languages), followed by a dance popular in urban Africa today, the "high-life." Students in one school were so inspired by Ms. Williams' workshop that they presented an African festival for the entire school and community. Thus, her activities combine tradition with today in a meaningful learning experience.

One Museum division can claim to have had its own Community Outreach program for more than sixty years. David Pressler, program manager of The N. W. Harris Public School Extension, points out that his division's familiar glass-enclosed cases, that exhibit a wide variety of natural history materials, were first created in 1912. This collection, of some 1,200 portable units, has been circulated continuously, free of charge, throughout the Chicago school community. The program is currently operating at full capacity, with approximately 4,000 deliveries annually.

But The Harris Extension, too, is caught up in the new spirit of Community Outreach. Pressler has designed and developed a new program that takes Museum artifacts and specimens directly into the classroom as part of a contemporary exhibit package. Called "Field-Pac," the new educational exhibit-kit is especially created to promote participation by encouraging children to touch and explore objects and make first-hand discoveries. Each exhibit-kit contains real specimens or artifacts that can be handled as well as arranged to create a classroom or library exhibit. There are also large, colorful photo panels designed to set the stage for discovering new things by visually changing the classroom environment. In addition, Field-Pacs contain: audio-visual materials that provide further descriptions or explanations of the exhibit materials; background information for the kits' use that teachers can utilize to customize programs to their pupils' own needs, abilities, and desires; plus suggestions for activities and projects that will make

Tom Shakespeare, an Arapahoe historian from the Wind River Reservation in Wyoming, examines an Arapahoe tribal artifact, collected by Field Museum anthropologists more than fifty years ago. Members of the Wind River Reservation's Shoshone and Arapahoe tribes studied Museum collections this past summer. They will use photos of the artifacts and copies of early anthropologists' field notes in preparing tribal history books and curriculum materials for the tribes' school programs. This project is another way in which John White, Field Museum's Native American Program coordinator, encourages the use of Museum artifacts in education programs of Native American communities.

each Field-Pac a source of personal discovery and expression for every pupil.

The Field-Pac project is part of an ongoing program of research and development within The Harris Extension. In order to learn how these new materials are utilized in the community and how they can be further refined, comprehensive field testing is being carried out under Pressler's direction. Currently being field-tested is the Field-Pac entitled "Selected African Textile Design." Others in the series on African arts deal with jewelry, leatherwork, and calabashes. Now being developed are Field-Pacs on environmental studies, the microscopic world, and fossils. Under consideration are Field-Pacs for explaining the use of color in nature, masks from various cultures around the world, and what takes place behind the scenes at Field Museum.

Although Dr. Carnes admits to being most excited about those Outreach programs designed to be fully realized beyond the Museum's walls, her enthusiasm for those that wholly or partly take place within the Museum is fired by a recognition that they are important, effective, and in some ways unique.

In an office adjacent to Dr. Carnes, for example, Barbara Reque, Museum resource consultant, develops "resource sheets" for teachers, community group leaders, and parents—including special materials for parents of preschool children. These materials are designed to increase the value of a Museum visit by encouraging people to begin their learning experiences before they come to the Museum, and to continue them afterwards. To accomplish this, the resource sheets—some of which are translated into Spanish—suggest activities and projects to be done both at home and at the Museum. They zero in on specific topics, with titles such as "The Insect Hunt," "The Seasons," and "Visiting People of Other Places, Other Times."

With the materials for a program which Mrs. Reque has titled "Animal Insides and Outsides," children, directed by a parent or group leader, would look at pictures of skeletons, then feel their own bones and draw pictures of their own skeletons, before coming to the Museum. They would be shown the Museum's skeleton exhibits and encouraged to visualize and draw entire animals on the basis of their skeletons.

The children compare and draw features such as legs, observing different locations of the knee, ankle, and heel; and they make a comparative study of teeth, to determine whether an animal was a meat- or plant-eater. Suggested after-visit activities include making charts or books with their drawings and making skeleton models.

Slide programs for adults show how preschoolers can learn at the Museum; and how children visiting the current "Contemporary African Arts" exhibit can produce similar art in their classrooms. Another program presents an exercise in how to look at Museum exhibits.

Mrs. Reque's office is also the source of printed instructions on various African crafts such as tie dyeing, and on how children can set up mini-museums in their homes with items they make or collect. They might choose to make "A Museum About Myself."

A new program being offered this fall coordinates learning experiences for persons who plan to visit both the ➤

Lincoln Park Zoo and the Museum. Like another program already offered in cooperation with nearby Shedd Aquarium, it enables visitors to benefit from studying certain features in living animals, then taking a closer look at these same structures in preserved, nonmoving specimens. Mrs. Reque is also engaged in the development of these programs.

In addition to some Outreach programs already noted, there is another that utilizes the Museum's collections. In less than one year, 231 craft workshops, directed by Crafts Instructor Phillip Cotton, have been presented to 4,158 urban children and senior citizens and 462 group leaders. Participants in the workshops, which consist of two two-hour sessions, study the designs in Museum artifacts, and learn about the origins of the designs and the cultures that created them. They then create their own designs in pottery, weaving, tie dye, or batik. Cotton's workshops are still another means by which the Museum reaches out to ensure that its resources are made available to greater numbers of people.

Community Outreach also includes a program that has benefited both the Museum and the community for many years. The volunteer program has provided not only much-needed assistance for virtually every Museum department, but it has also given many persons, including senior citizens, an opportunity to engage in productive activity and be of service to the Chicago community. These volunteers contribute their time as instructors, clerks, typists, cataloguers, and research assistants. They may be preparing insects for the study collection; or leading a group tour; or typing a scientific report; or selling souvenirs in the shop; or photographing and cataloguing artifacts. Under the direction of Carolyn Blackmon, coordinator of special educational services, dozens of community and social agencies are contacted in an effort to obtain this vital assistance, with the gratifying result that approximately 190 persons are currently participating in the volunteer program.

Through the efforts of John K. White, part Cherokee and the Museum's coordinator of Native American programs, cultural materials from the Museum's collection are being reintroduced to the contemporary scene with presentations in Chicago's Northside Indian community. He is attempting to integrate and perpetuate the traditions revealed in these artifacts with today's Native American traditions.

But much of White's energies and thoughts these days are focused on a site about sixty miles northwest of Chicago. There, he sees an Eastern Woodland Indian village of reed mat- or bark-covered wigwams and longhouses, and a ceremonial building. Nearby, Native Americans are tending squash, corn, and bean crops under a gentle sun, thinking ahead to the Green Corn Dance they will perform when the community corn crop reaches the "roasting ear" stage. White hears the shouting and laughter of others engaged in the sports of stickball and shinny. At the log trading post, he sees visitors buying craftwork made in the village.

A scene from America's history? Yes, although this particular village never existed, and may never except in White's mind. The Museum is still seeking funds for his ambitious three-year project called "Native American Culture of the Eastern Woodlands." Native Americans would participate in an integrated program of seminars, workshops, field trips, and other activities, and construct the village. They would live in the village, too, much as their ancestors did, becoming proficient in crafts, performing rites and ceremonies, and tending the communal garden. Through this project, numerous educational materials would be produced for schools, organizations, and the media.

If realized, this experience for Native Americans would be the most ambitious Community Outreach program to date. But only financial aid can turn dreams and good intentions into reality. Funding for the various Outreach programs so far has come from sources such as the National Endowment for the Arts, the Ray A. Kroc Environmental Fund, the Illinois Arts Council, the N. W. Harris Public School Extension fund, the Wieboldt Foundation, the Woods Charitable Fund, Inc., the Albert Kunstadter Family Foundation, and the W. Clement and Jessie V. Stone Foundation. Government grants usually have been matched with money from the Museum's operating fund. But, as of September 1, funds were still being sought to continue the African and crafts workshop this fall. The Native American program, too, is threatened with termination unless funds become available.

"It is unrealistic to be confident that these sources alone will provide all the support needed for our continuing and hoped-for Outreach projects," Dr. Carnes says. "We do realize that this support is considerately and generously provided; but at the same time we feel the need, we have the ambition, and we have the tools for making a much greater impact on the community for which this Museum exists. We could not have progressed as far as we have with Outreach had it not been for our current supporters, and this continuing support is crucial to the program. But if Outreach is to grow significantly, new channels of support must be found and opened."

Nonetheless, the Museum's ambitious Community Outreach program is already a long reach toward providing the services a contemporary community has come to expect from the institutions it supports, which in turn are dedicated to their ultimate benefit. □

The main ring of National Accelerator Laboratory encloses 664 acres, which one day may become the largest reconstructed prairie in the United States.

Rebirth of a Prairie

by Joyce Marshall Brukoff

THE prairie is coming back to a land that has seen the full cycle of human encroachment upon a virgin environment.

A 664-acre parcel of land owned by the federal government—a part of the Fermi National Accelerator Laboratory, or "FermiLab," near Batavia—is on its way to becoming the largest reconstructed prairie in the United States. Long ago, the area, 35 miles west of Chicago's Loop, played host to Indian and settler, followed in turn by suburbanite and corporate developer. Now, in a rare and wise gesture, FermiLab administrators have decided to restore the land to the way it was before the coming of the pioneers, and to reestablish a midwestern prairie.

It won't be easy. The first step is the establishment of a ten-acre seed nursery at the laboratory. From this facility, lab personnel and volunteers hope to bring forth, in the middle of the giant, circular accelerator, the second largest prairie in the state. (The largest is Goose Lake Prairie.) The nursery will help to provide the seeds to start the prairie. The nursery plants, themselves, will be grown from seeds gathered from the Morton Arboretum, from existing prairies in the Chicago area, and from along railroad tracks where prairie plants can still often be found.

All this requires a great deal of time and effort. Among the dedicated workers instrumental in development of the FermiLab prairie are Ray Schulenberg, curator of the herbarium at Morton Arboretum, and Robert Betz, a biology professor at Northeastern Illinois University (and associate curator at Field Museum), now on a sabbatical leave to study prairies. The two serve on an advisory committee to FermiLab, along with Cindy Stein and John Taggart of the Illinois Chapter of the Nature Conservancy. FermiLab personnel and volunteers provide the necessary labor for collecting, processing, and planting the tens of thousands of seedlings.

Seeds are being collected from within a 75-mile radius of the Laboratory. All of the plants, then, will be native to the ►

Joyce Marshall Brukoff, a frequent contributor to the Bulletin, *is an Evanston writer with a special interest in environmental problems.*

Robert Betz (rt.), a botanist who has been instrumental in the development of FermiLab Prairie, works with volunteers as they transplant prairie flowers. Here, shooting stars are being removed from a prairie remnant in nearby Calumet City prior to relocation to FermiLab.

area. In 1975, it is hoped that several acres will be seeded from the nursery. Each year thereafter, additional land will be seeded, until the entire circular area has been planted. Within the prairie will be a core of white oak woods—a haven for animals, plants, and even insects indigenous to the region.

The land within the accelerator's perimeter is partly rich topsoil and partly "raw" subsoil exposed by construction work on the accelerator rim. Although the remnants of virgin prairies in Illinois are usually on good soil, they occur for the most part on steep hillsides, along railroads, in pioneer cemeteries, or other locations not suitable for cultivation or for building construction. Betz believes that a large prairie on "first class" land will be important to scientists of the future, enabling them to conduct specialized ecological studies and to gauge man's impact on the environment.

It is hoped that the FermiLab prairie will support a variety of flowering plant species, including for example members of the Compositae family (asters, sunflowers, goldenrod, coneflower, and blazing star), and the Graminae (grasses) and Leguminosae (pea) families. Weedy plants, as a rule, do not occur on virgin prairies, and it is hoped that once established, the tight root systems of prairie plants will prevent weeds from growing. With few exceptions, prairie plants are relatively long-lived perennials. The prairie will also be large enough to support various bird and animal species, such as prairie grouse, upland plover, and Franklin's ground squirrel—all of which require extensive open areas.

The word "prairie," which derives from the French for "meadow," was first applied in the 1600s by French explorers who came upon the large grasslands west of Lake Michigan. Some of the place names given by those early travelers, such as southwestern Wisconsin's Prairie du Chien ("Dog Meadow") and Prairie du Sac ("The Sauk Tribe's Meadow"), have continued to this day. The French term evolved earlier from the Latin *Pratum*, which referred to treeless, grassy tracts common in oak-pine forests near the Mediterranean.

The meadows as seen by those early French travelers are now almost gone. Few pristine grasslands exist, and those only in remnants. The midwestern prairie—also known as the tall-grass, eastern, or "true" prairie—is only one of several types. Other North American prairie types include the mixed-grass prairie of the high plains, the palouse prairie of the Pacific Northwest, the valley grassland of California, the coastal prairie of Texas, and the arid southwestern prairie known as desert plains grassland. Generally, the North American prairie has been described by Betz as a "natural North American grassland, composed of native perennial grasses and other herbaceous plants, in which the grasses contribute much of the vegetative cover."

After the Indians had roamed the

prairieland of the Middle West for thousands of years, with little or no effect on the native vegetation, the arrival of White settlers presaged its doom. Crops replaced primeval vegetation. In some areas, plowing with a wheel-mounted plow pulled by as many as eight to ten oxen "broke" the prairie. Other prairies were "grazed out" and trampled by large numbers of confined cattle. Towns developed, then cities, and finally the sprawling metropolis; in most areas native prairie became only a memory.

The destruction of the grassland was rapid, especially after Illinois inventor John Deere introduced his steel plow in the late 1830s. As early as 1909, Henry Allen Gleason, a botanist and environmentalist, remarked, "Unfortunately for the ecologist, the prairies of Illinois were converted into cornfields long before the development of ecology and phytogeography in America, thus forever prohibiting satisfactory investigation." Obviously, the condition of our native grassland has not improved since then.

Grasses such as big blue stem, northern drop seed, and Indian grass have been replaced by plants carried in deliberately or accidentally from Europe and Asia. Such annual weeds readily adapt themselves to earth that has been overturned. Public awareness, until recently, has been reduced to a level where unsightly front yards and urban lots overgrown by this "immigrant" vegetation are carelessly called prairies.

But for those who have seen and who know the beauty of a prairie as it swells through the season in two high periods of magnificent bloom, the restoration of a large grassland has a special aesthetic value. In the early spring, flowering plants are usually no more than several inches high, but by late summer, those in flower may stand five or six feet tall.

From the diminutive yellow star-grass (*Hypoxis hirsuta*), a spring bloomer only a few inches high, to the six-foot-high spikes of prairie dock (*Silphium terebinthinaceum*) that burst forth late in the season, the prairie continues to be an unforgettable sight.

Groups and individuals have already attempted, with varying success, the restoration of prairies—albeit on a small scale. In the 1930s, James Curtis of the University of Wisconsin used a hundred-acre tract of mostly bluegrass (commonly grown today in lawns) to determine if a weedy tract could be restored to a prairie-like condition. For a number of years, the tract was alternately burned and seeded, eventually the native vegetation began to dominate, and Curtis's experiment demonstrated that it was indeed possible to recreate a prairie. Morton Arboretum's Ray Schulenberg began a similar study in 1962 on fifteen acres of old farmland. Ten years after he began his experiment he had produced a ten-acre tract of high quality grassland. More recently, David Blenz—the late director of Camp Sagawau, a preserve in the Cook County forest preserve system—restored several acres to high quality prairie by means of a seeding machine.

Of course, none of these attempts yielded a virgin Illinois grassland, nor will the FermiLab project achieve that goal within the immediate future. As John Taggart observes, "For a truly native grassland to be formed, hundreds of years would be necessary for the components (plants, animals, soil, etc.) to arrange themselves naturally within the created environment." Yet, the FermiLab restoration will be a sizeable link with Illinois' past.

Justification for saving a prairie seems ample in a civilization which imbeds itself in artificiality. As a rare wild place in a world of manmade contrivance and complexity, it is something to be visited, studied, and cherished. □

Transplanting the tiny plants to their new FermiLab home is back-breaking work. Each year, several additional acres will be seeded or planted

Lake Superior Lampreys Continue Decline

Long the scourge of commercial fishing in the Great Lakes, the sea lamprey, *Petromyzon marinus*, is far less common in Lake Superior today than thirteen years ago when controlled population study was initiated. A record low catch of 1,911 adult lampreys for early April through mid-July 1974, compares with nearly 51,000 trapped during the same period in 1961. Catches for each year since then have averaged 7,200. The lampreys—which parasitize lake trout and other large species—are trapped at barriers near the mouths of streams, which they enter for the purpose of spawning.

The sea lamprey is originally a marine fish, but in historic times the species wandered into Lake Ontario, where it easily adapted to the freshwater habitat. It was first observed in Lake Erie in 1921. In 1934 it was found in Lake St. Clair, in 1936 in Lake Michigan, in 1937 in Lake Huron (although presumably it had entered Huron before Michigan). In 1945 the first lamprey was caught in Lake Superior and by the following year it was known to occur in all parts of all the Great Lakes.

The lamprey feeds on host fishes by attaching to them by means of an oral sucking disc, within the disc are sharp teeth. Saliva dissolves the tissues, which are then absorbed by the lamprey. Even if a victimized fish survives the attack, it remains permanently scarred and unfit for market.

In 1946, after Lake Huron's lake trout population had been severely reduced by the parasite, the Michigan Conservation Commission ordered a thorough investigation. TFM, a chemical that selectively kills lamprey larvae was first tried in Lake Superior's tributary streams in 1958; within three years the adult lamprey population in that lake was reduced 80 percent. By that time lake trout had virtually disappeared from Lakes Michigan and Huron, and in Lake Superior had been reduced by 90 percent. Whitefish, deepwater ciscoes, and walleyes were also severely affected by the lamprey. (In more recent years, the overabundance of alewives is largely attributable to the drop in populations of lake trout and other species that prey on alewives.)

Although lamprey control and heavy plantings of hatchery-reared stock have restored lake trout abundance to pre-lamprey levels in a few areas of Lake Superior, the trout are just now showing faint signs of becoming self-sustaining. Naturally produced trout in Lake Superior now make up 5 to 6 percent of the catch. Additional reasons for optimism exist with the recent evidence of lake trout spawning in Lake Michigan.

Total eradication of the lamprey from the Great Lakes by present methods is unlikely, since lampreys—notorious for their ability to adapt to unfavorable conditions—are able to maintain their life cycle in bays and inlets.

While lamprey populations have been greatly reduced, the remaining ones are getting bigger, reports Bernard Smith, director of the lamprey eradication program centered in Marquette, Mich. "They're larger than anything we've ever seen before, even when they first came into the lakes in the 1930s and 40s," said Smith.

"Trash" Fish for Cheap Protein

As trout, whitefish, and walleyes are struggling for a comeback against the lamprey, researchers have found that underutilized fish, such as suckers, burbot, and alewives can be made acceptable for consumers. The latter three species are not popular because they often have a muddy or fishy taste. Suckers and burbot are also considered "ugly," and suckers simply have too many bones to suit the average palate.

But food scientists at the University of Wisconsin have discovered that these unpopular species are rated as "very acceptable" by consumers when canned, smoked, or pickled, or when processed into frozen fillets or fish sticks.

Wisconsin researchers R. C. Lindsay, D. Stuiber, and V. L. Carlson found that smoked and pickled suckers were rated as "quite acceptable," and suckers with the bones removed were popular when minced and smoked or as fish sticks. Burbot was acceptable as frozen fillets, fish sticks, and poached chunks. Smoked alewives are comparable to sardines, the researchers found.

The availability of these species, however, is seasonal. Burbot and suckers can generally be harvested only during spring spawning. Burbot are common only locally, as in the Green Bay area. Alewives, which are abundant, are not ordinarily caught in the winter time. Natural stocks of burbot and suckers are greater in Canadian lakes than in the Great Lakes.

Currently alewives are used only for oil and in meal for animals. Suckers are sometimes marketed as "fresh water mullet."

Aldrin Suspended by EPA

The manufacture of the pesticide aldrin or its metabolite dieldrin was suspended on August 2 by the Environmental Protection Agency (EPA). On the basis of tests with laboratory animals, EPA Administrator Russel E. Train has determined that "the present estimated average human dietary intake of dieldrin subjects the human population to an extremely high cancer risk."

As a result of the suspension, production of some 10 million pounds of aldrin—scheduled for sale in 1975—has been halted. The chemical has been used principally against corn pests.

The aldrin ban is the first such action against a pesticide upon an "imminent hazard" determination and without complete hearings of petitions to permanently ban the chemical. "To await the twenty to thirty years of exposure to dieldrin necessary to determine the ultimate effect is only to wait until the damage to an entire generation of humans is complete," remarked Train. "We reject the 'body count' approach to protection against cancer or other long-term threats to public health."

. . . but asbestos dumpings continue into Lake Superior

Meanwhile a known carcinogen—asbestos—continues to be dumped into Lake Superior, thus contaminating the water supplies of some 200,000 area residents. The pollutant is present in residues from the processing of taconite—a low-grade iron ore that is being processed at Silver Bay, Minnesota, on Lake Superior's north shore. Reserve Mining Company is owner of the plant. The effects of oral ingestion of asbestos fibers has not been demonstrated, although it is known that the fibers have the ability to pass through the walls of the gastrointestinal tract.

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Left, coyotes have little fear in attacking the seemingly invulnerable porcupine, one of their chief prey. Quills are commonly found in the stomach lining of coyotes, but infection seldom occurs.

Persecuted Coyotes Continue to Thrive

Although the coyote has been "persecuted more than any other animal in the United States," according to a wildlife biologist, "they are now probably more widespread than at settlement time." Bob Chesness, area game manager for the Minnesota Department of Natural Resources, describes the coyote as "the most adaptable predator in the nation."

In Minnesota, the coyote's range is reversed from that in the early 1900s. While their numbers decreased in southern Minnesota prairies, they expanded into the northern woods after fires and logging operations opened up new areas for them.

In recent years between 750 and 1,000 coyotes are trapped annually in Minnesota. Until 1965 an average of some 1,400 were taken annually. In that year a coyote bounty was discontinued. Chesness's studies refute claims that coyotes have an effect on overall deer mortailty. Although 48 percent of the 925 coyote stomachs examined by Chesness contained evidence of deer, most of the flesh had been consumed as carrion. The other animals most commonly eaten by coyotes were mice, porcupine, livestock, and hare. Less than 5 percent of the coyote stomachs contained sheep or poultry, reported Chesness.

Noise as Shark Repellent

Sharks can be repelled by certain low-pitched sounds, reports a University of Miami marine biologist. A. A. Myrberg, Jr., of the University's Rosenstiel School of Marine and Atmospheric Science, has found that sounds similar to a cow's "moo" will repel sharks; but, he adds, the sounds can also attract them.

At a distance of 15 miles offshore, researchers played tape recordings of various low-freqency sounds for the silky shark, which is abundant off the Florida coast. Certain sound combinations repelled the sharks, while other combinations attracted them. The reasons for these reactions are still unknown, says Myrberg, and he adds that it may be years before sound can be used as a reliable shark repellent. The whir of helicopter blades, he noted, might serve as a shark attractant and thus complicate rescue operations at sea.

Whale "Suicides" Due to Parasites?

The mass "suicide" of whales—by stranding themselves in shallow coastal waters—has long puzzled zoologists. A plausible explanation for the phenomenon has now been put forward by James G. Mead of the National Museum of Natural History. Parasitic damage to the whales' inner ears, Mead reports, interferes with their echolocation systems; they may thus wander onto beaches or into shallow tidal basins where they are trapped when the tide goes out.

Masses of roundworm parasites (*Nasitrema* and *Stenurus* species) were found by Mead in the sinuses and ear cavities of sixty pilot whales that had beached themselves on the Carolina coast. Mead suggests that the parasites infest fish and squid that are eaten by the whales. The worms then cluster in the inner ears of the new host.

Wolf Transplant Project Threatened

The wolf "transplant" to the woods of Michigan's Upper Peninsula, reported in the July/August *Bulletin* (p. 15), has suffered two serious setbacks recently. The two male wolves, of the four animals transferred to Michigan from Minnesota last winter, are both dead. The first male was struck and killed by an automobile, the second was shot. The body of the latter was discovered near Sagola, in Iron County, where it was presumably taken after being killed. A $1,000 reward for information leading to conviction of the wolf's killer has been offered by Dr. Harry Frank, of Flint, Mich.

Meanwhile, William Robinson, coordinator of the wolf transplant project, is awaiting shipment of another male from Minnesota. At last report the two females that were flown to Michigan in March were still roaming the forest, but in separate areas.

Erratum

"The Timber Wolf on Trial," which appeared in the July/August *Bulletin*, contained (p. 13) the statement ". . . data collected as recently as June, 1973, by Mech and Frenzel . . . shows an estimate of 9.9 to 10.9 wolves per square mile." This should have been transposed to read ". . . one wolf per 9.9 to 10.9 square miles." Our thanks to Museum Member F. B. Hubachek for pointing this out.—*Ed*

"in beauty it is begun..."

Horses

They were the fastest animal
That roamed on the prairies
They roamed as free as the
Wind in numbers like flowers
All over the prairies with colorful
Coat and shiny hair blowing
High on the hills, but where
Have all the prairies with horses gone?

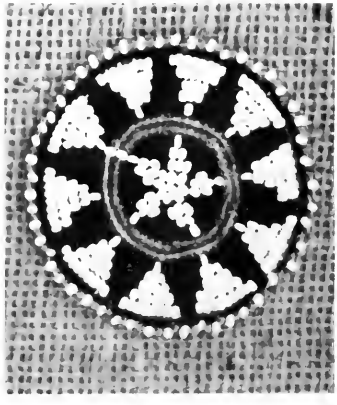
—This poem by thirteen-year-old Joseph Romero, a Navajo boy from Taos, New Mexico, is among a collection of poems, paintings, and other art works by Native American children that will be on view at Field Museum beginning October 1. The exhibit, entitled "In Beauty It Is Begun," is the largest of its kind ever produced. Media include drawings, paintings, prints, examples of beadwork, and poetry. Among the groups represented are Iroquois, Cherokee, Ojibwa, Winnebago, Mic-Mac, Arapaho, Navaho, Hopi, Pueblo, and Eskimo. The works range from a delightful stick-drawing self portrait, "Me," by a five-year-old Seminole girl to "Bird of Prey," a remarkably sophisticated representation of a hawk by a fifteen-year-old Seneca boy.

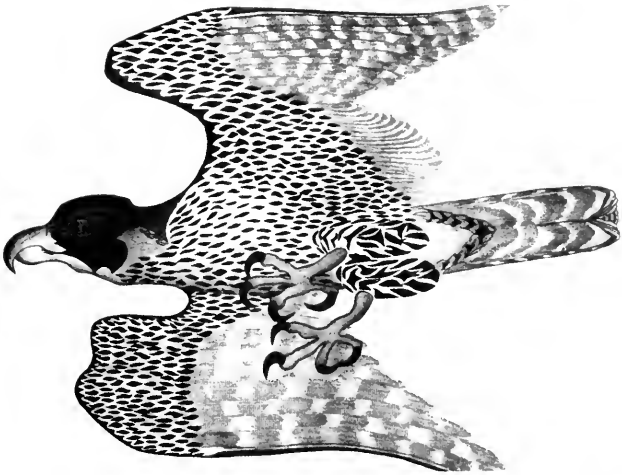
The title of the show, "In Beauty It Is Begun," is taken from traditional Navajo poems and prayers and evokes the Navajo belief in the need for man to live the correct way, in balance and harmony with Nature. It also suggests the particular freshness and clarity of the young Native Americans' expressions which form this collection.

The traveling exhibit was organized by Native North American Artists in cooperation with the Metropolitan Museum of Art, is being circulated by the Smithsonian Institution Traveling Exhibition Service, and has been funded by Xerox Corporation. Native North American Artists was formed in 1970 to promote American Indian art, and its primary activity has been to bring together Native American artists and their works for exhibitions and workshops.

"In Beauty It Is Begun" is on view in Hall 9, October 1 through December 1.

Above "White Cloud Kachina," by Dominic Arquero, age 15, Cochiti, New Mexico; left "Eagle Dancer," by Lambert Pino, age 15, Laguna, New Mexico; below right "Beadwork Rosette," by Wanda Bekis, age 13, Navajo, Colorado. Page 17, top left "Flowers," by Shelly, Eskimo, Alaska (Alaska State Museum Collection); Lower left "Girl," by Roger, Eskimo, Alaska (Alaska State Museum Collection); lower right "The Bird," by Joseph P. Romero, age 14, Taos, New Mexico, top right "Bird of Prey," by Don Conklin, age 15, Seneca, New York





field briefs

Mummy of Harwa, overseer of the storehouses of a wealthy estate, 22nd dynasty (9th-8th century, B.C.) Cat. No. 31839

The Case of the Screaming Mummy

Gerda Frank's article on "Pharaoh" Hatshepsut, which appeared in the September, 1974, *Bulletin*, brought to mind the following incident related by Henry Field, a Field Museum curator in physical anthropology from 1926 to 1941:

"Those who work in museums have strange experiences. One wintry night the guard making the rounds was startled by a blood curdling scream in the Egyptian Hall in the basement. He switched on the lights in the hall and blew his whistle for help. The guards came rushing downstairs. No one was in the hall.

"They walked about flashing their lights into the sarcophagi. In one deep case, about 125 feet long, a line of mummies is chronologically arranged. A single door gives access. It is always locked; it was locked on this night. To prevent moths or other pests from destroying the mummies, this case is airtight and always kept poisoned.

"One of the guards peered into this case. He shouted, "Look here, this mummy is off its base." One of the naked withered bodies had fallen from its base and was lying face down on the linoleum inside the poisoned case. I studied it carefully the next morning. The base extended at least four inches on each side of the dried skin and bones. No living person could have entered the poisoned case. No vibration in the building could have knocked it off the base without rending the walls, for the museum floats on an island of concrete, there being no hardpan on the filled-in land along the lake front.

"There is still no explanation of the scream or of the fallen mummy. It is just one more example of things we cannot explain."

—*The Track of Man*, by Henry Field, Doubleday & Co., © 1953, p. 233.

Stanley Field (1875-1964)

October 28 will mark the tenth anniversary of the death of Stanley Field (1875-1964), who served as president of Field Museum for more than 56 years. As its chief administrator during that extraordinary length of time, he is recognized as the most important single individual in the institution's development.

Stanley Field

Born in England, Stanley Field came to Chicago in 1893 to work at Marshall Field & Company, of which his uncle was founder and president. Although he remained associated with the company for the rest of his life, Field resigned as vice president of the store in 1918 to allow himself more time for the Museum. Having been made a Museum trustee in 1906, he was elected president two years later. It was during his tenure that the Museum, a small and relatively unknown institution when he began its guidance, grew to maturity and worldwide distinction. His monetary gifts to the Museum exceeded $2 million, but he gave of himself in even greater measure.

The largest responsibility Field assumed for the Museum was the construction of the present building, which was opened to the public in 1921. When his uncle's original bequest of $4 million proved to be far short of the amount required, Stanley Field personally assumed the responsibility of securing the additional funds required. Later, when he saw an outstanding need at the Museum for which funds were not available, he often authorized the expenditure and paid the cost out of his own "pocket."

Today, more than half a century later, the Museum is again faced with the need for enlarged, improved facilities; and it is toward this end that the Museum's $25 million Capital Campaign is directed. So it is a good time to reflect on how one man gave of himself toward the Museum's betterment. Stanley Field's gifts to the Museum, as well as his wisdom and guiding influence, will be felt as long as the institution endures.

Museum Members Urged to Help Bring Capital Campaign to Successful End

The Museum's $25 Million Capital Campaign is "heading home" — in more ways than one.

It was announced recently that the Museum has raised $11.3 million of its $12.5 million share (to be matched with $12.5 million from the Chicago Park District, through its bonding authority). Thus, with $1.2 million yet to be raised by the Museum before the year's end, the three-year drive is in the home stretch.

Of the funds already obtained, almost half has been raised by members of the Corporate and Foundation Division of the campaign, headed by Museum President Blaine J. Yarrington, and the balance by members of the Individuals Division, co-chaired by Marshall Field and William Mitchell.

But that last million dollars is the hardest. Thus, the Capital Campaign is directing its efforts inward — home to the Museum and its Members. The effort to contact Members and explain the Museum's needs has been intensified. During the past month, the campaign's general chairman, Nicholas Galitzine, has brought the Capital Campaign needs to the attention of all Museum Members. Each Member has received a proposal and a request for his personal support.

Members of the Women's Board, too, are participating in this final stage of the campaign. At several note-writing sessions — at the Museum and at the homes of Mrs. Thomas E. Donnelley II and Mrs. William A Brown Jr. — they have penned personal notes to their friends on the Museum's Membership roster, urging them to help in bringing the campaign to a successful conclusion.

Women's Board members who wrote notes to Museum Members are: Mrs. Bowen Blair, Mrs. William J. Bowe, Mrs. Arthur S. Bowes, Mrs. William A. Brown, Jr., Mrs. Robert Wells Carton, Mrs. Herschel H. Cudd, Mrs. Elliott Donnelley, Mrs. Thomas E. Donnelley II, Mrs. R. Winfield Ellis, Mrs. Gaylord A. Freeman, Mrs. Robert C. Gunness, Mrs. Harold F. Grumhaus, Mrs. Burton W. Hales, Mrs. Corwith Hamill, Mrs. Chapin Litten, Mrs. Frank D. Mayer, Mrs. Henry W. Meers, Mrs. John T. Moss.

Also: Mrs. Charles F. Nadler, Mrs. Patrick L. O'Malley, Mrs. Charles S. Potter, Mrs. Howard C. Reeder, Mrs. Frederick Roe, Dr. Muriel S. Savage, Mrs. Leo H. Schoenhofen, Jr., Mrs. Arthur W. Schultz, Mrs. William L. Searle, Mrs. John R. Siragusa, Mrs. Edward Byron Smith, Mrs. Hermon Dunlap Smith, Mrs. Gardner H. Stern, Mrs. Joseph L. Strauss, Jr., Mrs. Edward F. Swift, and Mrs. Henry P. Wheeler.

"We are hoping to convey to every Museum Member that all gifts, from the smallest to the largest, are important for continuing and expanding the Museum's research and services, which improvements to the building will make possible," said Galitzine. "I just wish I could personally talk to each Member to tell him of the importance of his contribution to this effort."

Among Women's Board members who wrote personal notes were [from left] Mrs. Leo H. Schoenhofen, Jr., Mrs. Robert C. Gunness, Mrs. Harold F. Grumhaus, and Mrs. Wallace D. Mackenzie.

OCTOBER at Field Museum

EXHIBITS

Opens October 1

In Beauty It Is Begun, a display of more than 150 drawings, paintings, beadwork, and poetry by Native American children. (See p. 16.) Through Dec. 1. Hall 9.

Continuing

Contemporary African Arts Festival, the first comprehensive program of its kind in the United States, features the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as films and a shop. Through Nov. 3. Hall 27.

Films in Studio in exhibit area

Daily at 1:30 p.m.

Oct. 1-4	*New Images, Abuja Pottery, East African Wood Carver,* and *Talking Drums*
Oct. 5	*The Hadza* and *Bitter Melons*
Oct. 6	*The Tuareg, Nawi,* and *Masai Warrior*
Oct. 7	*The Dry Season* and *African Village: Guinea*
Oct. 8	*Malawi: Two Young Men* and *Women Up in Arms*
Oct. 9	*Ancient Africans* and *In Search of Myself*
Oct. 10	*The Creative Person: Leopold Sedar Senghor* and *The Swamp Dwellers*
Oct. 11	*Gelede, Africa Dances,* and *Heartbeat of Africa*
Oct. 12	*New Images, Abuja Pottery, East African Wood Carver,* and *Talking Drums*

Friday, Oct. 4, 7:30 p.m., Ousmane Sembene's film, *Emitai*

SPECIAL PROGRAMS

Ayer Adult Illustrated Lecture Series resumes with "Expeditions Unlimited 1974-75" at 7:30 p.m. Fridays and 2:30 p.m. Saturdays in Lecture Hall. Seating limited to 225 persons. For reservations call Field Museum, 922-9410, Ext. 230.

Oct. 18 and 19
"Contemporary African Artists," by Maude Wahlman

Oct. 25 and 26
"In Search of Sea Serpents," by Harold Voris

Ray A. Kroc Environmental Education Program

Advance registration is required for participation in the current series, "Natural and Managed Environments." A $4 per person fee (non-refundable) covers lunch and transportation for adult and family trips. Children's workshops are $2 per person. For further information call Carolyn Blackmon at Field Museum, 922-9410, Ext. 361 or 363.

Programs for Young People (Ages 9 through 11)

Oct. 5	"Weeds?," workshop and walking tour.
Oct. 12	"Naturegrams," workshop devoted to making photograms.
Oct. 13	"Naturegrams," repeat.

Weaving Demonstration by members of the North Shore Weavers' Guild from 10:00 a.m. to 12 noon on Mondays, Wednesdays, and Fridays. Spinning is also shown on the first and third Mondays of each month. South Lounge.

CHILDREN'S PROGRAM

Continuing

Fall Journey for Children, "Fossils in the Floor," a free, self-guided tour, routes youngsters to museum areas for a fascinating study of ancient animals. All boys and girls who can read and write may participate in the program. Journey sheets in English and Spanish available at entrances. Through Nov. 30.

MEETINGS

Oct. 4, 7:30 p.m.,	Chicago Astronomical Society
Oct. 8, 7:30 p.m.,	Nature Camera Club of Chicago
Oct. 9, 7:00 p.m.,	Chicago Ornithological Society
Oct. 9, 7:30 p.m.,	Windy City Grotto, National Speleological Society
Oct. 10, 7:00 p.m.,	Chicago Mountaineering Club

COMING IN NOVEMBER

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Nov. 1 and 2:
"Endangered Cloud Forests of Costa Rica," by William Burger

Nov. 8 and 9
"A Native American Looks at Anthropology," by John White

Nov. 15 and 16
"Lost Cities of Indonesia," by Bennet Bronson

Nov. 22 and 23
"To Inca Land and Beyond for Birds," by Emmet Blake

MUSEUM HOURS

Open 9:00 a.m. to 5:00 p.m. Saturday through Thursday, and 9:00 a.m. to 9:00 p.m. Fridays.

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

November
1974

Field Museum of Natural History Bulletin

Field Museum of Natural History Bulletin

Volume 45, Number 10
November 1974

Managing Editor G. Henry Ottery
Editor David M. Walsten
Staff Writer Madge Jacobs
Production Oscar Anderson

CONTENTS

COVER

Flowers of *Bomarea* in a pendant umbel. These climbing plants, which are members of the amaryllis family, commonly occur in the cool cloud forests of mountainous regions in Central and South America. They usually grow at forest edges in low shrubbery and in second growth. Photo by William Burger, associate curator of botany and president of the Nature Camera Club of Chicago. On November 1 and 2 Dr. Burger will deliver an illustrated lecture on the endangered cloud forests of Costa Rica, as part of the Ayer Illustrated Lecture Series. For details, see "November at Field Museum," back cover.

Art and photo credits

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COYOTE!

by Cleveland Amory

My favorite animal? I'll take the coyote. Pronounce him "ki-oat" or "ki-o-tee," either is correct, and he won't care. But mark him well, and do not allow the mystery and marvel of him to be lost in familiarity.

All right, he *is* familiar. He has been located in virtually every state in the Union and he even appears regularly, usually along with the Late Late Show, in Los Angeles' backyard.

He is famous the world over as perhaps the most "American" of all wild animals—indeed, he sometimes seems the very symbol of the American West—but, like so many other animals nowadays, he needs your help and he needs it now.

Highly photogenic, with an eerie, never-to-be-forgotten howl—one with which he sings to the sun, to the moon and in heartbreaking relays to his own kind—he is the little brother of the wolf, yet a close cousin of the dog. If, on the one hand, he is incredibly quick, sharp-witted, cunning and resourceful—no other animal has all *three* senses, sight, smell and hearing as keen as his—on the other, he is loyal, playful, humorous and even philosophical. ➤

Cleveland Amory is chief critic for TV Guide *and "Curmudgeon at Large" for* Saturday Review/World. *He is the author of* The Proper Bostonians, The Last Resorts, *and* Who Killed Society? *In 1967 he founded The Fund For Animals, an anticruelty society, of which he is the president.*

Basically monogamous, coyotes mate, if not for life, for long periods. And, if two unmated males are fighting for the same unmated female, after it is all over she is likely to choose, not the one who won, but the one who lost.

When the pups come, they are taught to hunt, at the age of two months, not by the mother but by the father. And discipline is severe. It is not unusual, for instance, to see a father coyote returning to his den and his pups rushing out to meet him, but, no matter how far away the father is, at a certain invisible line—obviously the greatest distance they are permitted to go from the den—the pups will stop short.

"Next to God," goes the Mexican saying, "the coyote is the smartest person on earth." Even if this is exaggerated—the coyote is, after all, far too smart to be, by human standards, "brave"—the fact remains that he is, if not the most intelligent of all animals, certainly the cleverest. He would have to be

Man has made his very name suspect. The second definition for the word "coyote" in the new American Heritage Dictionary is, . . . "contemptible sneak." For two hundred years, the coyote has faced a steadily increasing campaign to eradicate him from the face of the earth. Many animals have faced such campaigns, but against no other animal save possibly the coyote's big brother, the wolf, has the campaign reached such heights of insane cruelty and brutality. Some time ago, for example, in Liberty, Kansas, one T.G. Castleberry caught 553 coyotes in 59 days—then draped every carcass on his barn, literally covering its entire front.

In the old days, the coyote was hunted for his pelt. Then, when pelts dropped in price, he was hunted because he was supposed to be a cattle killer. Then, when it was proven he wasn't a cattle killer—he lives almost exclusively on mice, moles, rabbits, insects and snakes, and even eats fruit for dessert—he was hunted because he was supposed to be a sheep killer. Finally, when it was proven he wasn't a sheep killer, he was hunted because he was a lamb killer. And when even that was found to be enormously exaggerated, he was hunted because he was supposed to kill what man wanted to hunt. Not hunt to eat, of course, but for "sport" hunting. The coyote is classed, simply, as a "varmint."

As such, there is no season on him—for on him it is always open season. Virtually alone among all animals too, for him there are literally no rules of even basic decency, let alone fair play. He is hunted by land, he is hunted by air and, if he ventured on the sea, he would undoubtedly be hunted here. Again, virtually alone among animals, he has learned that the air can be dangerous, and when he even hears a plane, let alone sees one, he takes cover and, like a trained guerrilla fighter, camouflages himself.

The coyote is regularly jack-hunted, by light, by night—something forbidden by law for most animals. Not, however, in the case of the coyote. "Most hunters," says one hunting magazine about the "sport," "clamp a powerful light directly to their guns and keep it on at all times." In the winter, snowmobiles hunt the coyote down, with the hunters signaling to each other by walkie-talkies. In the summer trained hunting dogs run him down in relays. Often, indeed, the coyote is chased by dogs riding in automobiles—then, when he begins to tire, the automobiles stop and the dogs are released.

It has been said that the coyote will eat anything that doesn't eat him first. As we

have seen, this is not true. But courage he has, and far more than that with which he has been credited. Curiosity is his Achilles heel, wariness his secret weapon. Stories of coyotes outwitting hunters are legion. Coyotes will work in teams, alternately resting and running to escape dogs set upon them. They have even been known to jump on automobiles and flat cars to escape dogs. And they have also successfully resisted bombing. Lewis Nordyke reports that, once when a favorite coyote haunt in Texas became a practice range for bombing, the coyotes left—temporarily. Soon they were back to investigate, and finding that the bombing at least kept people out, decided to stay, meanwhile learning the bombing schedule and avoiding the bombs as well as possible.

Some coyotes have gotten along with their lower jaws shot off. Joe Van Wormer reports that an agent in Idaho captured a coyote whose mouth had been cruelly wired shut. It was able to open it only half an inch, but nonetheless had been able to survive. A coyote in Montana also had her jaw wired shut—she was used by a hunter to "train" his dogs. And a female coyote killed in Tule Lake in northern California was found to have four healthy pups in her den. She had managed to fend for them although she herself had been shot in both eyes with a shotgun and was totally blind . . . .

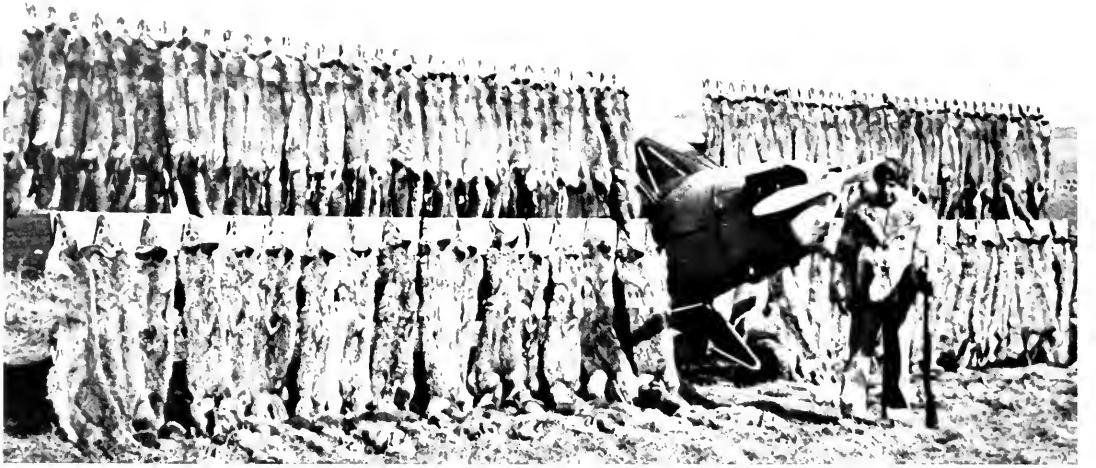
When the coyote is not hunted, he is trapped. For the coyote, there are especially horrible traps—to match his ingenuity. So-called "passion" bait is soaked in a piece of wool and put under a pan. When the coyote investigates, the slightest pressure releases the deadly steel leghold.

Once the coyote is caught, he will often gnaw off his leg rather than remain in the trap. Literally thousands of coyotes have existed for life on three legs. But there are thousands more, too, amazingly, two-legged coyotes. One female coyote in Michigan had only stubs for front legs—she ran like a kangaroo—and yet, when killed, was bearing five unborn pups. A coyote in Colorado existed for more than a year missing two feet—the left front and right hind. In New Mexico a coyote got along, somehow, with both feet missing from his right side, and still managed to raise a family. . . .

I have on my desk something called a "Humane Coyote-Getter," which is advertised as the "Marvel of the 20th Century." Humane? It is literally a trap gun. A bait is soaked in urine and covered with a jacket, then placed over a bullet cartridge, the whole being set in the ground. When the coyote investigates, the bullet is set off by a spring and shoots the coyote in the mouth with sodium cyanide. This in turn, on contact with the coyote's mouth, or eyes, or wherever it hits him, releases gas, and the coyote gasses himself to death. Or perhaps just blinds himself.

This Coyote-Getter is, by coyote-getting standards, actually humane—at least compared to the more general way of killing coyotes. That is, plainly and simply, by poisoning them. Texas alone, for example, put out in one recent year 300,000 strychnine tables—tablets which are slipped into an inch square of sheep suet. The death from strychnine is slow and cruel—and the people who put it down admit that at least 70 percent of the baits are picked up by "other animals"—but it goes on.

Even strychnine, horrible as it is, is as nothing compared to the dread Compound 1080, or sodium ►



The advent of the airplane proved a real boon to the coyote killers. The hunter above displays 132 coyotes and foxes, killed with a shotgun as they ran ahead of his plane. In their helicopter, the hunters at left fly over fleeing coyotes and dangle a rope. Instinctively, the coyotes bite the rope, then continue to hang on as they are lifted from the ground. At about 100 feet they are dropped to their death.

monofluoroacetate. This is a poison so lethal that there is no known antidote. It is chain reacting—thus, when a meadow mouse eats it and is in turn eaten by a larger animal who is in turn eaten by a coyote who is in turn eaten by a mountain lion—well, 1080 will have poisoned them all.

Perhaps the most horrible thing about Compound 1080 is that it is administered in small doses. Not because it is expensive—unfortunately it is not; it is cheap. But it is administered in small doses so that the coyote will get as far away from the bait as possible before he dies, and thus not be able to warn, by his body lying there, other possible victims. Coyotes have been known to travel as far as twenty miles to die—in incredible agony. . .

The coyote has had its defenders. Montana State Senator Arnold Rieder early came to the aid of what he called "this gallant little animal." "We wonder," he asked, "if this creature of nature was not meant to have a fairer life. By a twenty-five-to-one ratio, the coyote's deeds have been beneficial to man." So did Oklahoma's Senator Gil Graham, who spent a lifetime among Indians and animals. "I consider the coyote," he said, "the most unjustly accused of all animals." Paul Maxwell, another coyote friend, not only aided orphaned and wounded coyote pups in his own house but also quoted his friend Jimmy Siebert. "I ranched sheep for fifty years," Siebert told him, "and I never had a single sheep killed by a coyote." Then too there was Texas rancher Arthur Lytton, who for forty years ran a twenty-thousand-acre spread. "I would never," he said, "allow a predator to be killed on my land. They are necessary for the balance of nature. Kill them and you're in for nothing but trouble—from rabbits and rodents and everything."

But the vast majority of the sheepmen turned deaf ears to such voices. Their fury against the coyote knew neither bounds nor even sanity. Frank Dobie told the story of a sheepman who liked to saw the lower jaw of a trapped coyote and then turn him loose for his dogs to tear to pieces. Stories of skinning coyotes alive are common; coyotes have also been scalped alive. In Washington State not long ago a case was reported to Raymond Davis in the Defenders of Wildlife office of some men who had trapped a coyote and then burned it alive. In the same state, Les Boyd, a Whitman County farmer, finding a dead coyote nailed to a fence post, posted a sign to the same fence. "Attention," he wrote, "This semi-tame coyote, who was eradicating mice from the fields, is the victim of a thoughtless act by man—which is supposedly a reasoning animal."

Farmer Boyd was not joking. Research by wildlife management student Peter Black at the University of Idaho indicated clearly that mice, not sheep, was the coyote's favorite food. Black's coyote autopsies turned up as many as twenty-seven mice in one coyote, and his findings revealed that of the stomach contents of coyotes examined mice constitute 90 percent. . . .

On December 15, 1971, under the chairmanship of Senator Gale McGee of Wyoming, a hearing was held on the subject of this poisoning. I was merely one of a dozen or more witnesses against it, but, testifying for both The Fund for Animals and the Defenders of Wildlife, as well as for the World Federation for the Protection of Animals, I achieved at least one distinction. "Gentlemen," I began, "on the question before us . . ." Senator McGee stopped me. "I think," he said, "you could be accused of undue influence on the chairman of this committee." At this the sheepmen in the rows behind stirred comfortably. They were certain that I would be brought up short. I did not know what was coming. "Last night," continued Senator McGee, "my daughter attempted to shake me down for fifty cents for a button for your organization. Furthermore, I paid."

At this the sheepmen became very quiet again. I thanked him and continued. "On this question," I proceeded, "there is a man who has, literally, written the book. I would like your permission to place into testimony and put in the record his entire book."

My request was granted. It was a book entitled *Slaughter the Animals, Poison the Earth*, and it was written by a man named Jack Olsen, well-known author and senior editor of *Sports Illustrated*. Mr. Olsen is a rugged six-foot-twoer who at that time lived on a mountain top in Colorado, from whence he could survey vast stretches of land—land on which, as his book described in an utterly unforgettable way, the United States Government was engaged in a poison program of such dimensions that even to read about it and not do anything to help stop it seemed a criminal offense. I finally corralled Mr. Olsen by telephone and asked him to come first to New York and then to Washington. "Listen, bud," he told me, "there's only one way I'll come to New York, and that's handcuffed to a Federal marshal. Since I discovered fresh air, I don't even like talking to New York on the telephone. It's contaminating.

"When you live at nine thousand feet, you don't get many animals," Mr. Olsen told me. "But some nights we get as many as eleven coyotes that come around. I put out Purina dog chow for them and they really turn out for it. Racoons come too. They love Purina. People should know that if they live in wild places, even where there aren't many animals, if they'd put out maybe five bucks worth of food a month, they'd get plenty of animals. And, particularly for the coyotes, it would help them in their tough periods—those starving times.

"There's one thing about coyotes, though. They're so smart. If you try to get out to see them, even if you click the front door, they're gone. Once they even went when I clicked my camera from *inside* the house." Mr. Olsen paused. He was obviously thinking about his coyotes. "Yes," he said slowly, "smart. I guess that's why they're surviving."

(*continued on p 15*)

Third of Four Wolf Transplants Killed in Upper Michigan

The attempt to restock Michigan's Upper Peninsula with a self-sustaining wolf population is close to failure. Of the two male and two female wolves flown to Michigan from northern Minnesota last winter, only one female survives. The first male was struck and killed by an automobile. The second male was presumably caught in a trap then shot. The female was caught in a snagline trap intended for coyotes, then shot. The trapper stated that he had killed the wolf out of self-defense. Under federal regulations self-defense is the only legal justification for killing a wolf. The transplant project is funded by the Huron Mountain Wildlife Foundation, the National Audubon Society, and Northern Michigan University.

In Minnesota, an endangered species act went into effect on August 1, following which three wolves were taken in areas where wolf predation on livestock was allegedly a problem. The state endangered species act allowed the taking of wolves only for the "prevention of injury to persons or property." On September 6, however, the state law was superseded by the Federal Endangered Species Act.

Steel Shotgun Ammo Being Field-Tested

Tens of thousands of ducks and geese die each year from lead poisoning, caused by the ingestion of spent shotgun pellets. The most practical solution yet suggested for this problem is the substitution of steel for lead in the composition of the shotgun pellets.

This fall the new ammunition is being field-tested in twenty-four national wildlife refuges located in each of the four migratory waterfowl flyways (Atlantic, Mississippi, central and Pacific). Smaller-scale tests were held in some refuges in 1972 and 1973.

In 1972 the number of birds bagged by each hunter using steel shot was very close to the number expected if lead had been used. Downed but unretrieved birds occurred with about the same frequency as expected for lead shot. There were indications that more shots were fired for each bird bagged with steel loads than would have been the case with lead.

In 1973 the effectiveness of lead and steel shot for ducks was again nearly identical. Too few geese were included in the samples to show significant differences between lead and steel shot. The results, however, suggest that lead was more effective as 124 geese were dropped per 1,000 shots fired with steel and 163 geese per 1,000 shots of lead.

Public hearings on steel shotgun ammunition will be held in St. Louis on November 4 in the county library auditorium, and in Denver on November 6 in the Denver Post Office auditorium. Hearings are also to be held in Washington, D.C. and in San Francisco.

Manatees and Dugongs Faring Poorly, Despite Protection

Manatees and dugongs, large and odd-looking marine mammals of the Atlantic, Indian, and Pacific Oceans and several major continental rivers, are not faring as well as they should in many areas. Poaching, accidental netting during large-scale fishing operations, and law enforcement difficulties all contribute to their plight.

Of the three species of manatees, the Florida manatee population seems to be least troubled. A 1972-73 aerial survey of Florida's coasts and rivers found the population numbering between 800 and 1,300—a figure that has remained stable for several years with some local increases. No figures on the other species are available, but historically manatees were seen in tens of thousands of areas where they are rarely seen today.

The dugong, native to the coastal waters of the Indian and Pacific Oceans, seems faced with near extinction. Although once abundant enough to support a large commercial dugong fishery, its numbers have declined drastically in recent years. Stable populations exist only near the coast of northern Australia. The dugong has been completely extirpated in separate coastal areas of western India and is now rarely seen in the Red Sea and nearby gulfs.

There are three subspecies of manatees—the African, Amazonian, and Florida. All are subtropical, plant-eating mammals, whose range includes the coastal waters and rivers of Africa, North America, and South America. Appearances vary, but in general manatees are spindle-shaped, heavy-bodied creatures sometimes weighing nearly half a ton. They have blunt heads with prominent, whiskered noses and flippered forelimbs. Instead of hind limbs they have a flat, rounded tail.

The sluggish manatee is a night browser of aquatic plants. Although not yet proven, it is believed that manatees must return to fresh water to drink. Except for the relationship between mother and offspring, manatees do not have strong bonding instincts. Males travel in groups during the female's breeding season, but following this season the groups disperse and the mammals lead a solitary existence.

Dugongs resemble manatees, but have a broadly notched tail. They are found only in the tropical and subtropical coastal waters of the Indian and Pacific Oceans, on the east coast of Africa and along the northern coast of Australia. Unlike the manatee, dugongs occasionally travel in groups with as many as six members. In centuries past, they moved about in large herds of several hundred animals.

For decades, hunters pursued manatees during night hunts, using harpoons and guns. Manatees were killed primarily for their meat, but also for their hides, which were used to make crude shields and, in later years, machine belts and water hoses. Currently, manatees have legal protection worldwide, consequently, hunting has declined.

Dugongs were hunted throughout their range also. Their meat is similar to veal or pork and "keeps" for a long time. Dugongs have also provided oil similar to cod liver oil and leather hide especially suitable for sandals. Today, hunting pressures have been greatly reduced, in part due to the dugong's decline and also because it is protected by law in most of its currently inhabited areas.

Both manatees and dugongs are plagued by boats, particularly those with large keels and propellers which inflict mortal wounds to thousands each year. To date the only positive action taken to prevent such accidents is the regulation of boat speeds in Florida in a manatee wintering area. A high death rate is also attributed to accidental nettings which cause the air-breathing mammals to drown. The use of herbicides to control weeds in congested waterways, as well as accidental industrial pollution, not only deplete the food supply but can be directly responsible for many of these marine mammal deaths.

Although manatees and dugongs are protected by law in some areas only regulated hunting is allowed in others, poaching is still a major problem and their meat continues to show up in foreign markets.

Publication cost of this section on Our Environment has been underwritten, in part, by the Ray A. Kroc Environmental Education Fund.

The use of manatees for weed control has been suggested as a possible solution for plant-infested waters. The domestication of manatees for meat also has been suggested, but reduced populations and a low reproductive rate make this prospect unlikely.

California Pelicans Staging Comeback

California's only colony of brown pelicans (*Pelecanus occidentalis*), which appeared to be in serious trouble as recently as 1970, is apparently responding to efforts in its behalf. The Wildlife Management Institute reports that 305 brown pelicans were hatched at the colony in 1973, compared to 1 in 1970. The colony's nesting sites are located on West Anacapa Island, Santa Cruz Island, and other nearby islands generally south and southeast of Santa Barbara.

The nesting success is attributed to recent action by the National Park Service, closing West Anacapa to public access during mating season, diminished ocean pollution by DDT may also be a factor. The insecticide affects nesting success by reducing eggshell thickness.

200,000 Porpoises Killed Annually by Tuna Fishermen

Regulations that will determine the fate of more than 200,000 porpoises killed each year by tuna fishermen are currently being considered by the National Marine Fisheries Service (NMFS).

Since the 1960s, fishermen operating in the eastern Pacific have caught yellowfin tuna by fishing "on porpoise." This technique was developed because the tuna swim with schools of porpoises, mainly the spotted porpoise (*Stenella graffmani*) and the spinner porpoise (*S. longirostris*). Fishermen in motorboats herd hundreds of porpoises into a tight, circling school, then set a purse-seine net on the school, trapping porpoises and tuna alike. As the net is drawn together, the porpoises panic, tangle in the net, and drown. It is estimated that between 200,000 and 400,000 porpoises died this way annually from 1970 to 1972.

Despite the use of nets with "safety panels" for the porpoise and a method for allowing them to escape over the nets, approximately 200,000 of the animals were killed in 1973. Bad weather conditions, poorly set nets, poorly trained operators, and old equipment have been blamed for the high casualty rate.

The Marine Mammal Protection Act of 1972, which imposed a moratorium on the killing, capture, and harassment of marine mammals, granted a two-year exemption to commercial fishermen who catch porpoises "accidentally" during their fishing operations.

Lake Erie Fish Catch on the Increase

The commercial fish catch from Lake Erie was a rather impressive one in 1973, considering the lake has been variously described as "dead" or "dying." The total commercial fish catch from the lake in that year was 48 million pounds; 40 million pounds were netted by Canadian fishermen, about 8.3 million pounds by Americans. The total catch compared to a 1972 harvest of about 39 million pounds—an increase of more than 20 percent.

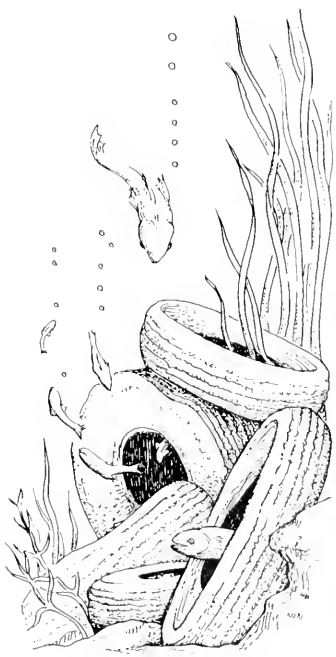
Yellow perch and smelt are the predominant species caught by Erie's north shore fishermen—35 million pounds, collectively, in 1973. The commercial catch of white bass, largely by U.S. commercial fishermen, was 2.4 million pounds. That amount was double the catch of any previous year for this species. The western section of Lake Erie, including Sandusky Bay, supplied 6.1 million pounds (74 percent) of the total U.S. landings in 1973, reflecting the relatively high productivity of this small area of the lake.

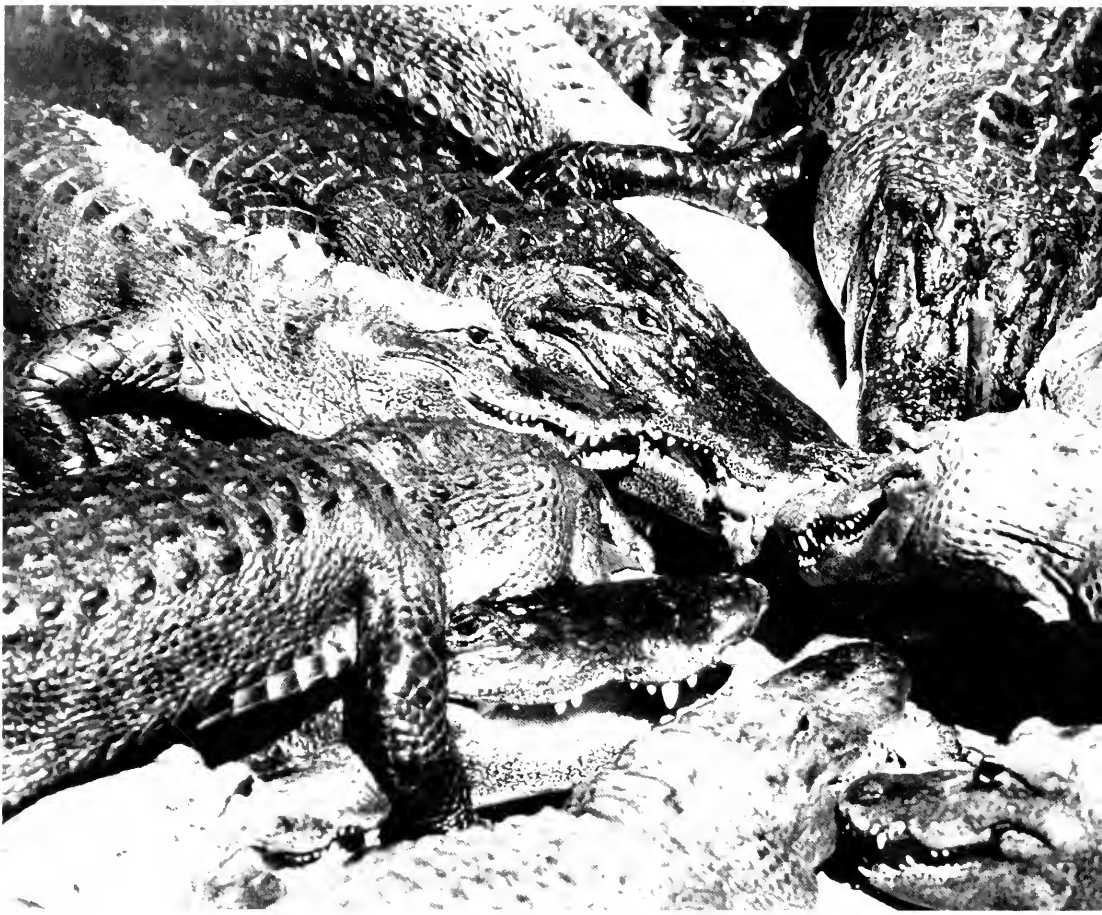
Be Kind to a Fish Today: Give Him an Old Tire

Old tires make good fish reefs, especially in a salt water environment, report T.B. Stone, C.C. Buchanan, and F.W. Steinle, Jr., of the National Marine Fisheries Serivce. Scrap tires are cheap, abundant, easily-handled, nontoxic, last more or less indefinitely in seawater, and provide excellent substrate for rapid development of lush growths of attachment organisms. Auto tire reefs have also been shown experimentally to cause, by the latter means, net increases in biological production (carbon fixation) in sea water. Because of their relatively inert chemical nature, and of their properties as suitable substrate for attachment organisms that lead to rapid encrustment and early camouflage by nature, scrap tires have a high degree of ecological compatibility with the ocean environment.

Stone, Buchanan, and Steinle estimate that nearly a billion old tires could be used to build artificial reefs in waters off the east coast of the United States to attract fish. This is predicated partly on the fact that more than 200 million tires are discarded each year in this country, posing a waste disposal problem for most communities. Use of large numbers of scrap tires to build reefs appears to offer at least a partial or temporary solution to the problem while benefiting fisheries resouces.

While the economics of reef construction will vary among localities, the costs of reef construction appear to compare favorably with disposal fees being charged at landfills for tires (0.25-$1.00 per tire). Until more efficient methods are proven for the recovery of energy or materials for tires, artificial reef construction now appears to be a viable method of tire disposal. It seems likely, however, that scrap tires will in a few years become too valuable for chemical reclamation or as fuel to be used in reef construction.





The Great Gator Transplant

The storied exploits of "Bring-Em-Back-Alive" Frank Buck seem not nearly so spectacular when compared to a recent gator-catching spree on the Louisiana coast. On several nights in mid-July, 500 thrashing American alligators (*Alligator mississipiensis*), ranging from two to ten feet long, were captured by wildlife and conservation specialists of the National Audubon Society. They were then trucked to Mississippi and southern Arkansas for subsequent release. The purpose of the project was to restock areas where the natural population of this endangered species had declined or vanished. Areas to be restocked include public and private lands in six Arkansas counties and twenty-three Mississippi counties.

In addition to Louisiana, Mississippi, and Arkansas, the American alligator occurs today in eastern Texas, southeastern

by David M. Walsten

Oklahoma, Alabama, Georgia, North and South Carolina, Florida, and possibly Virginia. A 1970 alligator census showed a population of about 50,000 alligators in six southeastern states. The alligator's close relative, the American crocodile (*Crocodylus acutus*) occurs just in Florida, where only about 300 are believed to survive. Curiously, the International Trade Commission places the American alligator in a more endangered category than the American crocodile.

Marsh Island Refuge, in Cameron Parish, and Rockefeller Refuge, in Iberia Parish, were the sites of the capture operations, directed by W. Carlyle Blakeney, Jr., Audubon s southeastern regional representative (Atlanta). In addition to Audubon personnel, Louisiana, Arkansas, and Mississippi state wildlife agents also assisted in the project.

The alligators were caught from boats by means of pole snares and with bare hands. Their snouts were then banded with strong rubber bands and the animals tagged, marked, and placed in moist burlap sacks to prevent dehydration during the long trip north.

About 200 of the captured alligators averaged 4½ to 5½ feet long. About 300 averaged about 3 feet in length. The sex ratio was approximately 1 : 1. Despite the great care taken by the captors to safeguard the alligators, three of the 500 animals died from injuries; nevertheless, this was an extremely low mortality, considering the hazards of the operation. Equally remarkable was the absence of injuries among the men who caught the reptiles: one man suffered a slightly bitten thumb.

Previous alligator transplant operations included a joint three-year program of the U.S. Fish and Wildlife Service and the Georgia Game and Fish Commission. □

Violators Arrested in Illegal Shipment of Alligator Hides

One of the biggest arrests ever made in the illegal shipment of American alligator hides occurred on September 17 at the Adams Tanning Corp., in Newark, N.J. Six persons were arrested and more than 500 hides seized by special agents of the U.S. Fish and Wildlife Service. On August 18, a similar operation in New Orleans resulted in criminal charges being filed against three men and the seizure of about 260 alligator hides.

The American alligator is protected by the Endangered Species Act of 1973, which prohibits the interstate transportation or sale of endangered animals. The Lacey Act also prohibits the interstate transportation of illegally taken wildlife. Violation of the Endangered Species Act carries a maximum penalty of one year in jail and a $20,000 fine for each violation. The hides seized in the Newark case had been transported to New Jersey from New Orleans. The skins averaged five feet long and were estimated by the government agents to be worth more than $45,000.

The shipment seized in New Orleans was valued at more than $15,000. Agents also seized a 40-foot refrigerated tractor-trailor which had been used to carry the hides from North Carolina. The two principles in the New Orleans case were charged with a total of 18 counts each for violations of the Endangered Species Act and the Lacey Act. Both men are liable for a $300,000 fine and 18 years in prison.

Arms and Armor of the Gilbert Islands

by Christopher Legge

As you turn a certain corner in Hall F of Field Museum's ground floor, you may suddenly find yourself eyeball-to-eyeball with a six-foot Micronesian warrior. He grips a shark-tooth dagger that is long enough to skewer your liver, and his resolute gaze would frost the heart of the most intrepid Museum guard. But, rest assured, he stands immobile, forever imprisoned in a glass case. As if further reassurance were needed, this stalwart warrior, dressed in the curious battle garments of the Gilbert Islands, is made of wax.

The Gilbert archipelago, consisting of sixteen coral atolls, straddles the equator just west of the International Date Line in the Pacific. It has been aptly described by H.E. Maude, a Pacific historian, as "the very citadel-heart of the South Seas, the least known, least visited, and least exploited of all the major groups of the Pacific." Other observers have often described the natural beauty and tranquil appearance of these islands. One is therefore surprised to learn that in the Museum's Gilbertese ethnological collections, weapons and pieces of armor greatly outnumber those used in peaceful pursuits.

The Gilbert archipelago is named after Thomas Gilbert, a British sea captain who sailed through the group from Australia to Canton, China, in 1788. Little attention was paid to them, however, until World War II, when they suddenly assumed a strategic importance. The islands were seized by the Japanese in 1941 and two years later they came under control of Allied forces. The first detailed observation of Gilbertese arms and armor was by Charles Wilkes who, in 1841, visited the islands as commander of an official "United States Exploring Expedition"—a

Christopher Legge recently retired from the position of custodian of collections, anthropology.

four-year venture that took its members around the world:

> The arms and legs of a large proportion of the natives exhibited numerous scars, many of which were still unhealed. These had been made with shark's-teeth swords. . .weapons which are calculated rather to make severe gashes than dangerous wounds. The spears are equally formidable, and four rows of shark's teeth are inserted in them; some are of the uncommon length of twenty feet, but they are usually about eight or ten feet long, and have prongs projecting from their sides also armed with teeth. . . In order to guard against the destructive effect of these arms, they had invented a kind of armour, which was almost an effectual defence against their weapons, and accounted at once for their arms and legs being the only parts where scars were seen. This consisted of a sort of cuirass, covering the body as far down as the hips, and rising above the back of the head three or four inches. This, when taken off and set upon the deck, somewhat resembled a high-backed chair. It was made of plaited cocoa-nut-husk fibres, woven into as solid and compact a mass as if it had been made of board half an inch thick, and was as stiff as a coat of mail. For the legs and arms, they have also a covering of netted sennit of the same material, which they put on. That for the legs resembles a pair of overhauls, such as sailmakers use, with straps over the shoulders. The covering for the arms is drawn on in like manner. The appearance of the body was as if it were clothed in pantaloons and jackets of a deep brown colour. This they must find a very inconvenient covering for their hot climate. However singular the body-dress is, that of the head is still more so: it consists of the skin of the procupine-fish, cut open at the head, and stretched sufficiently large to admit the head of a man. It is perfectly round, with the tail sticking upwards, and the two fins acting as a covering and guard for the ears; its colour is perfectly white, and by its toughness and spines affords protection against the native weapons.

Robert Louis Stevenson, who spent several months in 1889 in the Gilbert Islands, wrote: "In the last decade many changes have crept in. . .and, fire-arms being introduced, the spear and the shark-tooth sword are sold for curiousities."

The costumery of Field Museum's Gilbertese warrior has a number of remarkable features. The extension of the cuirass, which forms a protective shield for the back of the neck and head, is unique. Apparently, the main purpose of this extension was to protect the wearer against misdirected chunks of coral thrown by the women who attempted to pelt the enemy as they stood behind their men. Although this explanation may seem far-fetched, it is the one offered by the Gilbertese themselves.

Another noteworthy feature of the cuirass is that it is decorated with human hair woven into horizontal rows of black diamonds, which are, in fact, stylized dolphins.

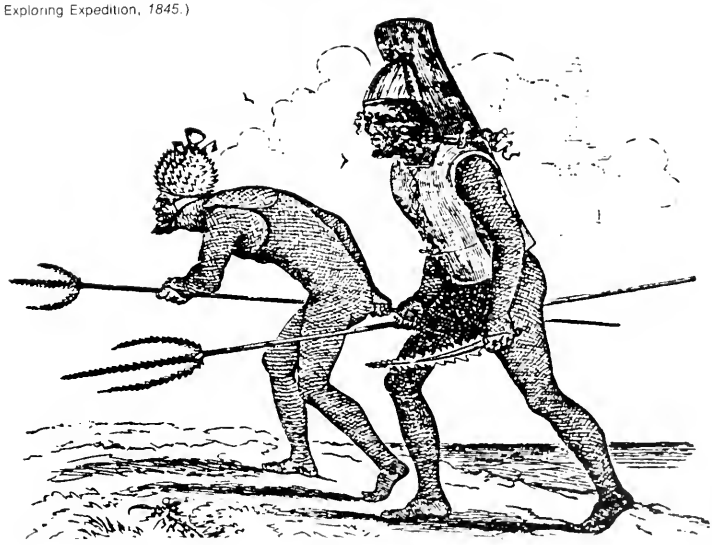
In place of the porcupine fish head covering described by Commander Wilkes, Field Museum's warrior displays a skull cap of plaited coir twine vaguely reminiscent of an early aviator's helmet. Tufts of human hair are woven into the top and in front of the ear guards.

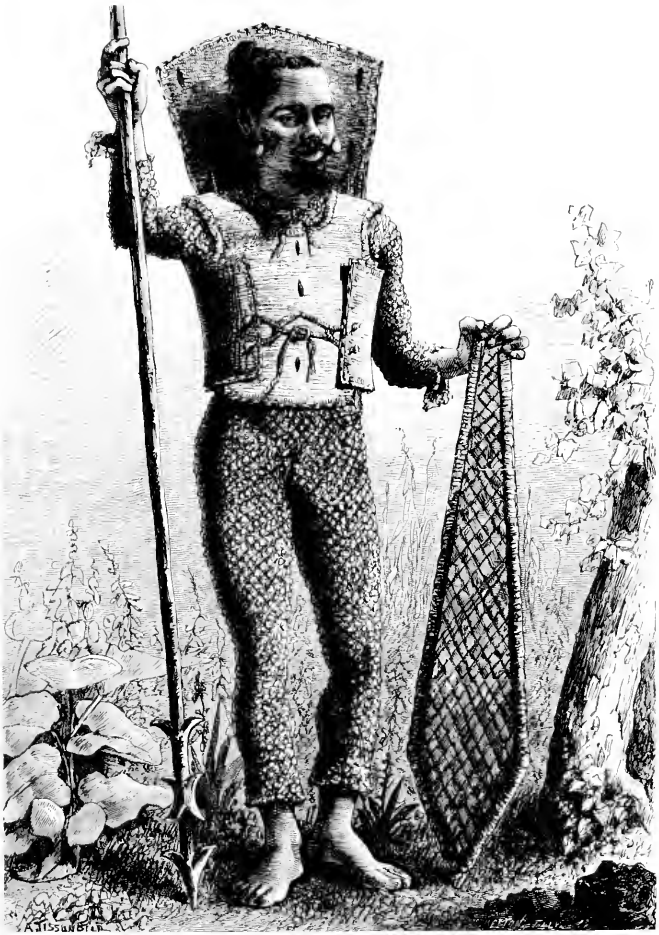
According to Ralph Linton, formerly a Field Museum ethnologist, "a broad belt of fibre or ray skin was often worn about the waist, over all; sometimes gauntlets were worn. The complete suit weighed from fifteen to twenty pounds and made the wearer so unwieldly that each armored man was attended in battle by an unarmored squire, who passed him weapons and otherwise aided him."

Adjacent to the case containing the coir-suited warrior is another which displays various types of Gilbertese weaponry. It is not for the faint of heart. The swords, daggers, and spears are embellished with rows of gleaming shark's teeth or with sharp-pointed snail shells designed to inflict the most gruesome of wounds. In the midst of these instruments of mayhem is a rather fetching necklace—fashioned of human teeth.

The weapons are a glimpse into the Gilbert Islands' past. Today the Gilbertese are peace-loving and domestic. Among the arts which they have retained is a vigorous style of dance—as fulfilling, it is hoped, as their martial arts of yesteryear.

Gilbertese warriors stalking the enemy. The spears and dagger are armed with shark's teeth. The man at left wears a helmet made from the skin of a porcupine fish. (*From Charles Wilkes,* Narrative of the United States Exploring Expedition, *1845.*)





Natives of the Caroline Islands, far to the west of the Gilberts, wore battle costume strikingly similar to that of the Gilbertese (From Alphonse Bertillon, Les Races Sauvages, *1882.)*

This style of Gilbertese armor afforded marvelous protection for the face and head, but greatly limited the warrior's vision. (From Friedrich Ratzel, Volkerkunde, *1885-88.)*

COYOTE *(continued from p. 7)*

. . . One remarkable defense of the coyote occurred in—of all places—the State of Maine. In 1973, State Representative Roswell Dyar, a hardware and hunting-goods storekeeper, put a bill into the Maine Legislature asking for a $50 bounty on the coyote. It was, seemingly, the right state for it. In Maine, so strong is the "hunting ethic" that even bounties on bears were not challenged until out-of-state hunters began valuing the bears more as trophies than as game. The state has had a bounty on bobcats since 1922; at $15 per cat, it had paid out more than $400,000 for dead bobcats. What chance then for the coyote?

It soon appeared he had much chance. "Dyar and Company," wrote John Cole, editor of *Maine Times*, "had badly underestimated both the number and the variety of the state's coyote defenders. The new voices were coming from quarters that Dyar and his people had never anticipated. The formerly invincible, rural, agricultural, hunting, fishing, farming Maine citizen—the descendant of the settler, the clearer of the forest and the builder of barns and bridges—this patriot was being contested in his own land. Incredibly a varmint was being defended; a four-legged outdoor demon had been recast as a sympathetic hero." Fighting for his bill on the floor of the Maine House, Dyar shouted, "These anti people—and when I say anti, I mean they are anti war, anti motherhood, anti work, and anti you-name-it—they are all against this legislation!"

But, as Cole makes clear, it was not the "anti" voices that proved most effective in killing the bill. Rather it was an elderly, weatherbeaten gentleman named Frank Gramlich, Maine State Supervisor for the Division of Wildlife Services—the very government agency which had for so long been entrusted with the attempted official extermination of the coyote in the West. Mr. Gramlich's testimony was delivered in quiet, clipped tones:

> For fifty years, my service has shot, poisoned, trapped and clubbed tens of thousands of coyotes. None of it worked . . . .
>
> In Nevada we put out more than one million poisoned baits, which killed other animals too, and we clubbed hundreds of coyote pups. There was no significant reduction.
>
> In California, we spent $8,000 to trap one coyote. And we could spend $15 million in the state of Maine and we still could not exterminate the coyote population.
>
> Our department is against bounties now; all our previous experience tells us they do not work. It is an archaic practice. And with the growing forces in this coutry against the blood sports, with the eco-awareness of the '70s, enacting a bounty would only accelerate those forces and hurt the hunter.

Something that would hurt the hunter! Obviously the bill would have to be defeated. In the long run, some coyote friends believe the only answer is to make a pet of him—and there has been signal success in this regard, the coyote's charm and loyalty overcoming all difficulties save one. This one, unfortunately, is the law itself. In Kansas City, for example, when young Greg Rhodus brought home a baby coyote whose mother had been killed by a plow, the Rhodus family fed it from a bottle and raised it with, among other things, poodles. The coyote never acted wild or bit anyone and when partly crippled by being hit by an automobile, even came through that. The only thing that finally hurt it was a law the Rhodus family did not know existed. A conservation officer appeared, seized the coyote and shot it. The Rhodus family learned, too late, that wildlife can be kept legally as pets only if purchased from a licensed wildlife breeder and a "wildlife hobby license" is purchased from the state. Otherwise anyone who rescues a wild animal has, at least according to the Missouri Conservation Commission, three alternatives—he can turn it loose, place it in a zoo or destroy it.

Or, presumably, he can take it out and hunt it and injure it again. In my case, the Kansas City Dog pound refused to abide such cruelty. When a coyote arrived at the pound and was slated for extermination, no one in the pound would do the job. Today the coyote is still the mascot of the pound and regularly visits schools and colleges for educational purposes.

Still another answer, some believe, is to meet the coyote literally halfway. Have him, in other words, as he is, half pet and half wild. One who believes this is Los Angeles' Gerald Coward, a man who, on a lonely walk up a canyon a few years ago, managed to make a lasting friend of a coyote. Coward, a photographer and writer, gave up his job and from that day on, for two and a half years, he walked up his canyon. And every day, for two and a half years, his coyote faithfully met him. All day they played, romped and explored together, learning about each other—and then, at the end of each day, they said goodbye. When the coyote mated, he even brought his companion to Coward at the same rendezvous. It was a remarkable idyll that existed until the terrible Los Angeles fire—when Mr. Coward saw his coyote no more. "The coyote," he said, "is the greatest animal there is." □

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I certify that the statements made by me above are correct and complete. —*Norman W. Nelson*, Asst. Dir., Admin.

field briefs

Bennet Bronson, Asian Curator, Returns from Sumatra

Bennet Bronson, assistant curator of Asiatic archaeology and ethnology, has recently completed a three-month archeological project in Sumatra, a part of Indonesia which is as famous among naturalists and ethnographers as it is unknown to archeologists. The purposes of the expedition were (1) to locate the capital of the great ancient sea-kingdom of Srivijaya, known from historical writings but never actually found, and (2) to obtain data on relationships between man and the rain forest environment during prehistoric times. Bronson reports that the excavations were highly successful with respect to this second goal. The group under his direction discovered and excavated a splendid early cave site high in the jungle-covered mountains of central Sumatra. But in terms of the first goal, he describes the project as "an utter, if fascinating, failure." While a whole series of previously undiscovered ancient cities was located, none of them were nearly old enough to be Srivijaya.

Bronson claims to be almost as pleased at not finding the Srivijayan capital (it is a critically important negative discovery) as he is at finding his prehistoric cave. Harold Voris, assistant curator of reptiles and amphibians, is equally pleased since Bronson also managed to locate several patches of virgin rain forest containing large numbers of lizards, snakes, and frogs. Voris will make collections in some of these places during his own Sumatran expedition scheduled to begin in December.

Recent Staff Appointments

Among Field Museum departments with new personnel are the Department of Zoology, the Book Shop, and Building Operations. John J. Pizzimenti, who was awarded a Ph. D. in evolutionary biology this year from the University of Kansas, has been named assistant curator of mammals. He is a native of New York City and received his undergraduate degree from California State University, Northridge, Cal.

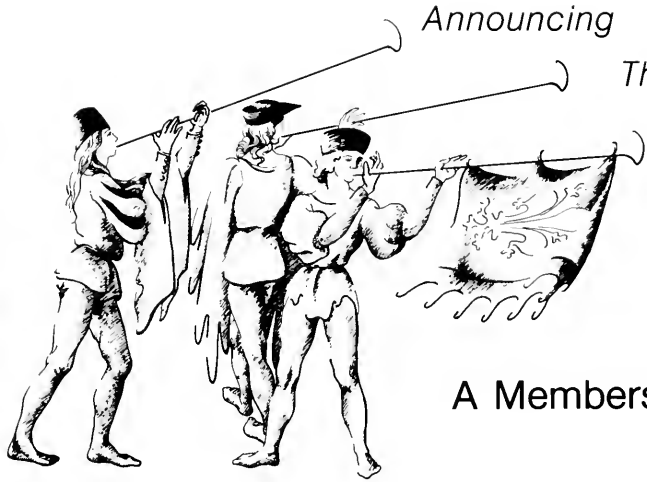
Carol C. Jones, a doctoral candidate in Geology at Harvard University, has been appointed assistant curator of invertebrates. She is originally from Baltimore and got her bachelor's degree at Bryn Mawr. Most recently, Ms. Jones taught at Tufts University.

Virginia T. Elmer, who was recently manager of Kroch's and Brentano's at Oakbrook is the Museum's new Book Shop manager. Joseph D. Taylor has been named assistant to building superintendent Norman Radtke.

Galapagos Program for Nature Camera Club

The November 12 program of the Nature Camera Club of Chicago, which meets at 7:30 p.m. in the Museum, will feature a special program by world traveler Lester Peterson. His "Wildlife of the Lava Islands of Galapagos" is the result of three trips Peterson has made to the islands. He spends about six months every year photographing wildlife around the world.

Native American Children's Art on View in Hall 9 through December 2



Announcing

The Christmas Gift

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Members also receive:

- A subscription to *The Field Museum of Natural History Bulletin*—11 issues per year, including a 1975 appointment calendar with spectacular nature photos in color.
- Tickets to a gala Members' Night Party featuring entertainment, refreshments, and visits to beind-the-scenes areas—where exhibits are created, scientific research conducted, and most of the Museum's 13 million specimens are kept.
- Free admission to the Museum at any time for the Member, family, and Member's friends.
- A 10 percent discount on *Fieldiana* publications, Field Museum's continuing series of scientific monographs.
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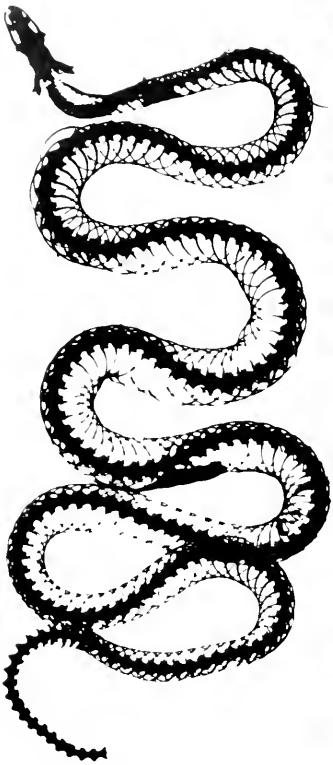

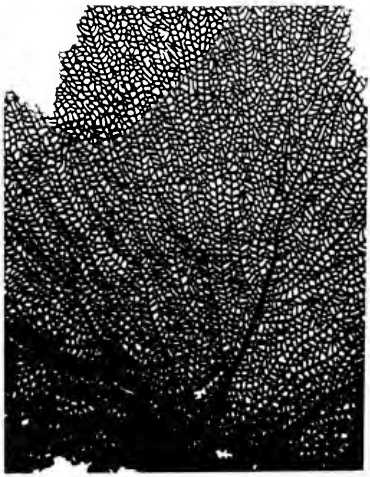

"Photograms" Courtesy of Workshop Participants

Among the children's workshops offered by Field Museum's Department of Education has been one which uses natural objects, such as those shown here, in an introduction to the basics of photography. The technique is remarkably simple. The object is placed on a sheet of photographic contact paper in the dark, a light is turned on, and the paper is then developed in regular photographic solutions. By means of this technique, the simplest object found on the lawn or in the garden can take on a magical new beauty. Normally photograms appear white on a black background; those reproduced here have been reversed.

Your Participation in Capital Campaign Needed Now

The Capital Campaign has drawn to within $800,000 of its $12.5 million goal. The full amount — through private subscription — must be reached in order to qualify for an additional $12.5 million from the Chicago Park District Bonding Authority. To achieve this, your help is needed *now*.

The response to a proposal recently sent to all Field Museum members was encouraging, but more contributions are necessary if the Capital Campaign goal is to be reached by the end of 1974, now just several weeks away. If you have not yet made your contribution, please write your check or make your pledge now. Pledges may be paid over a three-year period.

Projects that have already been completed under the Museum's $25 million rehabilitation program include the following:

- Jade Hall
- Department of Exhibition
- Interior freight elevator
- Lock security
- Eight new emergency exits
- Boiler room renovation
- Heating system conversion
- Scanning electron microscope laboratory
- Tuckpointing
- Division of Invertebrates: new offices, laboratories, library, and storage areas
- Malvina Hoffman sculpture displays

Construction in progress:

- Outside stair renovation
- Hall 18, with new floor areas above
- Group passenger elevator
- Electrical renovation of entire building

For the immediate future:

Contract bidding for the major renovation of the ground floor is now in progress, with work scheduled to begin early in 1975. A new cafeteria, new administration offices, theater renovation, a new west entrance for school groups, and new education areas are included in the ground floor rehabilitation plans.

At left, workmen complete the steel framework for the renovation of Hall 18. The hall's new ceiling provides the flooring for new working space on the third floor; formerly this space was a light well. The new space is to be used for offices and laboratories in the Division of Insects, and for major storage areas and a lecture/class room for new educational programs.

NOVEMBER at Field Museum

EXHIBITS

Through November 3

Contemporary African Arts Festival, the first comprehensive program of its kind in the United States, features the work of artists, including painters, printmakers, sculptors, and fabric designers, as well as a shop. Hall 27.

Continuing.

In Beauty It Is Begun, a display of more than 150 drawings, paintings, beadwork, and poetry created by Native American children. Through December 2. Hall 9.

Field Museum's Anniversary Exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with the physical, biological, and cultural aspects of nature; "A Sense of History" presents a graphic portrayal of the Museum's past; and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

SPECIAL PROGRAMS

Ayer Adult Illustrated Lecture Series, "Expeditions Unlimited 1974-75," at 7:30 p.m. Fridays and 2:30 p.m. Saturdays in Lecture Hall. Seating is limited to 225 persons. For reservations call Field Museum, 922-9410, Ext. 230.

November 1 and 2:
"Endangered Cloud Forests of Costa Rica," by William Burger

November 8 and 9:
"A Native American Looks at Anthropology," by John White

November 15 and 16:
"Lost Cities of Indonesia," by Bennet Bronson

November 22 and 23:
"To Inca Land and Beyond for Birds," by Emmet Blake

Weaving Demonstration by members of the North Shore Weavers' Guild from 10:00 a.m. to 12:00 noon on Mondays, Wednesdays, and Fridays. Spinning is also shown on the first and third Mondays of each month. South Lounge.

December 26, 27 and 30

Guided tours of Museum exhibit areas leave from north information booth at 2:00 p.m.

CHILDREN'S PROGRAMS

Saturday, November 16

"Lizards, Snakes, Toads, and Salamanders," an all-day program featuring live animals, is offered youngsters ages 12-18 at Field Museum with the cooperation of the Lincoln Park Zoo. Events include: 10:00 a.m., live animal demonstration and film; 1:00 p.m., workshop, **"The Evolution of Reptiles";** and 1:00 p.m., workshop, **"Reptiles as Pets."** Attendance is by preregistration only. For information phone Field Museum, 922-9410, Ext. 351.

Through November 30

Fall Journey for Children, "Fossils in the Floor," a free, self-guided tour, routes youngsters to Museum areas for a fascinating study of ancient animals. All boys and girls who can read and write may participate in the program. Journey sheets in English and Spanish available at entrances.

MEETINGS

November 1, 7:30 p.m.,	Chicago Astronomical Society
November 8, 8:00 p.m.,	Chicago Anthropological Society
November 10, 2:00 p.m.,	Chicago Shell Club
November 12, 7:30 p.m.,	Nature Camera Club of Chicago
November 13, 7:00 p.m.,	Chicago Ornithological Society
November 13, 7:30 p.m.,	Windy City Grotto, National Speleological Society
November 14, 7:00 p.m.,	Chicago Mountaineering Club
November 26, 7:30 p.m.,	Nature Camera Club of Chicago

COMING IN DECEMBER

Ayer Adult Illustrated Lecture Series continues with "Expeditions Unlimited 1974-75" at 7:30 p.m. Fridays and 2:30 p.m. Saturdays in Lecture Hall. Seating is limited to 225 persons. For reservations call Field Museum, 922-9410, Ext. 230.

December 6 and 7:
"Grand Canyon Expedition," by Matthew H. Nitecki

Winter Journey for Children, "Cats, the Graceful Hunters," begins December 1.

MUSEUM HOURS

Open 9:00 a.m. to 4:00 p.m. Monday through Thursday, 9:00 a.m. to 9:00 p.m. Friday, and 9:00 a.m. to 5:00 p.m. Saturday and Sunday.

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410

December
1974

Field Museum of Natural History Bulletin

Field Museum of Natural History Bulletin

Volume 45, Number 11
December 1974

Managing Editor G. Henry Ottery
Editor David M. Walsten
Staff Writer Madge Jacobs
Production Oscar Anderson

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Photos

Page 7, Ron Church/Tom Stack & Associates; 8, Tom Myers/Tom Stack and Associates; 9, Tom Stack; 10, UPI Compix

Note: Belated thanks to Tony Frelo and Tony Donaldson, whose fine photographic work appeared in the October, 1974 Bulletin. Mr. Frelo's aerial photo of the National Accelerator Laboratory, at Batavia, Ill., was reproduced on p. 11. Mr. Donaldson's photos of Fermilab volunteers appeared on pp. 12 and 13.

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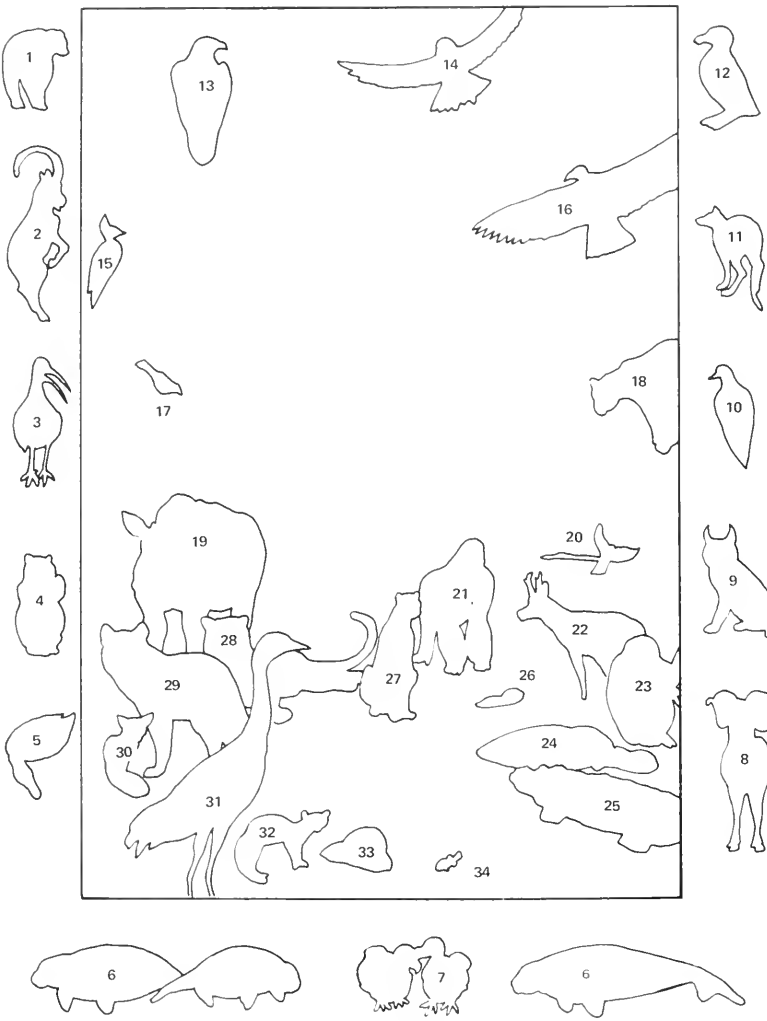

Threatened, Endangered, and Extinct Fauna: Key to Cover Illustration

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2. *Walia Ibex* (*Ethiopia*)
3. *Eskimo Curlew* (*Canada to Argentina*)
4. *Giant Panda* (*China and Tibet*)
5. *Labrador Duck* (*extinct*)
6. *Steller's Sea Cow* (*extinct*)
7. *Dodo* (*extinct*)
8. *Bighorn* (*North America*)
9. *Spanish Lynx* (*Spain*)
10. *Passenger Pigeon* (*extinct*)
11. *Tasmanian Wolf* (*Tasmania*)
12. *Great Auk* (*extinct*)
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32. *Black-Footed Ferret* (*North America*)
33. *Mediterranean Monk Seal* (*Black Sea, Mediterranean*)
34. *Devil's Hole Pupfish* (*North America*)

COVER

Patricia J. Wynne, of New York, rendered this month's cover illustration in recognition of threatened, endangered, and extinct animal species. In this recreated Peaceable Kingdom her animals, too, gather around a tree, perhaps in hopes of better times ahead.

Miss Wynne's work is represented in permanent collections in Chicago, Detroit, and other cities. She has exhibited at the Art Institute of Chicago and at numerous other galleries and art centers in the United States and Canada.

Endangered Fauna of the United States

The number of vertebrate animal species currently listed as "endangered" by the U.S. Department of the Interior is about 106, including 31 fish, 4 amphibians, 3 reptiles, 17 mammals, and 51 birds (26 endangered U.S. bird species are to be found only in Hawaii, the remaining 25 occur in the continental states). The list below does not include endangered whale species or other animals confined to a marine environment.

The Endangered Species Act of 1973, which supersedes the Endangered Species Conservation Act of 1969, includes the following changes: the law now encompasses all species of the animal and plant kingdoms; two categories of endangerment are established—"endangered" species, which are in danger of extinction throughout all or a significant part of their range, and "threatened" species, which are likely to become endangered within the foreseeable future throughout all or a significant part of their range.

The list of endangered and threatened species is subject to frequent modification. Information about such modifications may be obtained from the Office of Endangered Species and International Activities, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

The animal species listed below are arranged phylogenetically by class and order, and alphabetically within each order by their common names. The taxonomic terms "class" and "order" are used merely for organizational purposes. The common names used are those which are associated with a given species most often, but these have no legal significance. The legal identification of each animal listed is the scientific binomial or trinomial that appears after the common name.

BONY FISHES (Class Osteichthyes)

Sturgeons and Paddlefishes	**Order Acipenseriformes**
Sturgeon, Shortnose	*Acipenser brevirostrum*
Trout, Salmon and Relatives	**Order Salmoniformes**
Cisco, Longjaw	*Coregonus alpenae*
Trout, Arizona (Apache)	*Salmo* sp.
Trout, Gila	*S. gilae*
Trout, Greenback, Cutthroat	*S. clarki stomias*
Trout, Lahontan Cutthroat	*S. clarki henshawi*
Trout, Paiute Cutthroat	*S. clarki seleniris*
Carps, Minnows, and Relatives	**Order Cypriniformes**
Bonytail, Pahranagat	*Gila robusta jordani*
Chub, Humpback	*G. cypha*
Chub, Mohave	*Siphateles mohavensis*
Cui-ui	*Chasmistes cujus*
Dace, Kendall Warm Springs	*Rhinichthys osculus thermalis*
Dace, Moapa	*Moapa Coriacea*
Squawfish, Colorado River	*Ptychocheilus lucius*
Woundfin	*Plagopterus argentissimus*
Silversides, Topminnows, and Relatives	**Order Atheriniformes**
Gambusia, Big Bend	*Gambusia gaigei*
Gambusia, Clear Creek	*G. heterochir*
Gambusia, Pecos	*G. nobilis*
Killifish, Pahrump	*Empetrichythys latos*
Pupfish, Comanche Springs	*Cyprinodon elegans*
Pupfish, Devil's Hole	*C. diabolis*
Pupfish, Owens River	*C. radiosus*
Pupfish, Tecopa	*C. nevadensis calidae*
Pupfish, Warm Springs	*C. nevadensis pectoralis*
Topminnow, Gila	*Poeciliopsis occidentalis*
Sticklebacks, Pipefishes, and Relatives	**Order Gasterosteiformes**
Stickleback, Unarmored Threespine	*Gasterosterus aculeatus williamsoni*
Perches and Relatives	**Order Perciformes**
Darter, Fountain	*Etheostoma fonticola*
Darter, Maryland	*E. sellare*
Darter, Okaloosa	*E. okaloosae*
Darter, Watercress	*E. nuchale*
Pike, Blue	*Stizostedion vitreum glaucum*

AMPHIBIANS (Class Amphibia)

Salamanders	**Order Urodela**
Salamander, Desert Slender	*Batrachoseps aridus*
Salamander, Santa Cruz Long-Toed	*Ambystoma macrodactylum croceum*
Salamander, Texas Blind	*Typhlomolge rathbuni*
Frogs	**Order Anura**
Toad, Houston	*Bufo houstonensis*

REPTILES (Class Reptilia)

Crocodiles	**Order Crocodilia**
Alligator, American	*Alligator mississipiensis*
Lizard, Blunt-Nosed Leopard	*Crotaphytus silus*
Snake, San Francisco Garter	*Thamnophis sirtalis tetrataenia*

BIRDS (Class Aves)

Albatrosses, Petrels, and Relatives	Order Procellariiformes
Petrel, Hawaiian Dark-Rumped*	*Pterodroma phaeopygia sandwichensis*

Pelicans	Order Pelecaniformes
Pelican, Brown	*Pelecanus occidentalis*

Ducks, Geese, Swans, and Relatives	Order Anseriformes
Duck, Hawaiian (Koloa)*	*Anas wyvilliana*
Duck, Laysan*	*A. laysanensis*
Duck, Mexican	*A. diazi*
Goose, Aleutian Canada	*Branta canadensis leucopareia*
Goose, Hawaiian (Nene)*	*B. sandvicensis*

Eagles, Falcons, Vultures, and Relatives	Order Falconiformes
Condor, California	*Gymnogyps californianus*
Eagle, Southern Bald	*Haliaeetus leucocephalus leucocephalus*
Falcon, American Peregrine	*Falco peregrinus anatum*
Falcon, Arctic Peregrine	*F. peregrinus tundrius*
Hawk, Hawaiian (Io)*	*Buteo solitarius*
Kite, Florida Everglade (Snail Kite)	*Rostrhamus sociabilis plumbeus*

Pheasants, Grouse, Curassows, and Relatives	Order Galliformes
Prairie chicken, Attwater's Greater	*Tympanuchus cupido attwateri*
Quail, Masked Bobwhite	*Colinus virginianus ridgwayi*

Cranes, Rails, Bustards, and Relatives	Order Gruiformes
Coot, Hawaiian*	*Fulica americana alai*
Crane, Mississippi Sandhill	*Grus canadensis pulla*
Crane, Whooping	*G. americana*
Gallinule, Hawaiian*	*Gallinula chloropus sandvicensis*
Rail, California Clapper	*Rallus longirostris obsoletus*
Rail, Light-Footed Clapper	*R. longirostris levipes*
Rail, Yuma Clapper	*R. longirostris yumanensis*

Plovers, Snipes, Gulls, and Relatives	Order Charadriiformes
Curlew, Eskimo	*Numenius borealis*
Stilt, Hawaiian*	*Himantopus himantopus knudseni*
Tern, California Least	*Sterna albifrons browni*

Parrots, Parakeets, and Relatives	Order Psittaciformes
Parrot, Thick-Billed	*Rhynchopsitta pachyrhyncha*

Woodpeckers, Puffbirds, Barbets, and Relatives	Order Piciformes
Woodpecker, Ivory-Billed	*Campephilus principalis*
Woodpecker, Red-Cockaded	*Dendrocopus borealis*

*Hawaii only, but may also occur outside U.S.

Perching Birds: Sparrows, Larks, Thrushes, and Relatives	Order Passeriformes
Crow, Hawaiian (Alala)*	*Corvus tropicus*
Honeycreeper, Akiapolaau*	*Hemignathus wilsoni*
Honeycreeper, Crested (Akohekohe)*	*Palmeria dolei*
Honeycreeper, Hawaii Akepa (Akepa)*	*Loxops coccinea coccinea*
Honeycreeper, Kauai Akialoa*	*Hemignathus procerus*
Honeycreeper, Maui Parrotbill*	*Pseudonestor xanthorphrys*
Honeycreeper, Maui Akepa (Akepule)*	*Loxops coccinea ochraceu*
Honeycreeper, Molokai Creeper (Kakawahie)*	*L. maculata flammea*
Honeycreeper, Oahu Creeper (Alauwahio)*	*L. maculata maculata*
Honeycreeper, Ou*	*Psittirostra psittacea*
Honeycreeper, Palila*	*P. bailleui*
Honeycreepers, Layson and Nihoa Finches*	*P. cantans*
Honeycreepers, Kauai and Maui Nukupuus*	*Hemignathus lucidus*
Honey-eater, Kauai Oo (Oo Aa)*	*Moho braccatus*
Sparrow, Cape Sable	*Ammospiza maritima mirabilis*
Sparrow, Dusky Seaside	*A. maritima nigrescens*
Sparrow, Santa Barbara	*Melospiza melodia graminea*
Thrush, Large Kauai*	*Phaeornis obscurus myadestina*
Thrush, Molokai (Olomau)*	*P. obscurus rutha*
Thrush, Small Kauai (Puaiohi)*	*P. palmeri*
Warbler, Nihoa Millerbird*	*Acrocephalus kingi*
Warbler (Wood), Bachman's	*Vermivora bachmanii*
Warbler (Wood), Kirtland's	*Dendroica kirtlandii*

MAMMALS (Class Mammalia)

Bats	Order Chiroptera
Bat, Hawaiian Hoary	*Lasiurus cinereus semotus*
Bat, Indiana	*Myotis sodalis*

Rodents	Order Rodentia
Kangaroo Rat, Morro Bay	*Dipodomys heermanni morroensis*
Mouse, Salt Marsh Harvest	*Reithrodontomys raviventris*
Prairie Dog, Utah	*Cynomys parvidens*
Squirrel, Delmarva Peninsula Fox	*Sciurus niger cinereus*

Carnivores	Order Carnivora
Cougar, Eastern	*Felis concolor cougar*
Ferret, Black-Footed	*Mustela nigripes*
Fox, San Joaquin Kit	*Vulpes macrotis mutica*
Panther, Florida	*Felis concolor coryi*
Wolf, Eastern Timber	*Canis lupus lycaon*
Wolf, Northern Rocky Mountain	*C. lupus irremotus*
Wolf, Red	*C. rufus*

Dugongs and Manatees	Order Sirenia
Manatee, West Indian (Florida)	*Trichechus manatus*

Even-Toed Ungulates	Order Artiodactyla
Deer, Columbian White-Tailed	*Odocoileus virginianus leucurus*
Deer, Key	*O. virginianus clavium*
Pronghorn, Sonoran	*Antilocapra americana sonoriensis*

THE WAR AGAINST DUTCH ELM

Not much headway has been made against Dutch elm disease, that scourge of parks, boulevards, and shaded lawns, which began attacking elms in North America about forty-five years ago. The disease had first been described in the Netherlands in 1921, and is thought to have been brought to this continent in a shipload of lumber. Not too many years ago it struck Champagne-Urbana, Ill., with dramatic intensity. In its first year there the disease destroyed more than 4 percent of that city's elms; by the second year 15 percent of the trees had to be removed. By the eleventh year, only 100 of the city's original 20,000 elms survived.

In 1973 the City of Chicago planted 40,000 elms to replace those stricken; this year about 30,000 will be planted. Meanwhile, the disease is working its way further westward and northward. In 1972 it made its first major penetration of Minnesota; the following year, more than 3,000 elms were known to have been killed. This year there was an increase of about 20 percent in the number of trees stricken in that state.

The insect vector, or carrier, of the fungus that causes the disease (*Ceratocystis ulmi*) is the elm bark beetle. There are two species, the European bark beetle (*Scolytis multistriatus*) and the native bark beetle (*Hylurgopinus rufipes*). The European form is the important vector in Illinois and most other affected parts of the United States. The native bark beetle is the more common vector in northern areas, including Minnesota, northern Wisconsin, and Ontario. Advances against the disease are being made on three principal fronts: development of resistant elms, control of the fungus, and control of the beetle.

Disease-resistant elm hybrids

Perhaps the most encouraging news is from horticulturists who have been developing elm hybrids with some degree of resistance to the disease. In 1958, two University of Wisconsin botanists, E.B. Smalley and D.T. Lester, received some elm seeds from Hokkaido University, in Japan. The seeds had reportedly been taken from a Siberian elm (*Ulmus pumila*) growing in Hokkaido University's botanical garden, at Sapporo. Smalley and Lester did controlled hybridization experiments on progeny derived from the seeds, concluding that they represented a hybrid between *U. pumila* and *U. japonica*, the Japanese elm. The common name they gave the hybrid is Sapporo Autumn Gold.

The tree derived from the Japanese seed is now sixteen years old and is expected to grow to a full height of about sixty to sixty-five feet— intermediate between the height of the parents. It is densely foliated and has a vase-shaped crown similar to that of the American elm (*U. americana*). The tree is named for the fall leaf color, described by Smalley and Lester as a "vivid, semitransparent, pale greenish yellow . . . to light greenish yellow (which) often holds well for many days prior to leaf drop."

Smalley's and Lester's tree "began flowering intensely at five years of age, somewhat earlier than is expected for either plant species." (American elms usually do not flower until they are ten to fifteen years old.) For now, cuttings from the hybrid are available only to experiment stations, but by 1975 they may be available to the public from commercial sources.

Another elm hybrid—the so-called Urban Elm—with an apparent strong resistance to Dutch elm disease, is being tested in various parts of the United States, including Massachusetts, New York, Ohio, North Dakota, and Illinois. The Urban Elm is descended from three species: *Ulmus hollandica*, *U. carpinifolia*, and *U. pumila*; seedlings have been tested since 1958.

This elm is characterized by a profuse upright branching habit; it has dense foliage and a compact crown. The leaves are intermediate in size between that of the parents, dark green and smooth. Unlike Sapporo Autumn Gold, the Urban Elm retains its foliage and dark green color until relatively late in the season. The tree's growth rate has been described by its developers as moderate to rapid. They also claim that it has a wide range of environmental adaptability. A fourteen-year-old Urban Elm had attained a height of twenty-five feet and had a form which appeared suitable for tree lawns and planting next to buildings. Propagating material for the Urban Elm may be obtained by writing the Shade Tree and Ornamental Plants Laboratory, P.O. Box 365, Delaware, Ohio 43015.

Fungicidal treatment

A fungicide known as benomyl, or Benlate, developed by duPont, has been shown to be of some value in the control of Dutch elm disease. It is applied to the leaves or is injected into the trunk under pressure; the latter method, however, has not yet been approved by the Environmental Protection Agency (EPA). Only trained arborists may apply the chemical.

The primary value of Benlate is as a disease preventive. Curative effects can be achieved if less than 5 percent of the tree's crown shows the characteristic yellowing and wilting. An important advantage of Benlate is the fact that it is "considerably less toxic than aspirin," according to the University of Wisconsin Cooperative Extension Service, and no ill effects on wildlife have been observed.

Sex attractant

Another weapon against the disease is aimed at the fungus vector, or carrier—the bark beetle. This is a sex attractant, used to lure bark beetles to their death. In nature, the attractant is released by virgin females as they bore into the elm wood. The chemical is termed an "aggregating pheromone" because it attracts both sexes for the purpose of mass-attacking the host tree, breeding, and feeding.

One type of beetle trap consists of a square section of coarse-meshed screen and a vial. The beetles are attracted by a small amount of pheromone placed in the vial, and they become permanently attached to the screen —coated with a sticky substance—when they approach. The pheromone was first synthesized and tested by scientists at the State University of New York, at Syracuse, and by researchers at the U.S. Forest Service Northeastern Forest Experiment Station, Delaware, Ohio. — *Ed.*

In many regions the walrus continues to thrive; in the Barents, Kara, and White Seas, however, herds are close to extinction.

On the Road to Recovery?

by David M. Walsten

THE WALRUS, the sea otter, and the polar bear—all of which have suffered greatly from human intrusion into their habitats—appear to be staging a comeback, according to the U.S. Fish and Wildlife Service.

While close to extinction in some areas, the walrus is recovering in others. The range of the two races—the Atlantic and the Pacific—encircles the polar basin, but there are far more Pacific walrus than Atlantic. The differences between the two are the longer tusks and larger body of the Pacific walrus.

In the Pacific, where the walrus numbered 40,000 to 50,000 as recently as the early 1950s, it is estimated there are now about 140,000, and biologists believe these numbers are increasing. They warn, however, that this will not continue if the annual Siberian and Alaskan native kill of 5,000 to 6,000 a year in Alaska and the Soviet Union is increased. The entire Pacific walrus population winters in the pack ice of the Bering Sea, with spring migration north through the Bering Strait as the ice breaks up.

In the Atlantic, the latest figures estimate the walrus population to be on the order of 25,000 in two groups—from the Kara Sea to eastern Greenland and from western Greenland to eastern Canada. They, too, migrate north-south with the edge of the ice cap. The average annual Eskimo and native kill of Atlantic walrus is now about 2,700, and the reproductive rate is estimated to be just a little more than that, at around 3,000 to 5,000 a year. Any increase in kills would jeopardize this subspecies. Herds in the Barents, Kara, and White Seas are close to extinction now.

Since 1956 the U.S.S.R. has prohibited all hunting of Atlantic and Pacific walrus except that necessary for Eskimo survival. Atlantic walrus hunting is limited by Denmark to Greenland residents using boats under 40 tons; hunting areas and dates are regulated. Canada restricts hunting to Eskimos and a few white residents. Trophy hunting of the Pacific walrus in Alaska was stopped by the Marine Mammals Protection Act of 1972. ►

Walruses feed mainly on clams but also eat snails, crabs, and worms; occasionally an adult male will eat seal flesh. They have a greater specific gravity than water and must rest on ice or land frequently, although they have inflatable pouches which enable them to sleep while afloat.

Calves are dependent on their mothers for eighteen to thirty months. Most females do not begin to breed until six or seven years of age. Mating occurs during February and March. Growth of the fetus, which is delayed, does not begin until about June; the actual growth period is about ten months. Most cows do not breed again until the year following the birth of their previous calf.

The Atlantic and Pacific walruses' eating habits could pose ecological problems for the mammals if offshore drilling for oil in the Bering Sea or Arctic Ocean is undertaken, or if the extensive clam beds in these areas are subject to dredging.

The sea otter will continue to make a comeback only if strict hunting curbs are maintained. On parts of the California coast, in which state it is a completely protected species, the sea otter is viewed as a threat by abalone fishermen.

THE SEA OTTER (*Enhydra lutris*), within its present range, is probably more abundant now than it has been for centuries. Because of its exquisite fur, the animal played a major role in the history of Alaska, and from the 1740s until the beginning of this century was hunted to the point of extinction. The early Russian settlement of Alaska was largely a result of the sea otter industry. When the United States bought Alaska in 1867, the sea otter was diminished in numbers, but hunting continued.

Finally, in 1911, the animals were given full protection under the Fur Seal Treaty signed by the United States, Great Britain, Russia, and Japan. In the years since, the animal has increased its numbers in some parts of its range to the point that it has created serious conflicts with commercial and sport fishing interests.

The animal's range is limited to the northern waters of the Pacific Ocean. Its populations are resident, showing no migratory behavior. Sea otters seldom range offshore beyond the 180-foot depth curve. In North American waters, these mammals are found from central California north to Alaska's Prince William Sound and west along the chain of the Aleutian Islands. On the other side of the Pacific, sea otters are found among the Soviet Union's Commander Islands, along the southern edge of the Kamchatka Peninsula, and among the Kurile Islands north of Japan.

In 1956 the world population of sea otters was estimated to be about 23,000 to 35,000. No current figures are available for populations in waters off the Soviet Union, but surveys in American waters reveal sizable increases. A 1973 census of Alaskan waters estimated sea otter numbers there to range from 100,000 to 120,000. This contrasts with a 1956 estimate of 25,000 sea otters in Alaskan waters. Off the coast of California sea otters numbered about 150 in 1938, and in mid-1973 the population was estimated at about 1,600 to 1,800.

Sea otters are actually members of the weasel family and are related to mink and land otters rather than to seals, sea lions, and walruses. Unlike seals, which rely on a heavy layer of blubber for insulation in the cold waters of the northern Pacific Ocean, the sea otter must depend upon air trapped in its fine dense fur to maintain its body temperature. Hence, these animals are extremely vulnerable to oil spills.

Various problems have arisen since the sea otter's recent comeback. In some Aleutian Island areas the overpopulation has depleted the animal's food resources to the danger point. Off the coast of California the sea otter continues to expand its range both north and south and preys on commercially valuable abalone and clams. Pressure from commercial and sport fishing interests is mounting for population control of sea otters and the establishment of refuge

areas away from fishing areas. The sea otter is protected by the Marine Mammals Protection Act of 1972 and in California it is listed as a completely protected species.

Survival chances for the polar bear, the scarcest of the three species, have been recently enhanced by a five-nation agreement on more restrictive hunting practices. In addition, the five nations (U.S., Canada, Norway, Denmark, and the U.S.S.R.) have agreed to sponsor intensified research programs on the polar bear, in order to better understand the animal's role in the environment and its requirements for survival. On the other side of the ledger, more hunting is expected in Canada; and Fish and Wildlife experts are nervous about the potential threat of human activity on Alaska's north slope, where female polar bears den each year to have their cubs.

Polar bears today live in seven clearly identifiable areas of the Arctic circle—from the Soviet Union's Wrangel Island to western Alaska; along the northern coast of Alaska; across northern Canada; in the Hudson Bay area; in Greenland; around Spitsbergen-Franz Josef Land, and in central Siberia. They are most abundant at the southern edge of the sea ice and make extensive north-south migrations according to the position of the edge of the ice.

Only very general world population estimates are available, with the most commonly cited figures ranging from a low of 10,000 to a high of 20,000. In Alaska, the kill by native and trophy hunters averaged 250 a year until the passage of the Marine Mammals Protection Act, which permits hunting only by natives for subsistence. Seven were killed in 1973 and forty in 1974. Last winter, an increase in the number of bears was reported along Alaska's north coast.

Soviet experts believe polar bear populations in the Soviet Arctic declined ►

Polar bears occur in Arctic regions of five nations—the U.S., the U.S.S.R., Canada, Denmark, (Greenland), and Norway—which have recently agreed to stricter hunting regulations and intensified research programs.

Who's that fellow with all the double chins and why is he laughing? He's a seal, of course—and he's not laughing, singing, yawning, or even saying "ahhh" for the zoo veterinarian. He's asking, as politely as he knows, for another fish please.

About 32 species of seals (including sealions and the walrus) are known. Only the Mediterranean monk seal (Monachus monachus) is currently listed as endangered, but a number of other species are threatened or have experienced marked population declines.

during the first half of the century but that they had stabilized since hunting was stopped there in 1956. A few cubs may be caught each year for zoos. The average annual harvest in Norway's Spitsbergen—about 300 prior to 1970—has been reduced to an estimated five or six by a five-year moratorium on hunting. In Danish-owned Greenland, Eskimos kill from 125 to 150 bears per year for subsistence purposes. Annual harvests in Canada approached 600 during the early 1960s and is now about 500, although permit-hunting under a quota system is being encouraged in the Northwest Territories.

Polar bears live an average of twenty-five years. They are solitary most of the year, except in the spring breeding season when males actively seek out females. They are polygamous: a male will remain with a female for a relatively short time, then seek out another. Females den in the autumn along coastal areas, sometimes on pack ice, and give birth in December. Litters of two are most common. They remain in the den until late March or early April, when they break out from beneath the snow pack. Cubs remain with their mother for about twenty-eight months, then they separate and the female breeds again. The polar bears' diet consists primarily of freshly killed seals, although they occasionally eat carrion of whales, walruses, and seals.

In November 1973, the United States, the Soviet Union, Canada, Denmark, and Norway drafted an agreement on the conservation of polar bears, which allows bears to be taken only in areas where they have been taken by traditional means in the past, and prohibits the use of aircraft and large motorized vessels as aids in taking. The agreement also calls for both national research and cooperative international research and management, especially in populations occurring on the high seas or within more than one national jurisdiction. It provides protection for ecosystems of which polar bears are a part, and seeks special protection from hunting for denning females, females with cubs, and cubs. □

Members Responding to Appeal For Capital Gifts. Have You?

Capital Campaign General Chairman Nicholas Galitzine reports that the appeal to Museum Members to bring the $25-million fund drive to a successful conclusion by December 31 is meeting with enthusiastic response from many. He added his hope that those who have not yet responded will do so this month.

"This is the season for giving," he noted. "When our friends consider the immense contributions in education and science made by the Museum to individuals and the nation—indeed, to the world—throughout each year, many of them will provide gifts for the Museum as they would any cherished friend at this time."

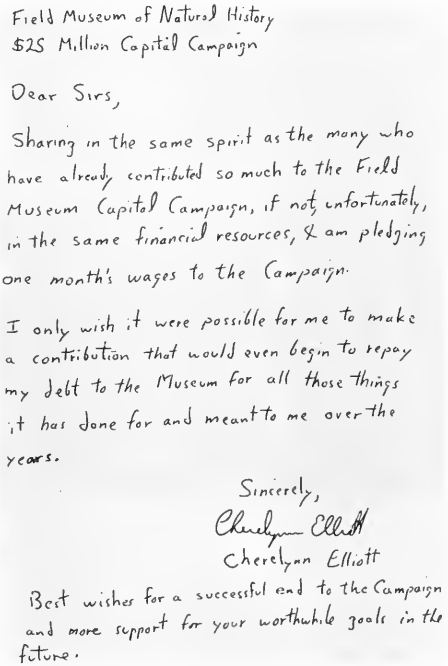
Mrs. Isabel B. Wasson of River Forest agrees. In a letter accompanying her check, she says, "It gives me great pleasure to make, what is for me, a substantial gift toward your Capital Campaign. I am a great believer in the contribution that the Field Museum is making not only in Chicago, but in the U.S.A., and in the world.

"I have taken my students in natural sciences from the River Forest Public Schools on innumerable trips to your Museum to study geology. I myself have attended Saturday lectures, special exhibits, and Members' Nights over many years."

It is not the first gift the Museum has received from Mrs. Wasson. Earlier, she had provided a substantial collection of rocks and minerals, which she and her husband collected, to the Museum's Raymond Foundation for use in its educational programs.

Member Cherelynn Elliott of Palos Park caught the spirit of the Museum's massive rehabilitation and renovation program. Her letter is reproduced below.

If Mrs. Wasson and Miss Elliott—and all other donors—were to visit the Museum today, they would see many instances in which their gifts are already being put to work to improve Museum services to visitors, educators, and scientists. They would notice the rebuilding of the entrance stairs, the renovation of exhibit halls, the installation of a group passenger elevator, and other activities described in previous *Bulletins*. Numerous other projects will be underway in the near future.



Field Museum of Natural History
$25 Million Capital Campaign

Dear Sirs,

Sharing in the same spirit as the many who have already contributed so much to the Field Museum Capital Campaign, if not unfortunately, in the same financial resources, I am pledging one month's wages to the Campaign.

I only wish it were possible for me to make a contribution that would even begin to repay my debt to the Museum for all those things it has done for and meant to me over the years.

Sincerely,
Cherelynn Elliott
Cherelynn Elliott

Best wishes for a successful end to the Campaign and more support for your worthwhile goals in the future.

Member Eleanor Curtiss of Berwyn is helping to make it happen, too. In the letter enclosed with her check, she comments, "The Field Museum has my high regard and I wish I could contribute more. My means are modest, demands for contributions come from all sides, and I shall be retiring in a few months. I'm happy to do my little bit. Best Wishes."

"We wish to emphasize," said Galitzine, "that it is not necessary to actually present a donation at this time. We will be very pleased to receive pledges of any amount, to be paid in one or more scheduled payments at the convenience of the donor."

A Phoenix woman decided on the amount she wished to give, and wrote the following letter to accompany her first check:

"Enclosed is my check in partial payment of my commitment towards the Capital Campaign. I wish I could do more but I am really limited on a retirement income. I wish you great success in this appeal. We have a great Museum and I do miss the Members' Nights since moving to Arizona. You have some wonderfully genuine people among your volunteers."

To these people and all other donors, Galitzine, on behalf of the Capital Campaign personnel and entire Museum staff, extends his sincerest gratitude, and re-expresses his hope that he will be hearing from many more members before the end of the month—and of the campaign!

Peacock
Pavo cristatus
India and Ceylon
Photo by Tom Stack

january 1975

S	M	T	W	T	F	S
			NEW YEAR'S DAY Museum Closed **1**	* **2**	**3**	**4**
5	* **6**	**7**	**8**	**9**	**10**	**11**
12	**13**	**14**	**15**	**16**	**17**	**18**
19	**20**	**21**	**22**	**23**	**24**	**25**
* **26**	**27**	**28**	**29**	**30**	**31**	

* JANUARY EVENTS

2 Winter journey for Children continues.
6 Weaving demonstrations resume, 10-12; Mon, Wed, Fri.

JANUARY EVENTS

26 Free "Ascent of Man" film, *Lower than the Angels*, 2 pm.

Field Museum hours
9 am to 4 pm Mondays through Thursdays.
9 am to 9 pm Fridays.
9 am to 5 pm Saturdays and Sundays

DECEMBER 1974

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FEBRUARY 1975

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White Ear-Tufted Marmoset
Callithrix jacchus
South America
Photo by Hy Marx

february 1975

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* 2	* 3	4	5	6	7	8
* 9	10	CHINESE NEW YEAR 11	ASH WEDNESDAY LINCOLN'S BIRTHDAY 12	13	VALENTINE'S DAY 14	15
* 16	PRESIDENTS' DAY 17	18	19	20	* 21	* 22
* 23	24	25	26	27	* 28	

* FEBRUARY EVENTS

2 Free "Ascent of Man" film *Harvest of the Seasons*, 2 pm

3 9-week training for Man in His Environment" volunteers begins

9 Free "Ascent of Man" film *Grain in the stone*, 2 pm

FEBRUARY EVENTS

9 Showing best slides from 30th Chicago Int'l Exhibition of Nature Photog., 2 pm

16 Free "Ascent of Man" film *The Hidden Structure*, 2 pm

FEBRUARY EVENTS

16 Showing best slides from 30th Chicago Int'l Exhibition of Nature Photog., 2 pm

21 Free Ayer Illus lect., "Changing Alaska Eskimo Culture," 7:30 pm

22 Free Ayer Illus lect., Changing Alaska Eskimo Culture," 2:30

23 Free "Ascent of man" film *Music of the Spheres*, 2 pm

28 Free Ayer Illus lect., "Natural History of Deep Sea Fishes," 7:30 pm

Field Museum hours
9 am to 4 pm Mondays through Thursdays;
9 am to 9 pm Fridays
9 am to 5 pm Saturdays and Sundays

JANUARY 1975

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MARCH 1975

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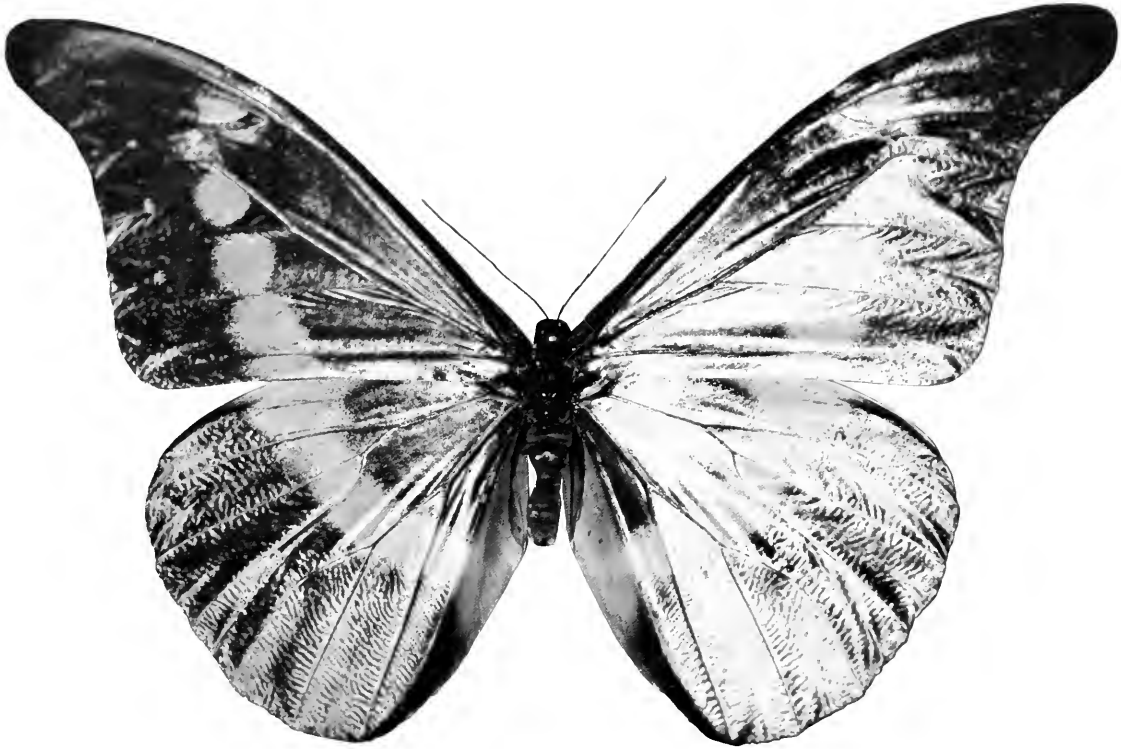

Morpho rhetenor var. *helena*
South America
Field Museum Collection
Photo by Herta Newton
(enlarged 1.5X)

march 1975

*** MARCH EVENTS**

1 Spring Journey for Children begins
1 Free Ayer Illus. lect., "Natural History of Deep Sea Fishes," 2:30
1 Members' children's workshops, 10:30 & 1:30
2 Free "Ascent of Man" film *The Starry Messenger,"* 2 pm
7 Free Ayer Illus lect., "The Tunguska Explosion: Meteorite, Comet, or Black Hole?" 7:30
8 Free Ayer Illus lect., "The Tunguska Explosion: Meteorite, Comet, or Black Hole?" 2:30
8 Members' children's workshops, 10:30 & 1:30
9 Free "Ascent of Man" film *The Majestic Clockwork,* 2 pm
14 Free Ayer Illus lect., "Wet Snails in Dry Deserts," 7:30
15 Free Ayer Illus lect., "Wet Snails in Dry Deserts," 2:30
15 Members' children's workshops, 10:30 & 1:30
16 Free "Ascent of Man" film *The Drive for Power,"* 2 pm
21 Free Ayer Illus. lect., "Veracruz, Mexico: Green Grow the Lilacs," 7:30
22 Free Ayer Illus lect., "Veracruz, Mexico" Green Grow the Lilacs," 2:30
22 Members' children's workshops, 10:30 & 1:30
23 Free "Ascent of Man" film *The Ladder of Creation,* 2 pm
28 Free Ayer Illus lect., "Frog Ecology in the Congo," 7:30
29 Free Ayer Illus lect., "Frog Ecology in the Congo," 2:30
30 Free "Ascent of Man" film *World within World,* 2 pm

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* 16	ST. PATRICK'S DAY 17	18	19	20	* 21	* 22
PALM SUNDAY * 23	24	25	26	PASSOVER 27	GOOD FRIDAY * 28	* 29
EASTER * 30	31			Field Museum hours 9 am to 5 pm daily except 9 am to 9 pm Fridays		

FEBRUARY 1975

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APRIL 1975

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New Guinea Emerald Python
Chondropython viridis
New Guinea
Photo by Hy Marx

april 1975

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27	28	29	30			

* APRIL EVENTS

1 Ray A. Kroc Environmental Educ. Prog. field trips and courses resume in April.

4 Free Ayer Illus. lect., "Collecting Mosses in Southern Chile," 7:30

5 Free Ayer Illus. lect., "Collecting Mosses in Southern Chile," 2:30

6 Free "Ascent of man" film *Knowledge or Uncertainty*, 2 pm

11 Free Ayer Illus. lect., "Ancient Ecuador," 7:30

12 Free Ayer Illus. lect., "Ancient Ecuador," 2:30

13 Free "Ascent of Man" film *Generation upon Generation*, 2 pm

18 "Ancient Ecuador Culture, Clay and Creativity, 3000-500 B.C." exhibit opens

19 Museum Traveler Day program. Journey awards and free film for children, 10:30

20 Free "Ascent of Man" film *The Long Childhood*, 2 pm

Field Museum hours 9 am to 5 pm daily *except* 9 am to 9 pm Fridays

MARCH 1975

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30	31					

MAY 1975

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18	19	20	21	22	23	24
25	26	27	28	29	30	31

Spectacled Flycatcher
Monarcha trivirgatus
Australia
Photo by Hart
and Judy Beste

may 1975

S	M	T	W	T	F	S
				MEMBERS' NIGHT **1**	MEMBERS' NIGHT **2**	* **3**
4	**5**	**6**	**7**	**8**	**9**	**10**
MOTHERS' DAY **11**	**12**	**13**	**14**	**15**	**16**	**17**
18	**19**	**20**	**21**	**22**	**23**	**24**
25	MEMORIAL DAY **26**	**27**	**28**	**29**	**30**	**31**

* MAY EVENTS

1 Members' Night at Field Museum

1 Ray A. Kroc Environmental Education Program field trips and courses continue

MAY EVENTS

2 Members' Night at Field Museum

3 Lelooska Carvers perform, 2 pm

Field Museum hours
9 am to 6 pm daily
except 9 am to 9 pm
Fridays

APRIL 1975

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JUNE 1975

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29	30					

Variegated Ground Squirrel
Spermophilus variegatus
U S Pacific coast
Photo by Hy Marx

Chipmunk
Eutamias sp
Rocky Mountains
Photo by Oscar Anderson

june 1975

S	M	T	W	T	F	S
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15	16	17	18	19	20	21
22	23	24	FATHERS' DAY 25	26	27	28
29	30					

* JUNE EVENTS

1 Summer Journey for Children begins

Field Museum Hours
9 am to 6 pm daily
except 9 am to 9 pm
Fridays and nights of
Grant Park concerts

MAY 1975

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25	26	27	28	29	30	31

JULY 1975

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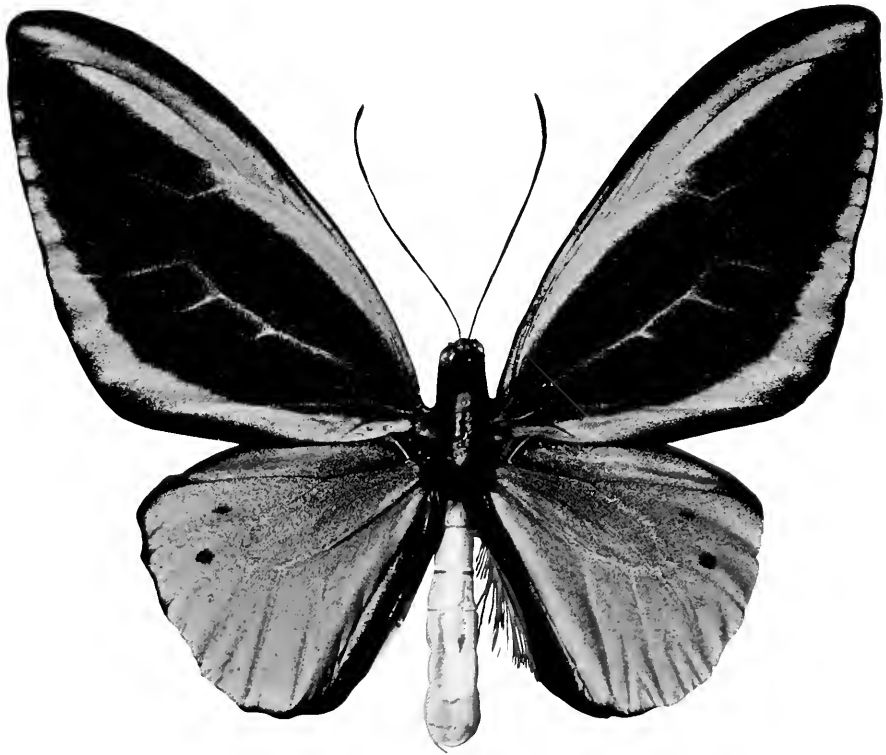
27	28	29	30	31		



Ornithoptera poseidon
Indonesia
Field Museum Collection
Photo by Herta Newton
(enlarged 1.5X)

july 1975

S	M	T	W	T	F	S
		1	2	3	4 INDEPENDENCE DAY	5
6	* 7	8	9	10	11	12
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27	28	29	30	31		

* JULY EVENTS

7 Public tours at 2 pm Monday through Friday until Aug 29

Field Museum hours
9 am to 6 pm Mondays, Tuesdays, Thursdays.
9 am to 9 pm Wednesdays, Fridays, Saturdays, Sundays

JUNE 1975

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AUGUST 1975

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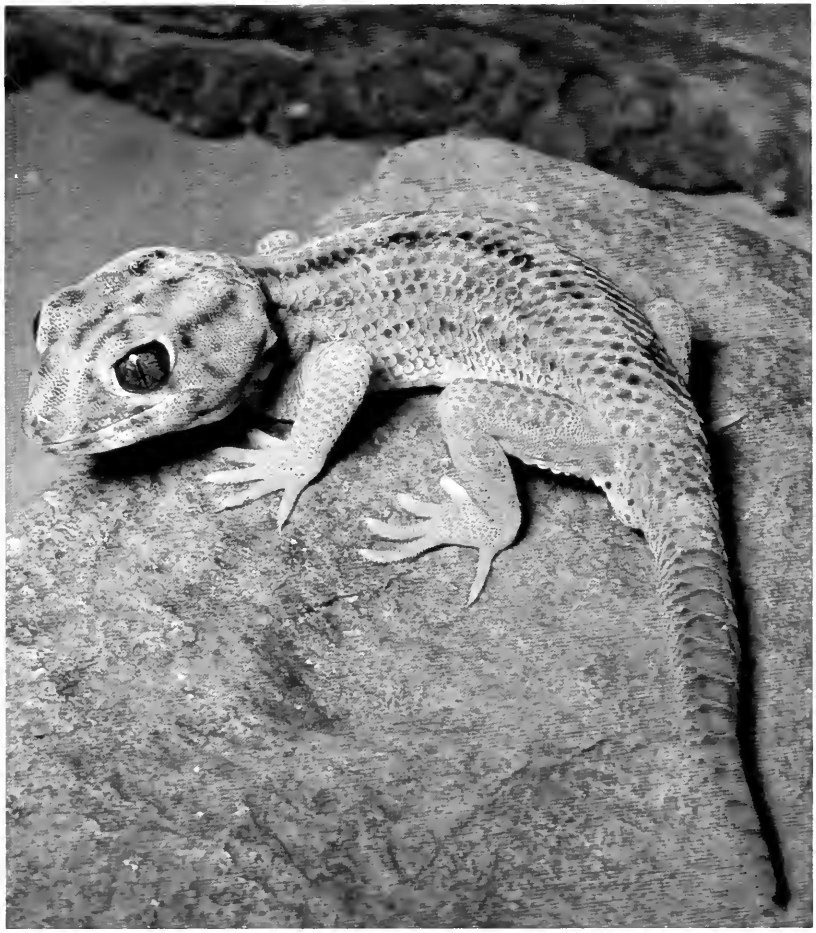

Turkestan Plate-Tailed Gecko
Teratoscincus scincus
Middle East
Photo by Hy Marx

august

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* AUGUST EVENTS

1 Public tours at 2 pm Monday through Friday until Aug. 29

Field Museum hours
9 am to 6 pm Mondays, Tuesdays, Thursdays, Saturdays
9 am to 9 pm Wednesdays, Fridays, Sundays

JULY 1975

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27	28	29	30	31		

SEPTEMBER 1975

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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Purple-Crowned Pigeon
Ptilinopus superbus
Australia
Photo by Hans and Judy Beste

september

S	M	T	W	T	F	S
	LABOR DAY * 1	2	3	4	5	ROSH HASHANA 6
7	8	9	10	11	12	13
14	YOM KIPPUR * 15	16	17	18	19	20
21	22	23	24	25	AMERICAN INDIAN DAY 26	27
28	29	30				

* SEPTEMBER EVENTS

1 Ray A. Kroc Environmental Education Program field trips and courses resume in September.

1 Fall Journey for children begins.

SEPTEMBER EVENTS

15 "Botanical Illustrations from Kew Gardens" exhibit opens.

Field Museum hours 9 am to 5 pm daily *except* 9 am to 9 pm Fridays and 9 am to 6 pm September 1

AUGUST 1975

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31						

OCTOBER 1975

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Blandford's Jerboa
Jaculus blandfordi
Persian plateau
Photo by Hy Marx

october

S	M	T	W	T	F	S
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12	COLUMBUS DAY 13	14	15	16	17	18
19	20	21	22	23	24	25
26	VETERANS DAY 27	28	29	30	HALLOWE'EN 31	

*OCTOBER EVENTS

1 Ray A. Kroc Environmental Education Program field trips and courses continue.

9 Twelve-week course for volunteers in education begins.

Field Museum hours
9 am to 5 pm daily
except 9 am to 9 pm
Fridays

SEPTEMBER 1975

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NOVEMBER 1975

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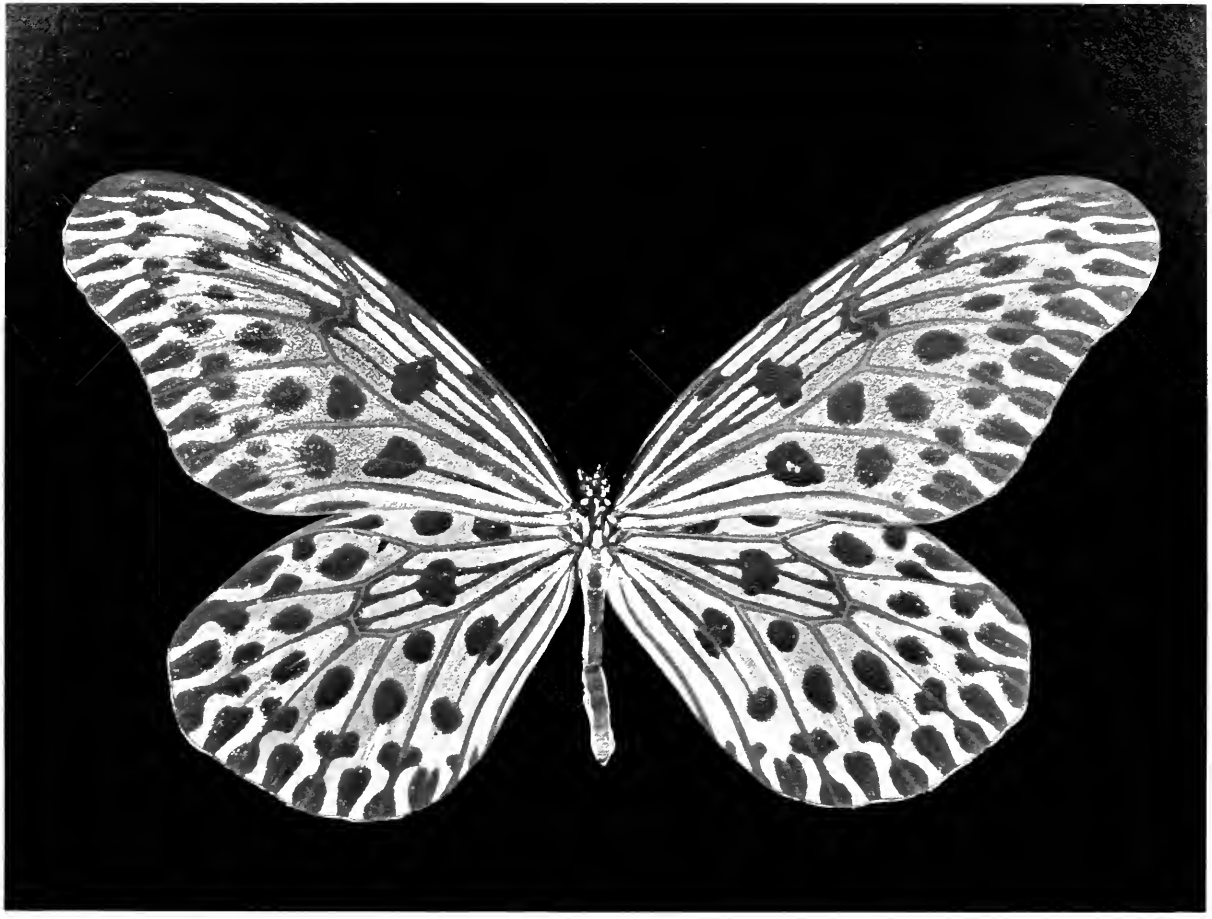

Idea lynceus tavorinus
Indonesia
Field Museum Collection
Photo by Hetta Newton
(enlarged 1.5x)

november

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2	3	4 ELECTION DAY	5	6	7	8
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23	24	25	26	27 THANKSGIVING	28	29
30						

Field Museum hours
9 am to 4 pm Mondays through Thursdays
9 am to 9 pm Fridays
9 am to 5 pm Saturdays and Sundays

OCTOBER 1975

S	M	T	W	T	F	S
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DECEMBER 1975

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Scarlet Macaw
Ara macao
South and Central America
Photo by Tom Stack

december 1975

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21	22	23	24	CHRISTMAS DAY Museum Closed 25	26	27
28	* 29	* 30	* 31			

*DECEMBER EVENTS

1 Winter Journey for Children begins
11 Alaskan Eskimo Art exhibit opens
29 Public tour at 2 pm
30 Public tour at 2 pm
31 Public tour at 2 pm

Field Museum hours
9 am to 4 pm Mondays through Thursdays,
9 am to 9 pm Fridays,
9 am to 5 pm Saturdays and Sundays

NOVEMBER 1975

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JANUARY 1976

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DECEMBER at Field Museum

EXHIBITS

Continuing

Field Museum's Anniversary exhibit continues indefinitely. "A Sense of Wonder" offers thought-provoking prose and poetry associated with physical, biological, and cultural aspects of nature; "A Sense of History" presents a graphic portrayal of the Museum's past; and "A Sense of Discovery" shows examples of research conducted by Museum scientists. Hall 3.

SPECIAL PROGRAMS

Ayer Adult Illustrated Lecture Series continues with "Expeditions Unlimited 1974-75" at 7:30 p.m. Friday and 2:30 p.m. Saturday in Lecture Hall. Seating limited to 225 persons. For reservations call Field Museum, 922-9410, Ext. 230.

December 6 and 7:
"Grand Canyon Expedition," narrated by Dr. Matthew H. Nitecki

December 26, 27, and 30

Guided tours of Museum exhibit areas leave from north information booth at 2:00 p.m.

Through December 20

Weaving demonstrations by members of the North Shore Weavers' Guild from 10:00 a.m. to 12:00 noon on Mondays, Wednesdays, and Fridays. Spinning will also be shown on December 2 and 16. South Lounge.

CHILDREN'S PROGRAM

Begins December 1

Winter Journey for Children, "Cats, the Graceful Hunters," a free, self-guided tour of Museum exhibit areas, focuses on the differences and similarities of cats, from the domestic variety to its larger relatives (lion, tiger, etc.). All boys and girls who can read and write may participate. Journey sheets in English and Spanish available at entrances. Through February 28.

MEETINGS

Dec. 6, 8:00 p.m.,	**Chicago Anthropological Society**
Dec. 10, 7:30 p.m.,	**Nature Camera Club of Chicago**
Dec. 11, 7:00 p.m.,	**Chicago Ornithological Society**
Dec. 11, 7:30 p.m.,	**Windy City Grotto, National Speleological Society**
Dec. 12, 7:00 p.m.,	**Chicago Mountaineering Club**

COMING IN JANUARY

Weaving demonstrations resume on January 6.

Ascent of Man, a series of one-hour films, opens with "Lower Than the Angels" at 2:00 p.m. Sunday, January 26, in the Lecture Hall. The films cover a time span of more than two million years and explore scientific discoveries that have shaped human history. They will be offered on consecutive Sundays through April 20.

MUSEUM HOURS

Open 9:00 a.m. to 4:00 p.m. Monday through Thursday, 9:00 a.m. to 9:00 p.m. Friday, and 9:00 a.m to 5:00 p.m. Saturday and Sunday

The Museum Library is open 9:00 a.m. to 4:00 p.m. Monday through Friday. Please obtain pass at reception desk, main floor north.

Museum telephone: 922-9410