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FRONT COVER: *Scene from Turkey River Mounds, Clayton County. Photo by Kenneth Formanek.*

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The "Driftless Area" of Iowa

WHAT LIES AHEAD?

People who have never visited Iowa — and some who have obliviously driven through — visualize it as a flat, rather monotonous area dominated mostly by corn. It is true our state is one of the flatter; it is true we have a lot of corn. But those who take time to poke into the corners and out-of-the-way places know Iowa is rich in subtle beauty, a state of contrasts, and filled with literate and friendly people who enjoy a high quality of life.

Consider its attributes and contrasts — two of the world's major rivers form the east and west borders; the deep, wind-blown loess hills of western Iowa are a world renowned featured; the deep, black topsoil is a result of centuries of growth of prairie grass; the rugged terrain, millions of years in the making, graces the northeastern corner. It is this last feature — the "Driftless Area" or "Little Switzerland of Iowa" that I want to discuss.

This rugged landscape, so unlike the remainder of Iowa, is in some ways not only unusual, but unique. Most of the ice caves or ice crevices (glacieres) are found here; it is a land of relict communities and species. It is a botanist's paradise — a place where various floras like the boreal element, represented by the balsam fir, white pine, yellow birch and Canada yew, meet the American lotus, goatsbeard, and swamp white oak, invading from the south. Refugees from the Rocky Mountains, like the Northern lungwort and certain snails are found in cool, moist habitats, close to the dry hill prairies which support members of the Great Plains flora. Several snails are found in this part of Iowa — and in no other place in the world! The Mississippi River supports the richest mussel diversity in the world.

It is a scientist's paradise — a legacy of glaciers gone awry — completely missed during the past two ice ages, a refuge for plants and animals. Thus, the ice gods left us a unique landscape to nurture, admire and protect.

Is it worth protecting? Scientists for nearly a century have answered a resounding affirmitive and have urged Iowans to protect the beauty, preserve the scientific wonders, and savor the scenic character that has added so materially to the high quality of life Iowans enjoy. The Black Forest of Germany is known throughout the world; but, it is an artificial entity — a faint shadow of its native condition, when compared to the Iowa driftless area.

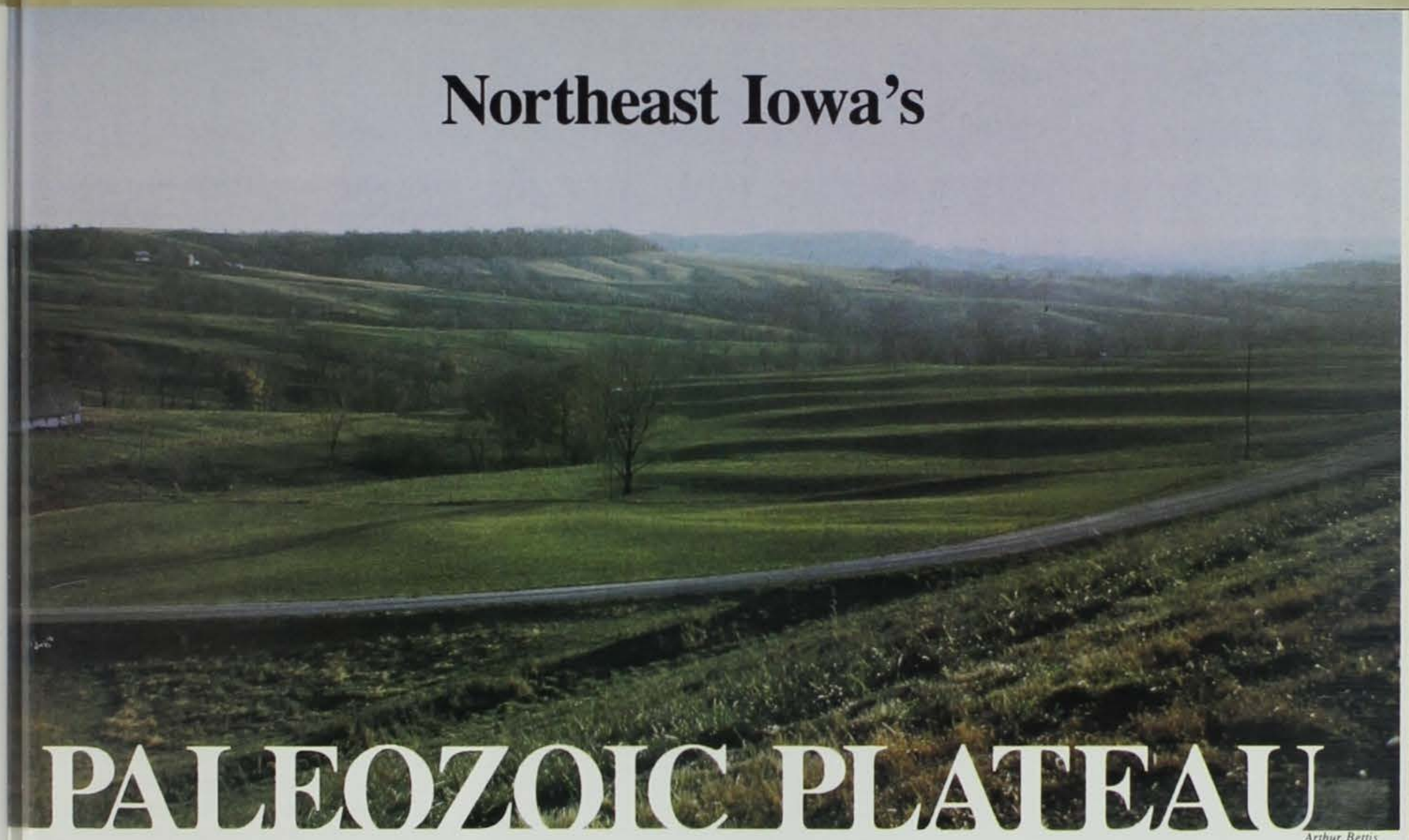
I have noticed that many people who live in this scenic wonder of Iowa do not recognize its singular beauty. They love their way of life but do not regard the landscape as unusual, and are often not concerned about protecting more of it. Some are hostile to more areas being protected and preserved. To those I plead: we must act soon and collectively, if we wish to allow future Iowans to enjoy the quality of life that we have known. Each time a woodland is cleared, a house built on a blufftop, a new highway constructed through a scenic area, we are all poorer. If we as Iowans dare to care enough to save all the remaining effigy mounds, the fragile cold-air slopes, the relict pine and fir stands, the flood-plain woodlands, the significant geological sites — we will have gone a long way toward telling northeast Iowans of the future that we were a compassionate people with sufficient foresight and fortitude to look short-term gain in the eye and not give in. Northeast Iowa — the Iowa driftless area — can be a world treasure. There is still time.

Recently, preservation and conservation agencies from the four states which contain a portion of the driftless area, met to discuss the significance of the driftless area and possibilities for an integrated program to protect its natural diversity. Each state agreed to increase the awareness of the driftless area in the minds of the citizens, to identify the most significant tracts and to attempt protection strategies for them. It is in this spirit that this special issue of the *Conservationist* is presented.

Dean M. Roosa, State Ecologist

Editors Note: This 48-page double issue is dedicated to the unique driftless area. Our regular monthly issues will resume in June. Photo contest winners will appear in the June issue.

Northeast Iowa's



PALEOZOIC PLATEAU

Arthur Bettis

Chicken Ridge near Elkader demonstrates the influence of underlying bedrock on the landscape. The timber-covered bluff marks the outcropping edge of resistant, Silurian-age rocks. Below the bluff are the gentle slopes developed on older, less resistant Maquoketa shale.

By George R. Hallberg, E. Arthur Bettis, III, and Jean C. Prior

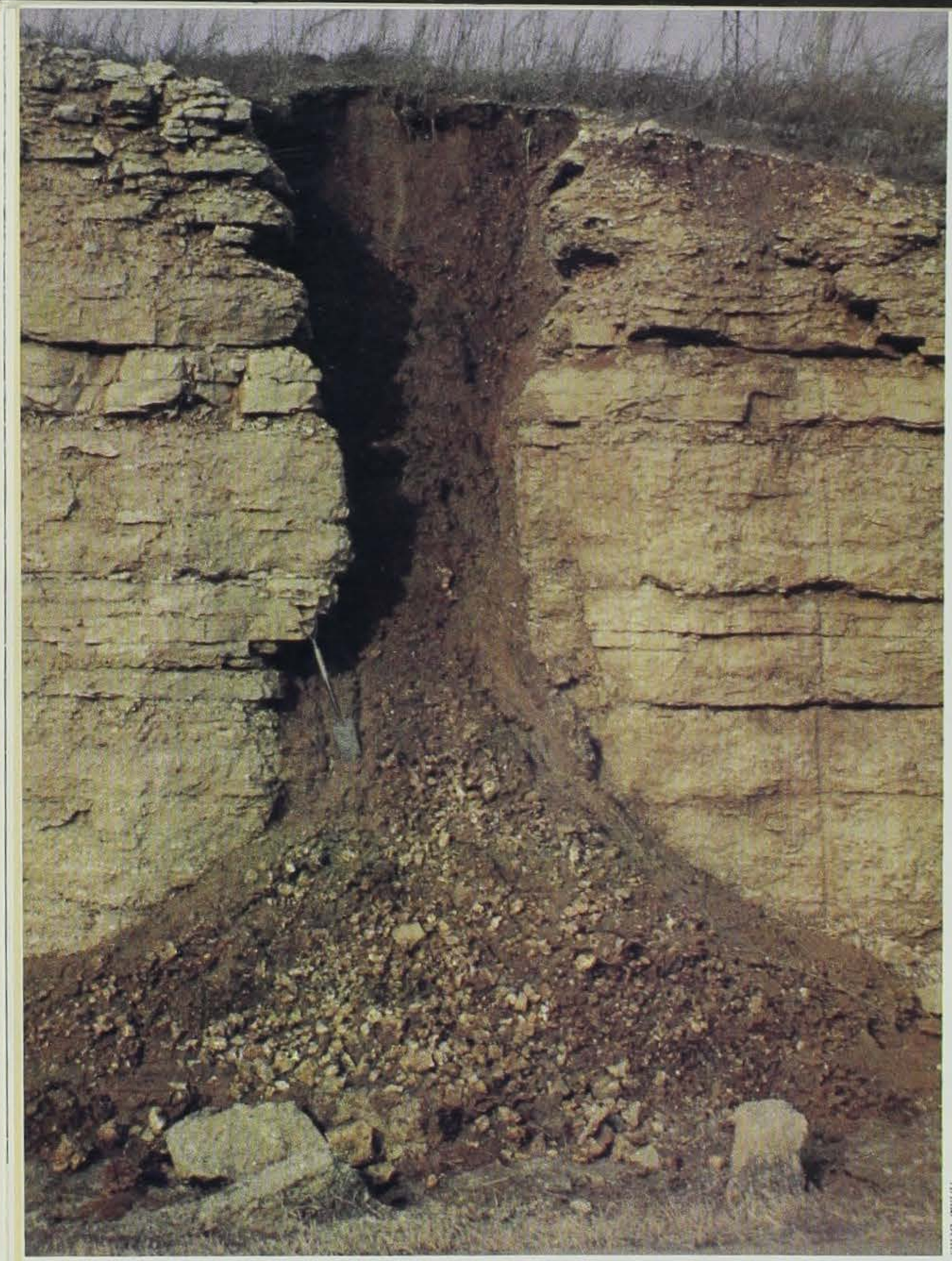
"To the traveler who has previously been acquainted with the topographic forms of Iowa only as they are developed in the drift-covered portions of the state, the extremes of relief and the intricacies and peculiarities of the topography...come in the nature of a surprise. The deep valleys, the high bluffs, the water-carved ridges, every topographic form, indeed, are each and all wholly unique, for the other parts of the state furnish nothing with which they can in any way be compared. The gorges, canyons with high, frowning walls, dome-like hills, and other peculiarities which the region presents, have led with much reason to speaking of..."The Switzerland of Iowa."

— Samuel Calvin
Geology of Allamakee County (Iowa) 1895

As noted by Calvin, landscapes of unexpected variety and scenic beauty exist in extreme northeastern Iowa. In comparison to the rolling terrain elsewhere in the state, the topography in northeast Iowa as well as adjacent portions of Minnesota, Wisconsin, and Illinois is unusually rugged. Differences in elevation between points along the Mississippi Valley and the uplands just a few miles distant are noted to be over 600 feet, or more than one-half the total amount of relief in the entire state. This area, clustered about the valley of the Upper Mississippi and its tributaries, has been referred to as "Little Switzerland," and in scientific circles has been known for many years as the "Driftless Area." Steep slopes, abundant rock outcrops, and deeply entrenched stream valleys provide the geologic framework for this especially picturesque region and its unique diversity of plant and animal communities.

The appearance of this deeply dissected terrain is strongly influenced by Paleozoic-age rock formations dating from Cambrian, Ordovician, and Silurian time, approximately 600 million to 400 million years ago. This is the only

The "Driftless Area" in Iowa, as originally designated by geologists, was limited to the extreme northeastern part of the state. However, its topographic characteristics as well as its distinctive flora and fauna actually extend farther west. This larger region, shown here in blue, is referred to as the Paleozoic Plateau, and its western boundary is clearly defined by the Silurian Escarpment and the Iowan Erosion Surface.



Arthur Bettis

extensive region in Iowa where bedrock so completely dominates the surface form of the land. The hard, resistant carbonate rocks (limestone and dolomite) and durable sandstones form numerous cliffs and escarpments, with waterfalls and rapids developed along the stream channels. Less resistant rocks, such as shale, yield more gentle slope patterns. Downcutting by the Mississippi River and its tributaries into these strata of varying resistance have resulted in terrain which reflects its bedrock core so closely that it is often possible to trace distinct geologic formations across the landscape. Balltown Ridge in Dubuque County and Chicken Ridge in Clayton County are especially good areas where these relationships can be observed.

These opportunities to study bedrock geology are rare throughout the gently rolling Midwestern landscapes. Northeast Iowa provides a "window" into the earth's underlying strata — a look at rock units that otherwise are hidden from view by a cover of glacial-age deposits sometimes hundreds of feet thick. This region attracts geologists and others interested in Paleozoic rock formations and their associated fossils, minerals, and other characteristics. Numerous university geology departments as well as professional geological societies plan regular field excursions into this outdoor laboratory.

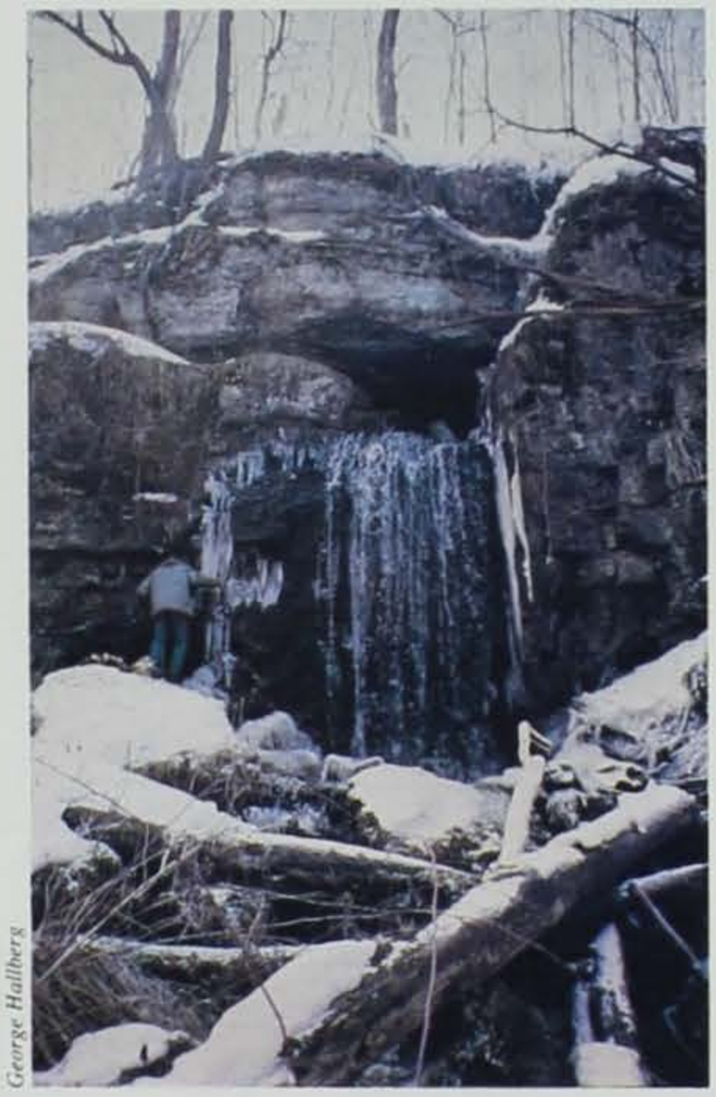
The characteristics of the rocks themselves also provide many of the unique features of the region. Carbonate rocks can be "dissolved" away by infiltration and movement of underground water, and through time, karst topography may develop. Karst features include sinkholes, subterranean caverns (such as Coldwater Cave in Winneshiek County), and perennial groundwater springs. The landscape's high relief, combined with varying slope angles and aspects, also provides a variety of microclimates, which in turn supports a diverse ecology that has long captured the attention of botanists and zoologists. For example, steep north-and east-facing slopes, backed by creviced limestones, are favorable sites for cold-air drainage, development of ice caves, and shelters for relict populations of Ice-Age plants and animals, long since gone from other parts of Iowa. This mosaic of earth materials, terrain, and microclimates provides the habitat for the diverse biota of the region.

The term "Driftless Area" has its origins in the early geologic interpretation of the region. The lack of recognition of deposits of glacial drift suggested that this area, with its high relief and extensive bedrock exposures, had not been touched by the glaciers. However, geologists, such as A. C. Trowbridge in the 1960's, documented numerous exposures of drift and pointed out that indeed the area was glaciated. Glacial deposits do occur along many of the stream divides. Recent work shows the so-called "Driftless Area" in Iowa was glaciated repeatedly during the early stages of Ice-Age activity in the Upper Midwest (Pre-Illinoian time). Stream erosion since the last glacial event in the area (about 500,000 years before present) has produced the deeply dissected landscape, and in the process also has removed the glacial drift from all but the upland divides. In addition, the area is mantled with 10 to 20 feet of windblown silt (loess) deposited more recently, between 25,000 and 14,000 years ago (Late Wisconsinan time). The loess cover often obscures recognition of the older glacial deposits.

Even though evidence of glaciation exists, this area continues to be referred to as the "Driftless Area." The term has provided a familiar and easily recognized "moniker" for the many botanists, zoologists, archaeologists, and

geologists interested in northeast Iowa. The original geologic designation of the "Driftless Area," however, is more restrictive than the topography and its associated flora and fauna suggest to the observer and natural scientist. Regardless of the details of glacial deposits and their history, the characteristics of the "Driftless Area" referred to by most biologists extend much farther west, covering an area nearly twice the size of that defined by earlier geologists. The boundary of this larger area of topographic and ecologic similarities is easily observed along its western and southern margins. Here the terrain changes abruptly from a rugged, dissected, rock-controlled landscape to the more gently rolling, subdued landscapes of the Iowan Erosion Surface and the Southern Iowa Drift Plain (see map). This change is in large part defined by the bluffs and cliffs developed along the northeast-facing outcrop belt of resistant dolomite marking the leading edge of Silurian-age rocks in Iowa. This prominent physiographic feature, known as the Silurian or "Niagaran" Escarpment, cuts diagonally across Dubuque, Clayton, and Fayette Counties. Further north, through central Winneshiek County, the Escarpment is less pronounced and is upheld by Devonian-age carbonate rocks. This larger region,

Opposite page: ***Sinkholes are common along Chicken Ridge, a portion of the Silurian Escarpment in southwest Clayton County. This vertical cross-section, exposed in a roadcut, shows the upper part of a sinkhole and the red clays and rock rubble which have collapsed and washed into it.***



George Hallberg

Left: ***Falling Spring, located near West Union in Fayette County, is a perennial coldwater spring issuing from Silurian-age carbonate rocks. Springs are common features in northeast Iowa. They develop where underground water, moving along crevices in the rock, is intercepted by the land surface, usually a valley sideslope.***

Below: ***This winter aerial view shows the entrenched meanders of the Yellow River valley in southeastern Allamakee County. This type of valley profile results from downcutting by the river into resistant bedrock formations. The deeply dissected topography adjoining the valley is also characteristic of the Paleozoic Plateau region.***

recognized as having many of the same characteristics as the original, more geographically restricted "Driftless Area" is better referred to as the Paleozoic Plateau (*Iowa Landforms*, Prior, 1976).

Although the ancient Paleozoic rocks provide the key ingredients of this landscape, its high relief is a product of much more recent geologic history — events during glacial (Pleistocene) and post-glacial (Holocene) time. Perhaps the most fascinating insight gained from current geologic research in the region is that much of the relief is remarkably young. Radiocarbon-dating of stream deposits shows that the deepest entrenchment, or erosion of the streams into the landscape, occurred only 20,000 to 40,000 years ago. Deeply entrenched, bedrock-cored meanders (such as the present sites of Elkader and Eldorado) which sit as much as 80 feet above the modern valley floor were abandoned between 20,000 and 14,000 years ago. Renewed downcutting since this time has continued to accentuate the relief.

The unique geologic setting of this region also results in its share of special problems for the people who live here. Many of the rock units exposed in the area are also important aquifers, or sources of groundwater for wells. Because these rocks are so close to the land surface, they are especially prone to contamination by man's activities. This is particularly true where the karst features mentioned earlier are developed in the carbonate rocks. Sinkholes, for example, provide direct conduits for surface-runoff water to enter underground crevices in the limestones and join the groundwater system. Any contaminants these surface waters contain, such as agricultural and industrial chemicals or wastes, may enter the drinking-water supplies of northeast Iowa residents. In fact, shallow water supplies in the karst areas of northeast Iowa show significant levels of contamination with nitrate. This is an issue of vital concern and many state and federal agencies are cooperating in detailed studies of the problem.

The geologic setting of northeast Iowa's Paleozoic Plateau provides the framework for its unique scenic qualities and its diverse ecology. It also poses unique environmental problems. Thus, in spite of its rugged appearance, this region also should be labelled: "Fragile — Handle With Care."

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Arthur Bettis III is research geologist for the Iowa Geological Survey. He holds a B.S. degree in anthropology and an M.S. degree in agronomy from Iowa State University.

Jean C. Prior is senior research geologist for the Iowa Geological Survey. She earned her B.A. degree from Purdue University and an M.S. degree from the University of Illinois.

This sinkhole in Clayton County opened during the corn harvest in the fall of 1981. Karst features such as this present physical hazards as well as water-quality problems for residents of the Paleozoic Plateau.

Dean Roosa

Arnold Roggman observes an algific talus slope located in the Roggman Boreal Slopes State Preserve.

PLANTS, ANIMALS AND PLANT COMMUNITIES

Among the most interesting features of the "Driftless Area" are its unique assemblages of plants and animals. Some of the region's species are more typical of distant places — a few are found nowhere else in the world. The following articles describe some of these special species and communities of Northeast Iowa.

David Newhouse

Plants of the Driftless Area

By

William P. Pusateri and Dean M. Roosa

William P. Pusateri, a native of Cedar Rapids serves as a botanist for the Natural Areas Inventory. After receiving a Bachelors degree from Coe College in 1973, he earned an M.S. in Botany from Southern Illinois University.

Dean M. Roosa has worked as State Ecologist for the Conservation Commission and State Preserves Board since 1975. He has a Ph.D. in botany from Iowa State University.

Top: ***Northern wild monkshood, known from fewer than 20 sites in the world, graces certain cool, north-facing slopes in northeast Iowa.*** Above: ***The yellow trout lily, known from only a few sites in northeast Iowa, is one of our earliest spring flowers. Widespread in forests in eastern North America, it is replaced in Iowa by its close relative the white Trout lily.***

The flora of northeastern Iowa has long been recognized by amateur and professional botanists as one of Iowa's very splendid treasures. A rugged, picturesque landscape is the setting for special assemblages of plants having closer affinity with the northern boreal forests and the eastern deciduous forests than to the rest of Iowa. This affinity reflects the dynamic nature of the area's geologic past.

During two glacial epochs, ice surrounded the driftless area without creating a continuous cover over the area we now call the Paleozoic plateau. This plateau functioned as a refuge or refugium for plant and animal species until the glaciers retreated. Some of these species have survived the rigors of past climatic changes and still remain today as the last surviving populations or relict communities of a much earlier era. It is here that the weathered and eroded ancient plateau provides a mosaic of microhabitats constituting a refuge for plant species with special environmental needs.

Today, these driftless area relicts represent highly significant populations of disjunct boreal species now at the edge of their range. The Paleozoic plateau also acts as a refugium for many of Iowa's endangered and threatened plant species. Approximately 50 endangered and 25 threatened species have been documented in this region of Iowa and the driftless area Flora comprises about 50 percent of the total taxa of the state. Professional and amateur botanists alike should be very concerned with the preservation of these relict communities for Iowans to study and enjoy.

A few of these rare communities have been preserved as part of the state preserves system. Examples of these preserves are the Bluffton Fir Stand, White Pine Hollow, Bixby State Preserve and Mossy Glen State Preserve. In addition to our state preserve system, many of our state and county parks also contain examples of these unique ancient vegetational communities. Care should be taken to see that these gems will be preserved for future generations.

Plants of Cool North-facing Talus Slopes

Slopes of shattered rock harbor some of the nations rarest species as well as a multitude of beautiful wildflowers characteristic of both northern boreal forests and eastern deciduous forests. A few of these special plants are described here.

Northern Monkshood *(Aconitum noveboracense)*

Another denizen of the deep shaded, cool talus slopes is the beautiful northern monkshood. Like the golden saxifrage, its species biology is dependent upon the cool air seeping from crevices in the loose talus. The air drainage maintains a constant summer soil temperature of about 43° Fahrenheit. Because of these extreme natural requirements and continual habitat destruction, the northern monkshood is now listed as a threatened species by the U.S. Department of the Interior. Disjunct populations are found only in Iowa, Wisconsin, Ohio, and New York; with Iowa having approximately 70 percent of the total world distribution.

Like other members of the buttercup family, its complex flowers are attractive to bumble bees which have become the main pollinator of this species. In return, the bees gather nectar and pollen for honey production. In this way, a species-dependent relationship has been built between this plant and animal species.

Since less than 25 populations are known to exist in the United States, the federal recovery plan was developed as an attempt to protect the few remaining wild populations. This plan attempts to establish protective agreements between developers and landowners in order to avoid destruction of monkshood populations in the future. Here in Iowa, the destruction of a monkshood population along a highway was avoided by the Iowa Department of Transportation. After alerted about the species occurrence in the path of construction, the DOT changed plans for building of the highway shoulder to avoid destruction of a significant population of this federally threatened species.

Rosy Twisted Stalk *(Streptopus roseus)*

A distinctive plant known only from five sites and rarely seen in northeast Iowa is the rosy twisted stalk or liverberry. It can easily be recognized by the twisted or bent stem which bears each flower or fruit. The generic name *Streptopus* comes from the Greek derivation "strepto" which means twisted. This species might be found in flower from early spring through June. It displays light green to pink bell-like flowers which terminates at the ends of the twisted stalks. Fruits are yellowish-orange becoming red when ripe.

It has been given a wide variety of regional common names which are both descriptive of its characteristics and

Dean Roosa

Randall Maas

Left: ***Common in boreal America, the lycopodiums are found in Iowa only on cool north-facing sites.*** Below: ***The Rosy-twisted stalk normally occurs in far-northern climes. In Iowa, it is restricted to mossy, north-facing cool slopes.***

disclose some of its past uses. Besides twisted stalk and liverberry, other names include cucumber root because Indians were believed to like the plant's cucumber-like flavor. It has also been called scoot berry for its strong cathartic effect.

Bunchberry *(Cornus canadensis)*

Also called dwarf cornel, bunch plum and crackerberry. As its specific epithet, *"canadensis"* implies this woodland wildflower is native of the northern regions of this continent, but in Iowa bunchberry is known from only two localities. Unlike its closest relatives, the dogwood shrubs, this species usually grows less than a foot tall from a creeping perennial rhizome.

Flowers are tiny and relatively inconspicuous, but surrounded by four large modified leaves called bracts. These bracts are particularly conspicuous due to their bright white coloration viewed against the deep green foliage leaves. The flowers eventually produce a tight cluster of red ripe berries from which the name bunchberry is probably derived. The tasteless berries are favored by many birds, and the whole plant serves as a browse for deer. In other portions of its range, some Indian tribes were known to eat the berries raw or make a tea from its dried roots in order to treat colic and fever.

Twinflower *(Linnaea borealis)*

Twinflower is another example of a fairly wide-ranging species which grows as far north as Alaska and Canada and south to the northern portions of the United States. It is a plant of the northern bogs and cool moist coniferous forests. In Iowa, its distribution is very limited. In fact, it is known from only three localities within the state.

This species grows as a delicate trailing evergreen with opposite round leaves. Flowers are born on upright branches. These branches are terminated by two pinkish bell-shaped nodding flowers.

Professional botanists are somewhat fond of Twinflower for its generic name. *"Linnaea"* was derived from the name of Carolus Linnaeus who is considered to be the father of modern-day botany and plant taxonomy. In fact, Linnaeus was so fond of this species that he commissioned a portrait of himself examining a twinflower in the field. The scientific name, *"borealis"* signifies a boreal distribution.

Bearberry *(Arcostaphylos uva-ursi)*

Like the twinflower, bearberry is a plant of arctic regions which ranges south to Virginia and west to Indiana, Illinois, and northeastern Iowa. It also is a creeping evergreen with terminal clusters of white or pinkish bell-shaped flowers. Unlike twinflower, it is a hardy low-growing shrub. Its flowers and ripe red berry-like fruit are characteristic of the heath family to which it belongs. The bark of the bearberry makes it fairly easy to recognize for it is papery in texture, reddish in color and exfoliates like the bark of some birch trees. It seems to grow well on both exposed rocky outcrops and sandy areas.

The fruit is edible, but insipid and mealy. Birds and other wildlife seem to be more appreciative of its flavor.

The name bearberry is derived from the Greek name arctos for "bear" and staphyle for "bunch of grapes". Thus, the name "bear's grape" in reference to the fruit. In Iowa, bearberry grows only at one known site.

Dwarf Scouring Rush *(Equisetum scirpoides)*

This very intriguing group is called by many common names: horsetails, snake weeds, jointgrass or scouring rushes. In Iowa, dwarf scouring rush is limited to the cool, north-facing slopes which mimics its habitat in the cool northern boreal forests where it thrives in greater profusion. In contrast, less than ten populations are known to be present in this region of Iowa.

Because of its dwarf size, it is somewhat easily overlooked; but like its other scouring rush relatives, it displays the unique characteristics of the horsetail family. They reproduce not by flower, for they have none; instead, it produces spores in cones which terminate the stems. Or, they reproduce vegetatively by underground stems. The above-ground stems are easily crushed because they are hollow. The name "jointgrass" comes from the regular horizontal markings or joints on the stem where tiny modified scale-like leaves arise. These leaves are hard to distinguish from small stems. Photosynthesis, therefore, must occur in the green stems rather than the tiny leaves. Horsetails are also known to contain silica within the cells of the plant. Early pioneers soon learned to crush the stems to release the fine granules of silica while scouring out their pots and pans.

Clubmosses and Ground-pines (Lycopodium species)

A group of primitive plants allied with the ferns is a common component of the ground cover of the boreal forests of the north. These are known as club mosses or ground-pines. They are neither pines nor mosses, but creeping and sometimes erect plants with tiny evergreen leaves. Like the horsetails and scouring rushes, they reproduce by spores produced in cone-like structures and by vegetative propagation.

In Iowa, we have five species, some with extremely limited distributions while others are a bit more common. These are known as the running clubmoss, round-branched ground-pine, crowfoot clubmoss, shining clubmoss and rock clubmoss. They are difficult to distinguish from one another, but yet each species maintains a unique beauty in itself. Few winter sites can compete with the sensation of seeing a ground-pine's greenery against the white of a fresh groundcover of snow. In its own way, it is as spectacular as seeing skunk cabbage pushing up through the white melting snow which surrounds it.

One of the reasons why clubmosses may be becoming so rare is that it has been widely picked as a Christmas decoration. This wasteful luxury, if continued, may lead to its eventual demise. Also, the spores of ground-pines are known to be very volatile. Some Indian medicinemen made use of this knowledge. They would throw handfuls of the spores into fires to create the magical effect of the flames rising with a roar. We should be thankful that both of these uses have long been discontinued, otherwise we would not be able to enjoy the unique beauty of these species today.

Cliff Dwellers

The sandstone and limestone escarpments of northeastern Iowa provide interesting habitats for fragile cliff-dwelling plants. The following is an account of a few selected species.

Muskroot *(Adoxa moschatellina)*

Another interesting cliff dweller and uncommon plant of this region is the muskroot. As its name implies, some consider the odor of its rhizome (a white, scaly, underground stem from which vertical stems and roots arise) to be an unpleasant scent. To others, it is reminiscent of the pleasant musky odor of wine cellars.

The scientific name, *Adoxa*, is Greek for "insignificant" or "obscure". This truly fits the habit of the plant which grows to be only about five inches in height; and to the untrained eye, it is fairly nondescript in relation to other common cliff dwellers.

(continued on page 44)

Francis Kingsbury

Sinkholes and rocky ledges provide excellent denning sites for the state-endangered bobcat.

Ken Formanek

A number of bald eagles winter in Iowa, but for the first time in many years a pair of bald eagles has nested within Iowa's borders.

Northeast Iowa's Animals

By Robert W. Howe

The driftless area in northeastern Iowa is a special place for animals. More than one-fourth of our state endangered and threatened species occur in this small region which encompasses less than five counties. Some animals occur nowhere else in Iowa. All five of Iowa's federally endangered animals inhabit (or at least did inhabit) the driftless area. A number of other driftless area species are rare or absent in other parts of the state.

Why is this region so rich in animal species? Reasons are many and varied. Unlike plants, animals can move great distances, and in most cases they are able to seek out places in which to live. This is especially true for birds and larger mammals. A great many species prosper in the driftless area simply because their favored habitat is still abundant there, the rough and rocky terrain having escaped wholesale changes so characteristic elsewhere in Iowa. Past geological events in northeastern Iowa have affected most of today's animals only indirectly. Yet, as we shall see, the Ice Age has left us with a few curious remnants — survivors from the frigid landscapes of more than 10,000 years ago.

Refuge For The Rare

During the past two years, something of great significance has occurred in the northeastern corner of Allamakee County. For the first time in many years, a pair of bald eagles has nested within Iowa's borders. Our national symbol, this bird suffered catastrophically from the use of DDT and related agricultural pesticides. But with stricter regulations against the use of such poisons, eagles seem to be making a comeback. The Iowa Conservation Commission has purchased land where these eagles nest, and biologists will be watching the birds carefully in coming years. Perhaps one day Iowans again will be able to enjoy a healthy breeding population of this magnificent species.

Bob Howe serves as Biologist and coordinator for the Natural Areas Inventory. He earned his Ph.D. from the University of Wisconsin working with birds in small woodlots of southern Wisconsin and Australia.

Another victim of pesticides, the peregrine falcon, last nested in northeastern Iowa during 1967. Although no nests have been reported since that time, recent sightings and success elsewhere in their range give us hope that peregrines also may return to our state.

A number of other species, unfortunately, have declined dramatically in recent years. Habitats in the driftless area are critical for their survival in Iowa. For example, a recent study by James Bednarz of Iowa State University concluded that fewer than 20 pairs of the red-shouldered hawk still nest in Iowa. All but a few of these occur in extensive forests of Allamakee and Clayton Counties. Should these remnant forests be fragmented further, red-shouldered hawks, once common in Iowa, would be lost from our state.

Bobcats also enjoyed a wide distribution throughout Iowa. Today only a few remain, most in rugged forests of the driftless area. Even such familiar animals as the spring peeper, a frog of calm woodland pools, have disappeared from much of their former range. Northeastern Iowa provides pristine habitats where choruses of this tiny animal still can be heard.

Another inconspicuous animal, the five-lined skink, persists tenaciously in northeastern Iowa — almost 100 miles from the closest populations in Wisconsin and Illinois. Only one isolated population of this elusive reptile is known from nearby Minnesota.

Are there other species whose last refuge in Iowa is the rocky northeastern corner? Almost certainly yes. Nearly all recent sightings of black bears come from this part of the state. If bears survive at all in Iowa, forested regions of the driftless area are the most likely places to find them. Cooper's and broad-winged hawks, flying squirrels and other species, while found occasionally in other parts of Iowa, reach their greatest abundance in the northeast. Other species are discussed below. Truly, the driftless area gives us more than appealing scenery and economic resources.

Boreal Birds

Iowa is a prairie state. Yet many people, even Iowans, are not aware that cool moist forests, some dotted with conifers, occur within the state's borders. Sounds in these forests sometimes conjure images of lands to the north — Minnesota, Wisconsin, and Canada. Imagine the delight of Dr. Harlo Hadow, an ornithologist from Coe College, when he discovered evidence of nesting by the tiny winter wren in Pikes Peak State Park. This bird, as the name implies, is a denizen of the north, quite unexpected in Iowa. Several other individuals or pairs have been reported recently in Yellow River State Forest and elsewhere in the driftless area. Other boreal birds whose ranges dip into northeastern Iowa include the yellow-bellied sapsucker, brown creeper, least flycatcher, and veery. For the past two summers Darwin Koenig, Executive Officer for the Poweshiek County Conservation Board and one of Iowa's leading bird experts, has observed singing Canada warblers on an undisturbed slope in Dubuque County. Peterson's *Field Guide to Birds East of the Rockies* shows northern Wisconsin as this species' nearest breeding range. Could Canada warblers, like the others, breed in Iowa? Another northern songbird, the chestnut-sided warbler, has been reported in Winneshiek, Fayette, and Clayton Counties. Five adults and fledged young were observed in the Volga River State Recreation Area during 1978. Blackburnian warblers, golden-winged warblers, and mourning warblers have been known to nest in nearby southern Wisconsin and northern Illinois. Perhaps a few breeding pairs of these colorful species also occured — or maybe still occur — in northeastern Iowa. Such out-of-place warblers form an insignificant part of our state's avifauna, yet their occasional presence adds to the excitement of summer birdwatching in the driftless area.

Clear Streams and the Upper Mississippi

Many animals living in the driftless area depend largely or entirely on clear streams and rivers which flow through the landscape. Most of these water-loving animals occur elsewhere in Iowa, but the relatively undisturbed river margins and high water quality make the region especially favorable.

The Mississippi River channel between New Albin and Davenport is home for nearly a dozen nesting colonies (rookeries) of great-blue herons and (less commonly) great egrets. Sloughs and islands of the main channel provide undisturbed sites and protection from nest predators. Hundreds of birds have been reported from these sites, critical breeding areas for the tall wading birds that we commonly see while driving or boating along the river. Another inhabitant of the channel is the

Ron Johnson

Right: ***Several species of land snails are known only from Iowa's driftless area. Some, until recently, were thought to be extinct.*** Below: ***Northeastern Iowa is home for an isolated population of five-lined skinks.***

Joseph Collins

state-threatened river otter. Previously common throughout Iowa, this species once was on the verge of extinction in the state. Although river otters still are very rare in Iowa, a stable population seems to exist in the Upper Mississippi River.

Rivers and streams of the driftless area are themselves major habitats for special animals. At least ten of our native fishes are known to occur in Iowa only in the Upper Mississippi River or tributaries in the driftless area. Iowa's only native trout, the brook trout, reproduces naturally in a few clear streams of northeastern Iowa. Survival of several state-threatened fish species, including the chestnut lamprey and bluntnose darter, probably depends on the maintenance of high water quality in the Upper Mississippi River and its tributaries.

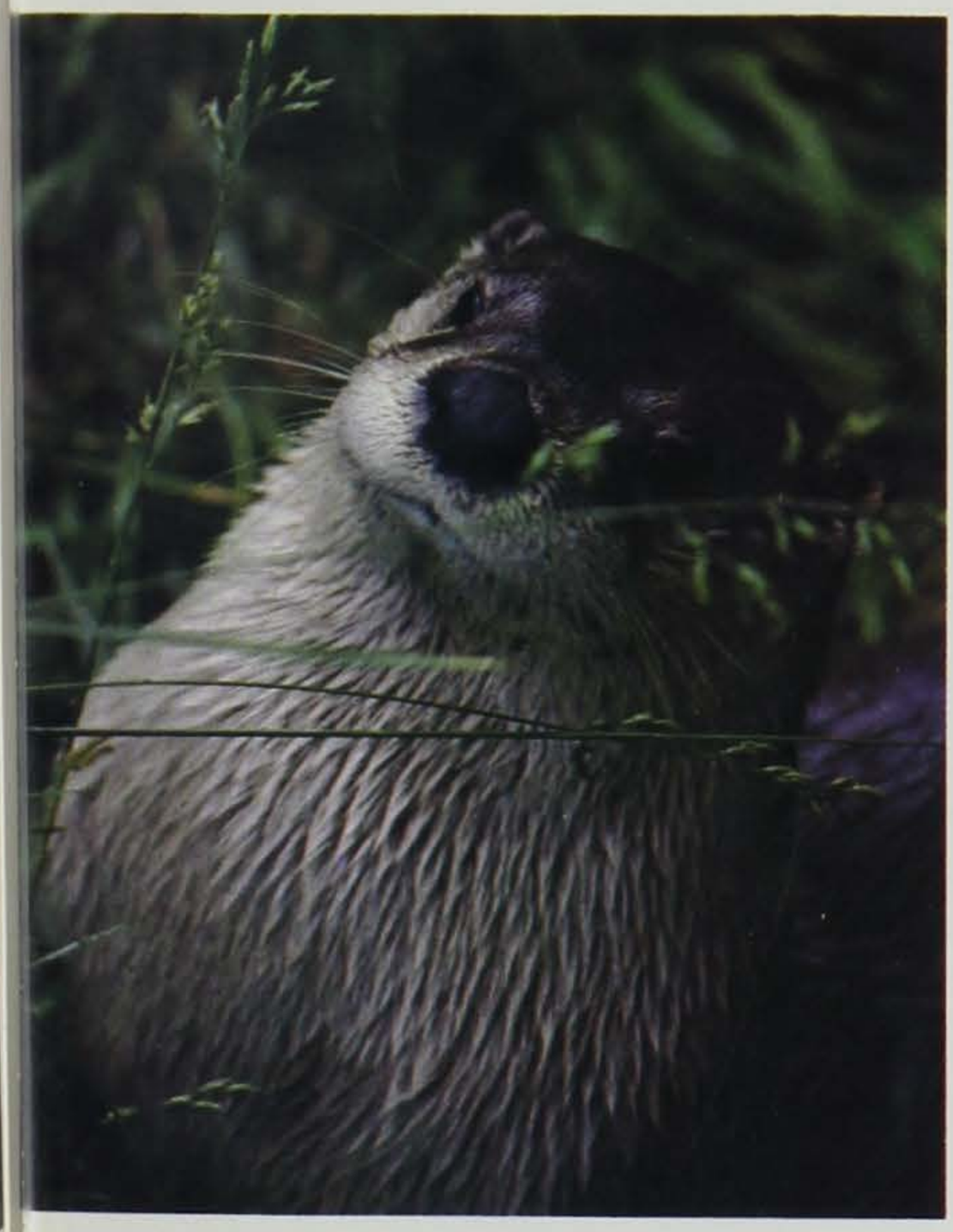
The Mississippi River was directly associated with a most colorful yet short-lived episode in Iowa's history — the pearl button industry. Hundreds of thousands of fresh-water mussels (clams) were taken from the channel and processed in busy river towns such as Muscatine and Davenport. Today, due to overharvesting, sedimentation, pollution and perhaps other factors, several species of Mississippi River mussels are dangerously close to extinction. Others that were once common are now very rare. One species, the federally endangered fat pocketbook, has been found very rarely in recent years. Critical habitat for another endangered species, the Higgins' eye clam, has been identified at several places in northeastern Iowa. Waters of the driftless area probably hold the key to survival for this rare species, which is found only in the Mississippi River drainage between southern Minnesota and Burlington.

Why should we worry at all about obscure species like the Higgins' eye? Perhaps the most important reason is that their status reflects the health of our own environment. The plight of Higgins' eye is symptomatic of a broader problem. North America supports the richest diversity of fresh-water mussels in the world. Many of these are restricted to the Mississippi River drainage. Unfortunately, a great many (perhaps most) are either rare, declining, or extinct. By protecting habitat for these humble creatures, we are protecting environment upon which we also depend.

Relicts From The Ice Age

Animals discussed so far are present in the driftless area because: (1) suitable habitats, particularly forests and quality streams, abound; (2) the region is situated at the extreme corner of the state, incorporating southernmost range limits of many northern species; and (3) the rugged landscape has not been developed extensively for agricultural purposes.

Are there species whose presence is due more directly to the region's peculiar geological history? Research during the past several years has shown that indeed northeastern Iowa is inhabited by several "relict" forms, isolated from their nearest relatives by hundreds of miles. These species might have been present in the region for thousands of years, the driftless area serving as a refuge from giant masses of ice. Other species invaded Iowa from the north in front of advancing glaciers. Later, as the ice melted, populations retreated to their former haunts in Canada and northern



B. Dyer

Left: ***The once-common river otter declined dramatically during settlement of Iowa. Today it might be making a comeback along the Upper Mississippi and its tributaries.*** Above: ***Although its range extends into the Appalachian Mountains the chestnut-sided warbler is found mainly in northern states and Canada. Recent evidence suggests that the species also nests in the Volga River State Recreation Area.***

states. Professor Holmes Semken and students at the University of Iowa have found bones of the arctic ground squirrel, collared lemming, and other northern animals in caves of northeastern Iowa. Today, these species are found in tundra or coniferous forests far to the north of our state. A few "boreal relicts" however, were left behind long after the glaciers were gone. Two such animals are fishes of cool waters — the slimy sculpin and lake chub. Iowa populations of these species are widely separated from their main ranges to the north. The lake chub was collected in the early 1950's at Twin Springs Creek near Dubuque. Unfortunately, the stream has deteriorated in quality, and recent attempts have failed to relocate the species. Slimy sculpins, on the other hand, still can be found in a number of clear driftless area streams.

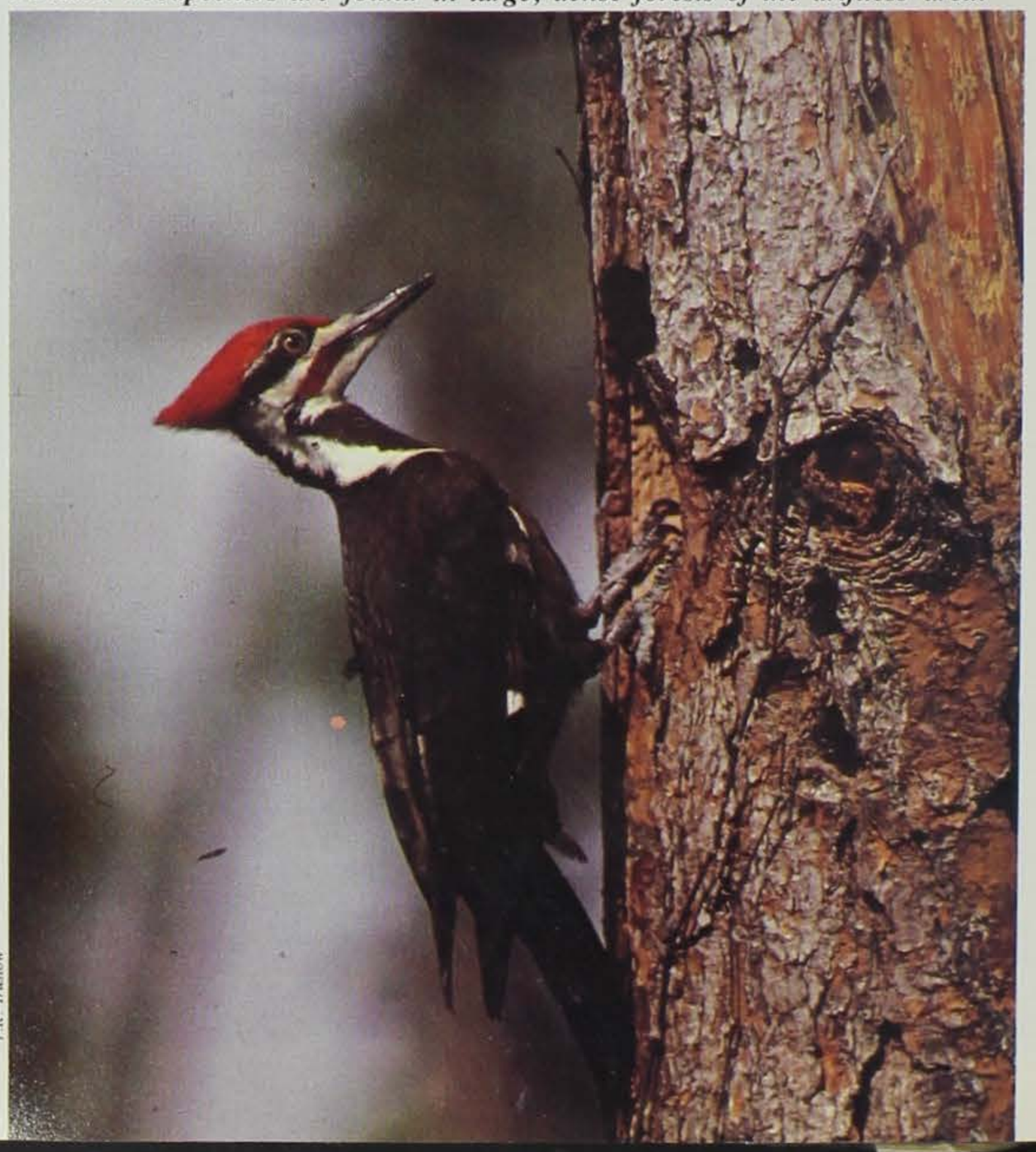
Perhaps the most interesting Iowa glacial relict is the federally-endangered Iowa Pleistocene snail. Biologists had known this species for many years from fossil deposits in Illinois, Wisconsin, Iowa, and other parts of the Midwest. It was thought that like many other species this tiny snail had gone extinct thousands of years ago. Then, in 1940, a scientist examining some snails in the U. S. National Museum discovered that the eminent Iowa naturalist Bohumil Shimek had once collected live specimens of the Iowa Pleistocene snail. Shimek had not realized the significance of his find. Despite repeated searches, his original collection locality was not rediscovered until 1955. Biologists commissioned by the U. S. Office of Endangered Species and others tried to find additional sites but failed. In 1980, Terry Frest, a geology graduate student from the University of Iowa, was asked by State Ecologist Dean Roosa to investigate the Iowa Pleistocene snail. Not only did Frest find new localities for the endangered species, but he also discovered two more relict snails and another species new to science! All four of these unique snails are restricted in very small numbers to special cold-air slopes in the Iowa driftless area.

Dr. Kenneth Christiansen of Grinnell College has devoted much of his career to a poorly known but ecologically important group of insects, the springtails. Thousands of these tiny animals might occur in a single shovelful of soil, where they feed on decaying plant material and microorganisms. Dr. Christiansen found that several species of springtails occur only in Iowa's driftless area. One species *(Onychiurus gelus)* is known from cold caves in northeastern Iowa and southwestern Wisconsin, in addition to special lava-formed caves in the state of Washington, nearly two thousand miles away! This species probably was much more widespread in the past; events over many years have fragmented its range into today's small localized populations.

Did any animals survive in Iowa during the cold, harsh conditions of the Ice Age? We will never know for sure, but evidence suggests that most species were driven farther south during glacial advances. Some, of course, never returned. Others have since moved north again beyond Iowa's borders. If any species were able to persist in the driftless area, they must have lived in sheltered or otherwise buffered habitats. Underground springs and water courses could have provided such conditions. A tiny aquatic animal *(Stygobromus iowae)*, an amphipod — relative of crayfish — is known today only from a few caves and seeps in northeastern Iowa. Several other specialized aquatic invertebrates (isopods in the genus *Asellus)* are restricted to underground waters in the driftless area. Another odd creature, a white flatworm of unknown identity, was collected at Maquoketa Caves in Jackson County by Dr. Jerry Carpenter of Northern Kentucky University. This animal has never been carefully studied, but it too might represent a species unique to northeastern Iowa. Presence of geographically restricted species like these suggests that perhaps a few types of organisms have lived in the driftless area since preglacial times. Perhaps other relict species remain to be discovered.

The driftless area truly is a biological refuge. Thousands of years ago, a few animal species apparently found refuge there from ice-covered landscapes of the Pleistocene. Later, the driftless area became a southern refuge as boreal animals moved north behind the retreating ice. Finally, the region today serves as a refuge from intensive land-use practices which characterize so much of Iowa and surrounding states. Perhaps more than any other part of Iowa, the driftless area retains pockets of our landscape and original fauna as they existed before settlement.

Pileated woodpeckers are found in large, dense forests of the driftless area.



F.K. Truslow

David Glenn-Lewin

Plant Communities

By Dr. David Glenn-Lewin and Roger Laushman

Roger Laushman is the community ecologist for the Iowa Natural Areas Inventory. He has a B.S. from Kansas University and did his master's research at Iowa State.

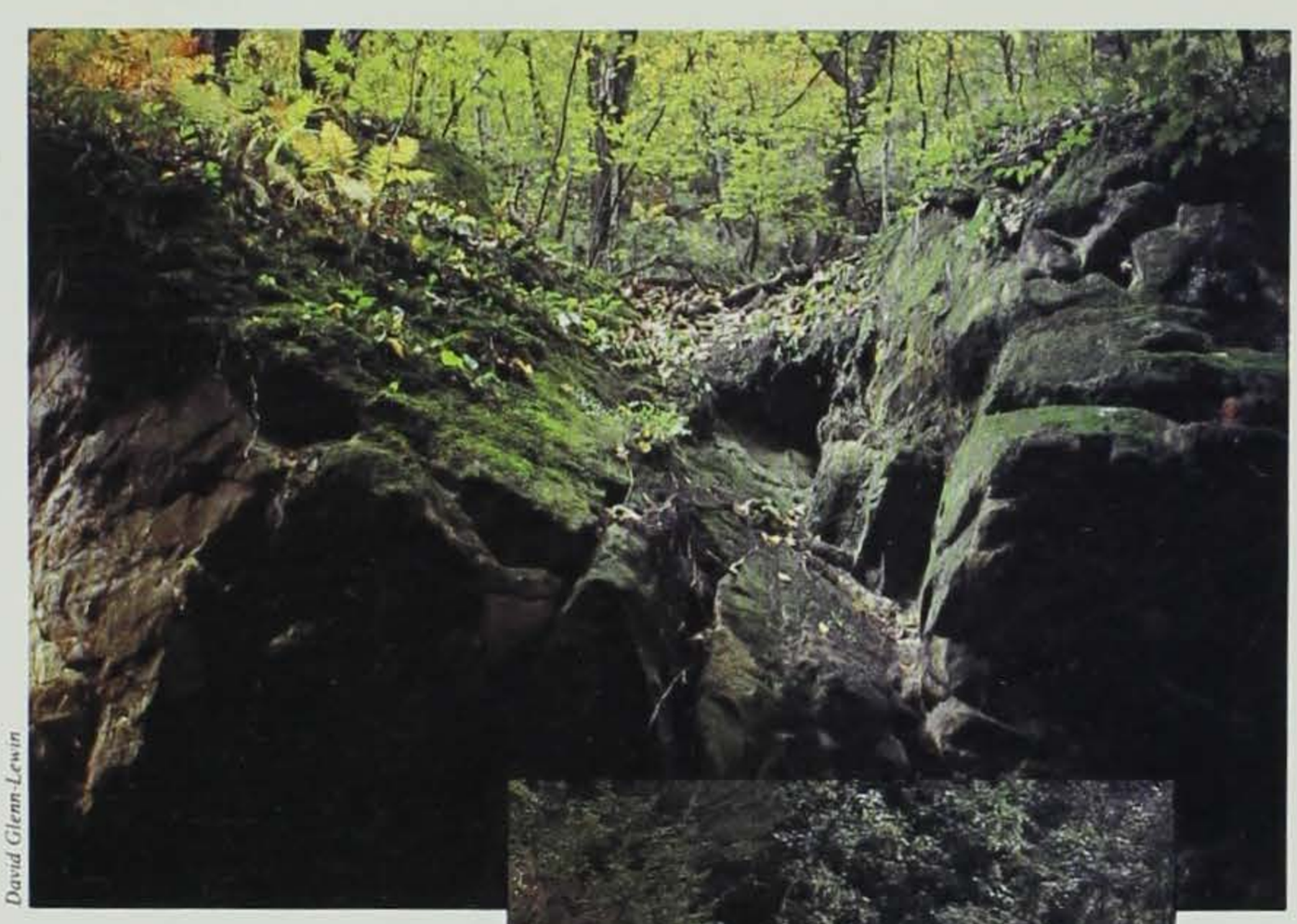
David Glenn-Lewin is an associate professor of botany at Iowa State University. He has earned an A.B. degree from Knox College and a Ph.D. from Cornell University.

While traveling across much of Iowa it is not difficult to imagine the great sweep of prairie grassland that was the home of the plains Indians and the bison. There is something intuitive about it — the landscape *should* be a grassland landscape and the trees dotting the view today somehow look out-of-place. However, while traveling from Guttenburg to Elkander, or from Decorah to Marquette in northeastern Iowa, the sensation is just the reverse. The trees look right in this setting. Of course, the trees are the natural element here, because, of the 15 percent of the state's surface that was originally forest, a large portion was located in this corner of the state.

As a landscape, the driftless area was and is forest. Within this timbered landscape, however, is a great variety of environments and consequently, a great variety of natural vegetation. The forest landscape itself varies from dry, open glades with scattered trees, to tall, dense slope forests, to alluvial, riverside woods that are flooded in the spring. In addition to this diversity, there are also other, smaller ecological communities that fit into the forest landscape. These usually occur as patches situated in unusual or extreme habitats and are the special communities that make the driftless area a special region. Hill or bluff prairies, bits of vegetation so widespread to the west, comprise one example. Other special communities include north-facing slopes that have cold air draining from the ice caves in the region (the "algific slopes"), micro-communities on outcrops of sandstone and different ones on limestone cliffs. Small patches of sand also have characteristic plant assemblages.

Midwestern states are fortunate because the federal land surveys that laid out the grid, (now so easily recognized by section roads on a map), were done before the landscape was much altered by European settlement. The surveyors recorded "witness trees" at certain intervals along their survey lines, and by some time-consuming but rewarding effort, we can use these records to reconstruct a good view of what the pre-settlement vegetation was like. In Allamakee County for instance, the surveyor's notes tell us that over three-quarters of the witness trees were some kind of oak, mainly white oak or burr oak. Hickory was less abundant, but nevertheless was a tree that occurred regularly. It would seem from the surveyor's notes that the pre-settlement forest was an oak-hickory forest. Today the most common trees are also oaks, so despite a great deal of human influence, the leading species have remained the same. This is not to say, however, that the effects of man have been minimal. Quite to the contrary, our influence has been pervasive and in most cases degrading.

One of the interesting things to come from the surveyor's notes is the observation that the average distance from



David Glenn-Lewin

Roger Laushman

Above: ***This rock ravine in Pikes Peak State Park shows bedrock which is at or near the surface throughout the driftless area.*** Right: ***Different in appearance from the typical tallgrass prairies of Iowa, hill prairies occupy predominantly south-facing slopes.*** Below: ***Hesper township in Winneshiek County maintains this example of a dry outcrop of St. Peter's sandstone.***

Dean Roosa

the surveyer's point to the nearest tree was greatest for burr oak, 104½ feet. This means that the forest was very open, more like a savanna than a forest. Indeed, the surveyors often wrote "oak barrens," a term that surely must have meant something like a savanna. Burr oak invaded the prairie grassland, and if they escaped fire for a few years, they would become large enough that any subsequent fire did not damage them. Thus, an occasional burr oak would succeed, and grow to maturity in a surrounding ocean of grass, creating the savanna. Oak savannas, because of the prairie grasses, built fertile soils; thus, we see no primeval savanna today. It has all been cleared or converted to agricultural land.

Such slow and sporadic invasion of the prairie must have been widespread (we know it was going on for at least two thousand years), but it does not mean that forest invasion of the prairie could not be more rapid. In some places, one can find a closed forest growing on soils that clearly developed under prairie vegetation. In one township in Clayton County, for instance, only 10 percent of the soil is classified as "forest soil," yet 70 percent of the county was forested at the time of settlement.

The forest landscape of today is substantially altered from that of 150 years ago. Nevertheless, remnant pieces of forest and forested areas that had been disturbed but have been allowed to redevelop are sufficient for us to understand the broad features of forest structure and composition, to know the kinds of trees that are natural in the forest, and how they are distributed in the landscape. We stated already that, overall, the forest is an oak or oak-hickory forest, but within this, what variations in the forest community can we recognize? It is possible to use any of several criteria to describe forests, but the forests of the driftless area can be conveniently described by using a combination of habitat position and the dominant, or most abundant, species of trees. In this way, the forest landscape can be divided into six parts: floodplain forest, hard maple forest, basswood forest, red oak forest, white oak forest and white pine forest. In addition to these general kinds of forest vegetation, there are many combinations of species that occupy unusual or restricted habitats. As might be expected, some of these unusual communities are among the most interesting in the region.

The floodplain forest, or alluvial forest, is found along the river bottoms of the Mississippi River and its larger tributaries, such as the Upper Iowa River and the Turkey River. The floodplain forest along the Mississippi River is not as extensive in northeast Iowa as it is in other places because the valley walls are steep and close to the river bed. In the tributary streams, small pieces of floodplain forest can be found where silt has been laid down on the insides of river bends. Floodplain lands are very fertile, and so they have been cleared mostly for agriculture. Old descriptions, and the few remaining pieces, indicate that the most important trees near the water are willows. Silver maple, basswood, elm, cottonwood, box elder, and ash grow on the broad flats of the floodplain. They grow very high, and often create an open feeling under the high forest canopy. The trees may be festooned with poison ivy, wild grape or Virginia creeper vines. The willow edges along the water can be impenetrable.

All the other common forest types are upland, existing where floodwaters do not reach. Which particular kind of forest and which particular combination of tree species exists in a location depends largely upon the slope position and exposure of the site. The lowest and most protected slopes, where stress due to summertime temperatures is least, are occupied by hard maple or basswood forests. These two species are often mixed together, or alone they may be the leading species, basswood usually being in the most protected sites. These forests include many of the best known hardwood species, such as black walnut, red oak and bitternut hickory. The forest floor is richly carpeted with numerous herbs that enjoy the protected environment. Some of the most common or characteristic include bloodroot, with its orange juice, wild ginger, which has inconspicuous flowers buried in the leaf litter; the three-lobed hepatica; and the delicate maidenhair fern.

Red oak is the dominant tree on middle slopes. This species can grow to very large size and a grove of old red oaks mixed with a few other tree species can be an impressive sight. Others may include hard maple and basswood as well as white oak, ash, and shagbark hickory. Ironwood is usually very abundant in the understory of these woods.

On upper slopes and on upland flats, the forest is usually composed of large numbers of white oaks, with much lesser amounts of several other kinds of trees. Occasionally, red oak will also be abundant. As in the red oak woods, ironwood is common in the understory. The forest floor is covered with a carpet of grasses and sedges, and many kinds of herbs and small shrubs.

Sometimes, we can tell that a white oak woods and some red oak stands have been grazed. The oaks take on a spreading appearance, which indicates their "open grown" character. Even more exemplary is the abundance of spiny or prickly shrubs, such as gooseberry and prickly ash. These are not eaten by the animals and so are favored over time. When grazing is stopped, a flush of tree reproduction may occur, filling the understory with small saplings.

On some of the drier, more exposed sites, a forest with many white pines has developed. This tree, at the western extreme of its range, may tower above the oaks and other hardwoods. White pine is usually found on rocky sites with thin soils and on exposed ridges, although it may grow in more protected sites as well. Its distribution probably reflects past forest disturbance, especially by fire. White pine was formerly more abundant than today. Because its wood is excellent for working, and is fine, strong and limber, many white pines were cut years ago. Some of those remaining have grown to enormous girth. The understory, shrub and herb layers resemble those of the oak communities.

In listing the common trees in each kind of forest, we see that a species that dominates in one kind will often be found also in other kinds. This illustrates one of the fundamentals of forest ecology — that the species of plants do not have clearly marked limits, but rather the species overlap and intergrade in their distributions, so that borders or boundaries between forest types are not easily recognized. The change from basswood forests in the low, protected slopes to the white oak forests of the exposed slopes and upland flats is a pattern of continuously varying abundance of species. So, while it is convenient to classify or describe kinds of forests, in fact, in the landscape these kinds are somewhat artificial and the forest really exists as an always varying landscape.

The floodplain forests and the upland forests described above occupy a large portion of the forest landscape in the driftless area. However, some of the most interesting forests are those that are restricted to special or unusual environments. These environments may be at either the exposed and dry extreme, or the cold and moist extreme. On rocky outcrops, on crags, and in and around boulders and cliffs, a combination of eastern red cedar (or juniper) and chinkapin oak grows. Their small and often mishapen form is misleading; these trees are doing very well, and indeed, some of the oldest trees in Iowa are eastern red cedars on just such sites. They may even be growing with their roots in the cracks and crevices of rocks. They grow slowly, but to great age. A unique combination of lower plants may also be found in these exposed habitats, and sometimes certain prairie plants are found here.

At the other extreme, on cool, wet slopes, one may occasionally see a stand of balsam fir, a conifer tree much more common to the north, but very restricted in Iowa to those small habitats which resemble more northerly environments. With the balsam fir may be some northern herbs, again rare in Iowa but common in the north. Yew, an evergreen shrub, can be found here. These remnants of northern woods may be found with or close to the "algific slopes" that are described below.

OTHER COMMUNITIES

While it is true that the characteristic plant communities of the driftless area are forests, the careful observer can find more. The sharply dissected landscape, with slopes facing all points of the compass and with bedrock at or near the surface throughout, creates "islands" in the forests where special plant associations exist.

For nearly every kind of bedrock that is exposed, physical and chemical properties influence the plants that can survive. Moisture in some bedrock layers might seep out on an exposed cliff or ledge. The combinations of substrate and moisture, with slope steepness and aspect, can lead to many possible micro-habitats.

Brief descriptions of some of the special plant communities of the driftless area follow. Some of these are more obvious and striking, while others have more subtle characteristics.

Hill Prairies

Many of the slopes in the driftless area consist of a thin coat of windblown silt deposited over the bedrock. On predominantly south facing slopes, the

combination of thin soil and drying sun and winds has prevented the forest from encroaching on remnants of native prairie. Because of the dry conditions, hill prairies have a quite different appearance from the typical tallgrass prairie that once covered much of Iowa.

Little bluestem and side-oats grama are the dominant grasses on what some people refer to as 'goat' prairies. There are many forbs typical of dry prairies, too, such as silky aster, leadplant, wood-sorrel, and the brilliant blazing stars.

Big bluestem and Indian grass may be present, but here they play second fiddle to the shorter, more dry-adapted species. Compass plant and rattlesnake master, typical of moist prairies, might also be present, but they are often stunted.

If a traveler visited the Loess hills of Western Iowa and then came to one of the hill prairies of the driftless area, that person would probably recognize similarities in the sites. The hill prairies, however, lack the distinct Great Plains species found in the West: plants such as yucca, cowboy's delight, and locoweed. Eastern hill prairies have their own special plants, including downy gentians and valerian.

Physically, the hill prairies are also quite different from the deep loess in the west. A rock outcrop in the center of a hill prairie can provide suitable habitat for paper birch and smooth cliff-brake fern to grow amidst needle-grass and coneflowers.

Scattered clumps of New Jersey tea and prairie willow and a border of eastern red cedars and sumacs, give the isolated hill prairies a quality distinct from other types of prairie. Free from grazing and certainly safe from the plow, hill prairies may be among the best preserved reminders of a pre-settlement Iowa.

Algific Talus Slopes

All over the driftless area, there are places where large pieces of bedrock have come loose and tumbled down cliff faces. The piles of broken rock (talus) can provide special habitats for plants. Where limestone talus seals the opening of a cave on a north facing slope, a unique set of conditions might exist. Henry S. Conrad wrote of these places, and more recently, Terry Frest of the University of Iowa and Paul Whitson of Cornell College have increased our understanding of such places.

Cool air from the cave can seep through the crevices and vent to the surface. Where ice caves exist, these north facing slopes are kept cold (between 37° to 45° Fahrenheit) all summer. This kind of cool, moist habitat is very different from the surrounding environment. In fact, it more closely resembles places of either higher altitude or more northern latitude. The plants found on these cold-producing (algific) talus slopes reflect these unusual conditions.

In most plant communities, such as our forests and prairies, the dominant species are familiar and are considered to be common. On the algific talus slopes, though, nearly every species is rare. Here is a whole plant community composed of unusual plants: northern monkshood, golden saxifrage, yellow birch, dwarf scouring rush, and Canada yew. There are rare ferns and boreal mosses alongside remnant stands of balsam fir. Among the cold crevices there are also rare snails that make the community an even richer place.

Algific talus slopes are not always easy to locate, but the fortunate few that have the chance to visit one can take a careful pride with them. The assemblage of rare plants and animals is an extremely fragile community; it is a community that has, without doubt, its finest examples in Northeast Iowa. Extra care should be taken to view the slopes from a short distance; with a camera lens or binoculars. It is nearly impossible to walk on the talus slopes without causing damage and in too short a time we could lose this noble refuge of plant and animal life.

Ledge and Cliff Communities

The geology of the driftless area is one of the most characteristic features of the region. In many places, usually along stream valley walls, faces of the bedrock are exposed. These craggy habitats seem unsuitable for vegetation and, indeed, many cliffs are bare. Occasionally there are eastern red cedars or paper birchs growing in the crevices and that is all.

For the visitor who knows where and how to look, the inhospitable rock can be surprising. To people like Don Farrar of the Botany department at Iowa State, these places have great secrets to share. Generally there are two types of bedrock, from a plant's perspective — the acid sandstone and the calcareous limestone. A plant that has only one chance to establish residency might "see" the difference as great as we perceive forest from prairie.

Moisture can be a limiting factor on cliffs and ledges, but even on the driest sites plants can be found secured in small cracks. Other sites might be shaded by overhanging trees. The damp rock becomes an ideal place for mosses and liverworts to form thick mats.

On many of the sandstone and limestone surfaces, ferns and fern-like plants prevail. There are some, such as the bulblet fern and the fragile fern, that can survive on either type. Other species are less tolerant.

Many of the sandstone-loving plants are among Iowa's rare flora. There is the purple cliff-brake, the rusty and the western cliff ferns, the crowfoot clubmoss, the shining clubmoss, and the rock spikemoss. Less rare plants are more common on limestone outcrops: smooth cliff-brake, slender cliff-brake and the slender lip-fern.

Plants other than ferns and fern allies are found, also. Examples are the jeweled shooting star, moschatel, hairy goldenrod, wild columbine, and the harebell. The rare low sweet blueberry, sullivantia, and three-toothed cinquefoil still exist in Iowa because of these special habitats.

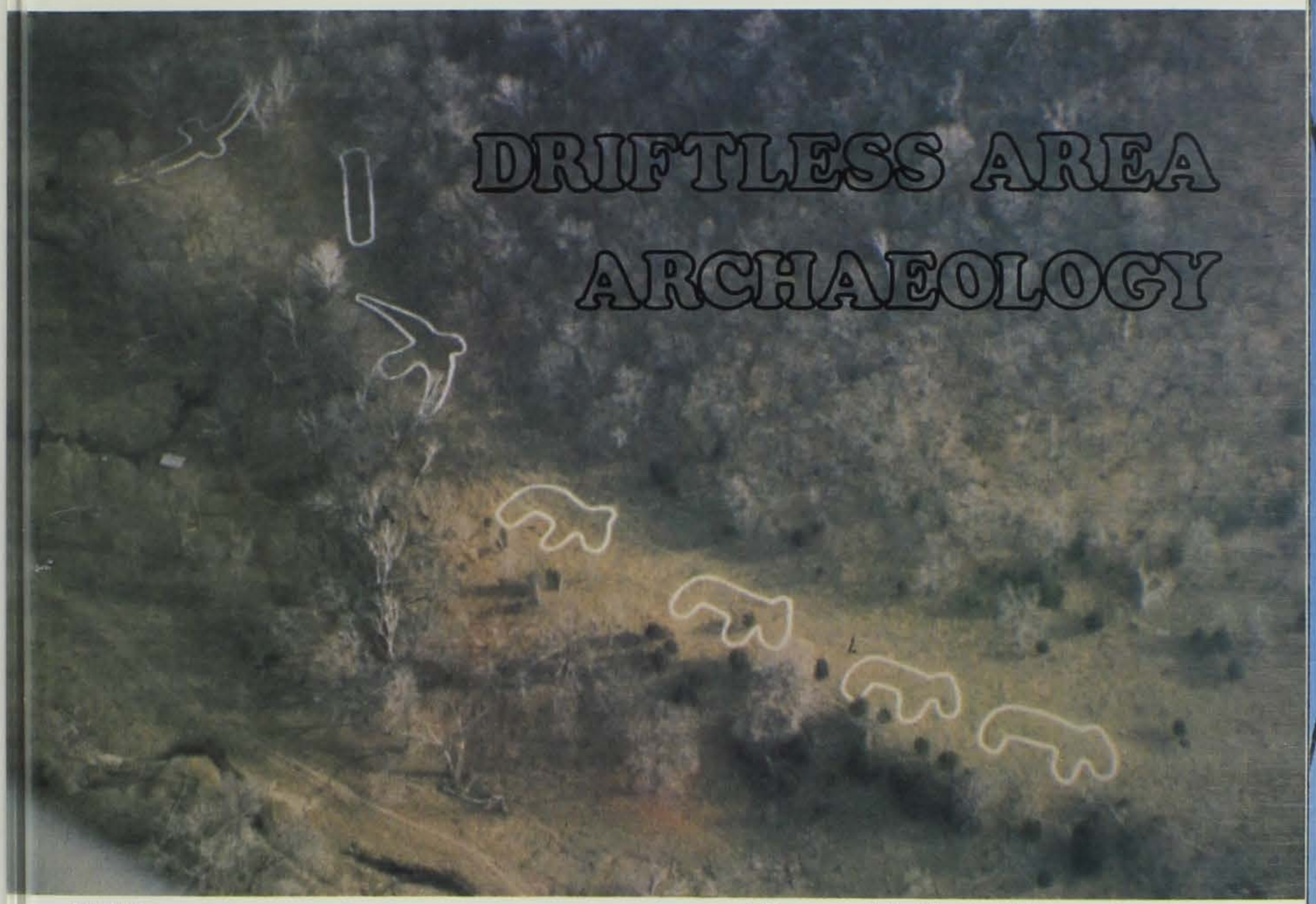
Many more special places exist in Iowa's driftless area and they also harbor rare and unusual plants. Along the river valleys there are sand communities where rare milkworts, tickle grass, and three-awned grass are found. In the wetlands, along with the cattails, rushes, and arrowheads, there might be found tape-grass and water horsetail, which reach their southern limits in Iowa.

The combination of common and rare species and the diversity of habitats can make a walk through the woods of northeast Iowa as exiting as it is relaxing. The communities of the driftless area provide a wealth of biological diversity for Iowans to pass on to future generations.

Roger Laushman

This floodplain marsh is located on Village Creek, south of Lansing.

DRIFTLESS AREA ARCHAEOLOGY



Clark Mallam

Effigy mounds in Chantry Hollow, northeast Iowa

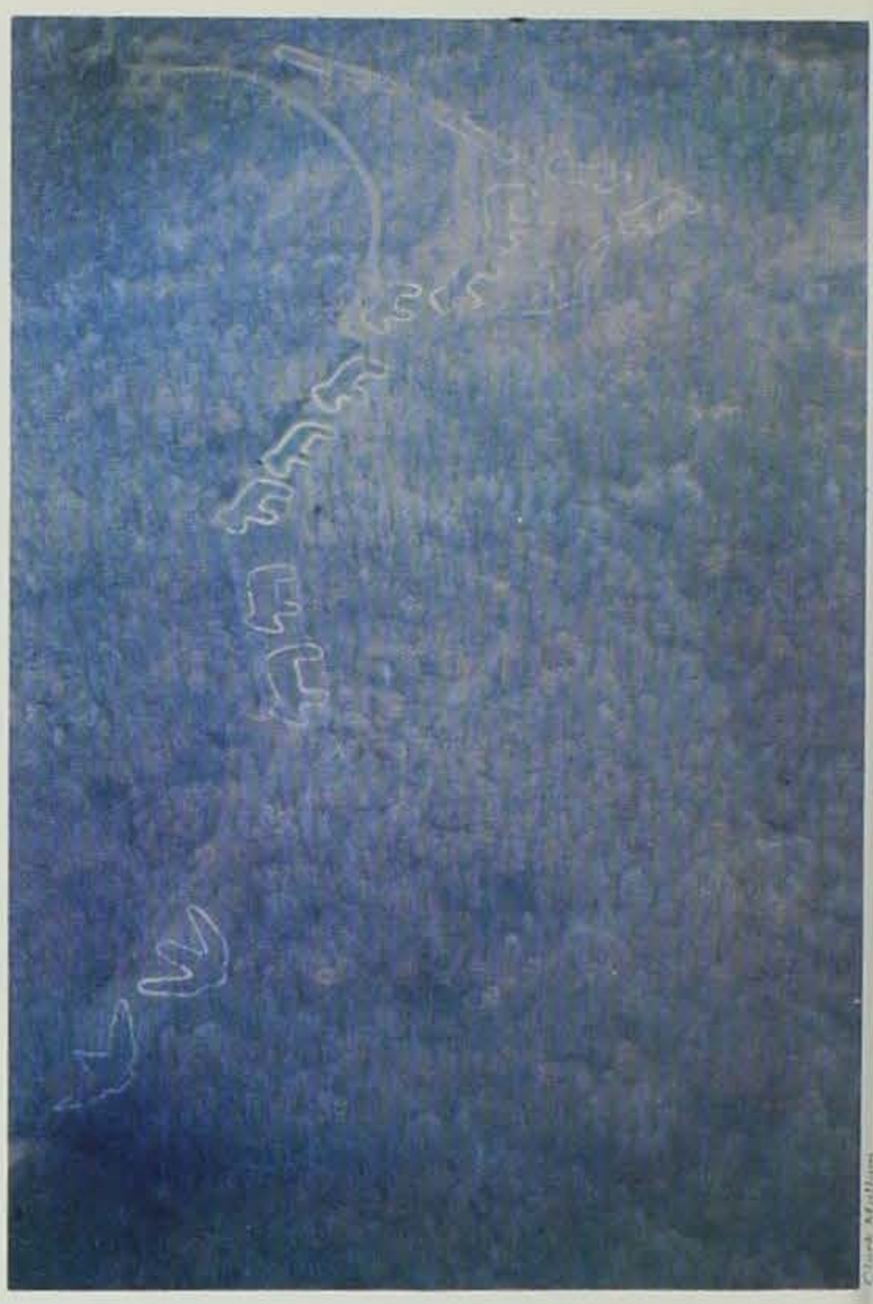
By R. Clark Mallam

R. Clark Mallam is an associate professor and director of the Archaeological Research Center at Luther College. He earned his B.S. from the University of Nebraska and his Ph.D. from the University of Kansas.

The "Driftless Area" is a term used to describe a distinctive region occurring within portions of four Midwestern states. For Iowa the driftless area consists of a narrow, irregular-shaped strip of land paralleling the Mississippi River in the northeastern part of the state. In form it resembles a great inverted triangle with the base located along the Iowa-Minnesota border and the apex positioned in the extreme northeastern portion of Jackson County. The term "driftless", while no longer appropriate in light of recent geological studies is still useful. Through time it has become synonymous with rugged topography. And, it is this particular feature — nearly 4000 square miles of heavily dissected topography consisting of common bedrock exposures, steep valleys, and almost 600 feet of relief — which makes the driftless area so distinctive. In the words of Samuel Calvin, an early Iowa geologist, this topographic unit of intense water-carved relief is an area "...gashed and furrowed in every direction by an intricate system of ramifying channels."

Biologically, it may be described as part of the greater northeastern Iowa ecotone, the zone where the deciduous forest biome of eastern North America and the grassland steppe biome of the western province meet. This ecotonal region contains at least four defined environmental zones: tall-grass prairie, parkland, forest, and riverine. The distinctiveness of these zones derives from the fact that they do not perceptibly grade into one another. Instead, there is definite interdigitation which produces an array of microenvironmental zones with a resultant "mosaic" pattern. Why this distinctive mosaic ecotone occurs in extreme northeastern Iowa and adjacent "driftless" areas is largely explainable in terms of topography. Over twenty years ago the biologist Thomas Hartley cogently noted that the eroded and dissected terrain causes an interruption of the normal environmental patterns which extends and stabilizes plant communities well outside their regular geographic range. Consequently, the range of wildlife is enlarged rather than being restricted to more specific environments. It is this physical landscape and its relationship to biologic communities that served as the context for prehistoric Native American adaptations. To these early peoples the driftless area offered shelter and sustenance in the form of protected rockshelters, river and stream terraces and various kinds of annually recurring plants and animals. What was required of them was that they learn how to use the mosaically distributed resources judiciously and systematically. The ways in which they did and how they constructed and attempted to

Clark Mallam



Clark Mallam

Above: ***Early white settlers in the area believed the mounds belonged to a superior race and thus buried their dead within the existing mounds.*** Right: ***The Marching Bear mound group is located within Effigy Mounds National Monument in Allamakee County.***

integrate their social rhythms with those of the natural world constitutes the archaeology of the driftless area in Iowa.

The study of this area's first inhabitants began during the initial phases of Euro-American settlement. In the first half of the 19th century, wave after wave of settlers moved steadily across the Midwest. Those reaching northeastern Iowa soon noticed that here, as elsewhere, other cultures had preceded them. Earthen mounds of varying sizes and shapes, many in the forms of animals, extended along the ridges and bluffs of the Mississippi River and its major tributaries. The mounds, though, were not a new phenomenon to many of the settlers, especially those who had passed previously through Ohio and the adjacent states. There they had encountered large groups of earthworks and mounds. Many had also become familiar with various interpretations regarding the origins and builders of these mounds. At the time, the most prevalent and popular interpretation centered on a "vanished race", a civilization then believed to have been distinct from, antecedent, superior, and unrelated to the contemporary Native Americans.

The "Mound Builder Myth" as this explanation has become known historically virtually dominated archaeological research in eastern North America during much of the 19th century. In northeastern Iowa many individuals annually plundered untold numbers of mounds seeking "relics" and additional data to support their contentions about the previous existence of a "vanished race." How deeply embedded this belief was in the minds of 19th century Iowans is perhaps best seen in certain of their mortuarial practices. Some, perhaps so convinced that a race other than Native Americans had constructed the mounds, even buried their dead in them. Many examples of this kind of bereavement behavior still exist in the driftless area. It seems logical, given the wide acceptance of the myth, that whites buried their dead in the mounds in the mistaken belief that they were really placing them with those of a superior race.

The controversy over authorship of the mounds and the subsequent investigations carried out by private and public agencies during the latter quarter of the 19th century may be said to mark the beginning of serious archaeological studies in the driftless area of Iowa. From that point on, beginning with the Northwestern Archaeological Survey in 1880 and the Bureau of Ethnology's Division of Mound Exloration in 1881, the antiquities of this area, as well as those of the rest of eastern North America, were subjected to increasing degrees of professional inquiry. By the early 1890's accumulating evidence clearly demonstrated that the mounds had been constructed by Native Americans and, furthermore, that mound building had tradition of considerable time depth.

Since that time archaeological studies in the driftless area have encompassed a broad range of topics, interests, and goals. Of these, the chronological ordering of cultures has been a primary concern. Two individuals in particular, Ellison Orr, a Waukon, Iowa, resident and archaeological enthusiast and Dr. Charles R. Keyes of Cornell College, Director of the Iowa Archaeological Survey, spent the majority of their careers addressing this subject. Together, they conducted numerous surveys and excavations of mound groups and village sites throughout northeastern Iowa and across the state in general. The 1930's period was extremely fruitful. During this time Keyes and Orr, supported by federal funding, accumulated the kinds of data necessary for constructing sequences and defining prehistoric cultures. Orr later wrote several volumes concerning their findings. These studies still constitute the basic sources for archaeological research in the driftless area. The dedication of these two men to archaeology and their efforts to preserve significant features of Iowa's past have earned

them the title "The Founding Fathers of Iowa Archaeology."

The Keyes-Orr period lasted from about 1920 to 1950. Since then, the discipline has continued to emphasize culture chronology and the reconstruction of prehistoric lifeways. However, since the mid-1960's a new goal has been added. Archaeologists now place emphasis on explaining the variability of the past through creation of behavioral models. This search for an understanding of culture change and the reasons accounting for the cultural differences grows progressively more involved. Presently, archaeology is no longer the interest of a few individuals and organizations. Instead, it represents a collective effort on the part of many institutions and state agencies including the Iowa Archaeological Society, the Association of Iowa Archaeologists, the Iowa Geological Survey, the Soil Conservation Service, the State Historic Preservation Program, the State Archaeologist, the State Museum and Archives, the State Preserves Advisory Board, and various academic institutions.

To date, past and present archaeological research in the driftless area have combined to produce a culture sequence which begins around 10,000 B.C. and extends to the beginning of European contact in the latter half of the 17th century A.D. This sequence is practically identical with those developed for the Midwest and Upper Mississippi areas. Evolutionary in design it provides the structure and narrative for a series of adaptations which range in complexity from the early hunters and gatherers to the later semi-sedentary village horticultural/hunter-gatherers.

The sequence, its divisions, and time frames are as follows:

Paleo-Indian — ?10,000 B.C. to 7000 B.C.
Archaic — 7000 B.C. to 1000 B.C.
Early Woodland — 1000 B.C. to 500 B.C.
Middle Woodland — 500 B.C. to A.D. 300 - 500
Late Woodland — A.D. 300 to A.D. 1200 - 1300
Oneota — A.D. 1100 to Contact

In general the sequence should be viewed as a guide to the past with flexible boundaries; the means, chronologically, by which members of the profession structure their research and promote dialogue. However valuable it may be to the academic community, it does possess certain limitations for the non-professional.

One way in which this complexity might be reduced is to divide the past and the element of time into modes of production. This term refers to the ways and relationships, materially, socially, and ideologically, which people enter into to effect production and to satisfy biological and cultural needs. Through time, these arrangements resulted not only in the production of goods but also in the reproduction and modification of the mode. In this sense the mode of production is the mode of life — an interrelated series of dynamic, on-going human relationships and relationships between them and the environments in which they lived.

For our purposes in assessing the archeology of the driftless area, two modes of production may be proposed: a very long hunting and gathering mode followed by a relatively short dual subsistence (horticulture combined with hunting-gathering mode).

For our purposes in assessing the archaeology of the driftless area to lifestyles may be proposed: a very long hunting and gathering style followed by a relatively short dual subsistence (horticulture combined with hunting and gathering). Together, they encompass the complete culture sequence and time frames previously discussed and contribute toward an understanding of how prehistoric peoples adapted to this distinctive environment.

Clark Mallam

Eden-eared projectile point from late Paleo-Indian period.

The hunting and gathering mode represents an adaptation in which people participated in natural production. During this time, approximately 10,000 B.C. to A.D. 1000, human groups, with increasing degrees of sophistication, made a living from natural resources. Such an adaptation demanded an intimate familiarity with the cycles of various plants and animals and the seasons in which they were readily available. Humans had to learn to adjust their populations, both in numbers and distribution, to the carrying capacity of the environment and to the ebb and flow of seasonal resources. In time these adjustments tended to produce, as the anthropologist Marvin Harris has suggested, a "seamless unity" between culture and environment.

The beginnings of the hunting and gathering mode in the driftless area are not well known. In fact, for the first 5000 years we possess only a few clues to the prehistoric puzzle. During this time it appears that small families of hunters and gatherers, sometimes merging into bands, moved throughout the variable terrain in search of large game animals. Their quest must have been successful for in almost any sizeable artifact collection the archaeologist will usually find several distinctively flaked projectile points which are diagnostic markers for this period. These points (see photo) are generally found along the crests of bluffs and ridges. The sites, probably vantage points and hunting stations, represent only a small segment of these people's lifeways. We have yet to reconstruct their annual economic cycle. If we were to do so, we would probably discover that large game animals, while a significant food source, were heavily supplemented by smaller species and plant collecting.

By at least 5000 B.C. and perhaps earlier, major alterations occurred in the hunting and gathering mode. For some time the late and post-glacial environment of the early hunters and gatherers had been steadily changing. In the driftless area as elsewhere this gradual warming climatic shift caused significant modifications in plant and animal communities. It was perhaps at this time that the mosaic environmental pattern began to replace the pine forests of the glacial age. As the large game animals drifted north the hunters and gatherers responded by developing different exploitation strategies. No longer did they concentrate on a few species. Instead, they seem to have expanded their entire subsistence pattern to include a variety of plants with particular emphasis on deer and smaller animals. What had occurred economically as a result of climatic change was a shift in the proportion of reliance.

Most archaeologists prefer to call this changing period the "Archaic" to differentiate it from the preceding Paleo-Indian era. To some it constitutes the foundation on which all other Native American adaptations occurred. Its key features were adaptability and efficiency. By adapting to and efficiently using

a broad range of plants and animals, human groups began to realize the possibilities contained within the hunting and gathering mode. It might be said that humans ceased to be concerned with the life cycles of only a few species and, instead, adapted themselves to the life-cycle of the total environment. This broadening pattern of exploitation, in turn, permitted a greater degree of residential stability.

The adaptability of this pattern facilitated human movement into virtually every ecological zone in the New World. In effect the archaeological record reveals the emergence and stabilization of lifeways predicated on systematic and balanced exploitation. This intimate familiarity with the life process may have been the catalyst in the long and gradual development of what Christopher Vecsey has called "Native American Environmental Religions," the evolution of a moral philosophy with attendant rituals concerning relationships between humans and between themselves and the natural world.

From the Archaic period on, the surface of the driftless area begins to assume the form of a cultural landscape. Campsites, hunting and gathering stations, and habitation areas literally blanket the terraces of the river valleys, streams and uplands. Their presence indicates that the environment was being used more intensively, physical space was being filled, a population increase was underway, and that some form of social organization extending beyond the family band was necessary to avoid conflict and to insure equal and continued access to productive resources. By 1000 B.C. or thereabouts, these combined factors had reached a level capable of generating a cultural-ecological crisis.

The crisis does not seem to have affected the driftless area on the scale that it did in other areas of the Midwest, especially Illinois and the central Ohio River Valley. Perhaps due to a denser population, this area — especially the Ohio River Valley — became the center for the development of more productive subsistence techniques and the emergence of a complex social organization. The Hopewell Interaction Sphere, as this organization is known archaeologically, emerged as a great network of social, economic, and political relationships which connected many distant cultures and bound them together into a collective entity united by a common ideology.

This system's most visible features were large burial mounds, huge ceremonial centers outlined by intricate arrangements of earthworks, a "death cult", exotic status-differentiating objects and social stratification. It appears that this far-reaching hierarchical organization was maintained and made possible through an intensification of hunting and gathering. It involved large numbers of people who focused their efforts seasonally on resources, especially aquatic foodstuffs, that were "concentrated, high-yielding, predictable and annually renewable." In addition there is some evidence that limited horticulture was practiced. Apparently, this system insured regular production and distribution of foodstuffs, territorial sanctity and widespread peace.

It did not last. By 300 A.D. the system began to dissociate. The reasons are varied, but it seems likely that the network, originally formed to promote peace and maintain access to resources through the principle of equality, gradually reached a point where emphasis shifted from collective social goals to private interests. When this occurred, Hopewell ideology was discarded because its founding principal and symbols were no longer functional. The evolution of a stratified society represented a relinquishment of the moral philosophy of balance which emerged as a consequence of multifocus exploitation.

The impact of the crisis at its height and breakdown had little effect on the driftless area. Certainly, its population was contacted and, to a limited degree, may even have participated. But, for the most part, the record reveals the continuation of an essentially Archaic pattern which incorporated pottery, various mound building practices, and certain survival techniques. The crisis of space and resources here seems to have been avoided by reemphasizing equality and human-land relationships.

Synonymous with the late woodland period, this adaptation in the driftless area, including parts of Minnesota, Illinois, and Wisconsin, achieved a point best envisioned as a cultural burst. The subsistence pattern expanded to include intensive harvest collecting, the practicing of limited horticulture and a fairly well defined matrix of band territories. Instead of constructing earthen monuments to display social differences it seems that they produced earthen structures to symbolize their relationships to the forces of life.

This distinctive lifeway, referred to as the Effigy Mound tradition, existed for at least 500 years, from A.D. 700 to A.D. 1200. During this time peoples throughout the driftless area constructed mounds in the forms of animals, conicals, linears, and compounds. Their arrangement and location, usually near predictable recurring natural resources, indicate a complex set of ideological, social, political, and economic relationships. It may be suggested that this pattern of mound construction reflected a particular belief, one based upon lessons learned through thousands of years of participation in natural production: humans must assume responsibility for the quality of life by respecting the environment which enhances it. If this assessment is correct, the mounds, then, are not so much burial sites as they are metamorical expressions about the ideal state that should exist between nature and culture — balance and harmony.

Looking across the rugged landscape of the driftless area and the many mounds which accent its surface, one cannot escape the impression that in this region, groups expressed their belief conviction by "cosmicizing" the earth. In other words, they consecreted the mosaic environment with its varied resources and ecological relationships by defining it as sacred space. If the rhythm — balance and order — of this region could be maintained, the resources on which humans depended would continue. In this sense, mound-building may be perceived as an ongoing ritual, a sacred activity humans entered into in order to insure regular and consistent production of natural resources. It was the social means of promoting order and of addressing an inherent contradiction in this mode: at the hunting and gathering level natural resources may not always be available or abundant.

Elsewhere, outside the driftless area, this contradiction had become so pronounced that efforts to resolve it led to a transformation: hunting and gathering with an emphasis on horticulture. In some areas, particularly along the middle and lower reaches of the Mississippi, the needs of expanding populations had extended beyond the limits of natural production. The process of making a living had been transformed from extraction to production. This adaptation was characterized by concentrated, socially stratified populations which were generally organized at the chiefdom level and who engaged in intensive surplus production.

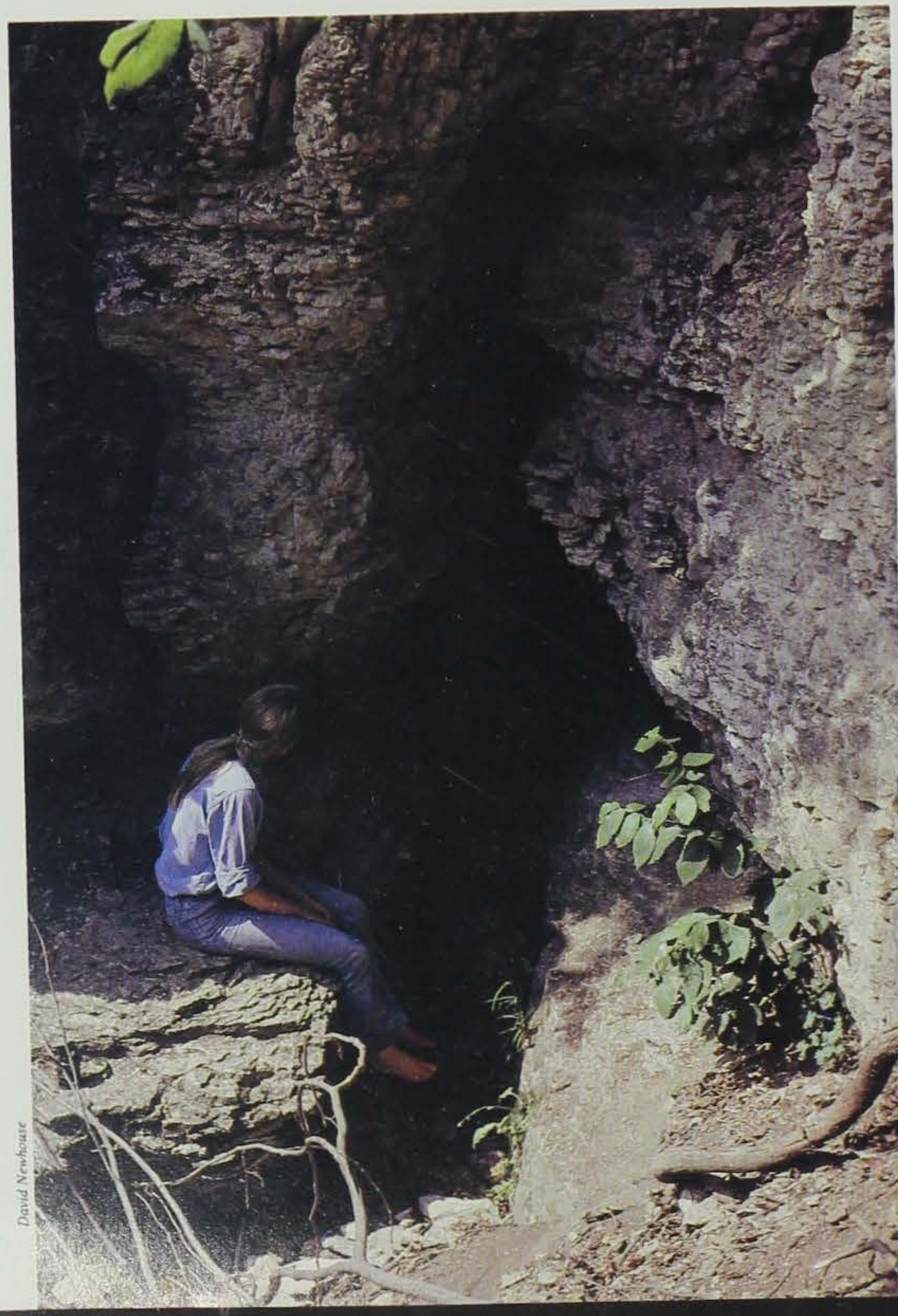
The new mode rapidly expanded. By A.D. 1100 it seems to have been firmly

(continued on page 44)

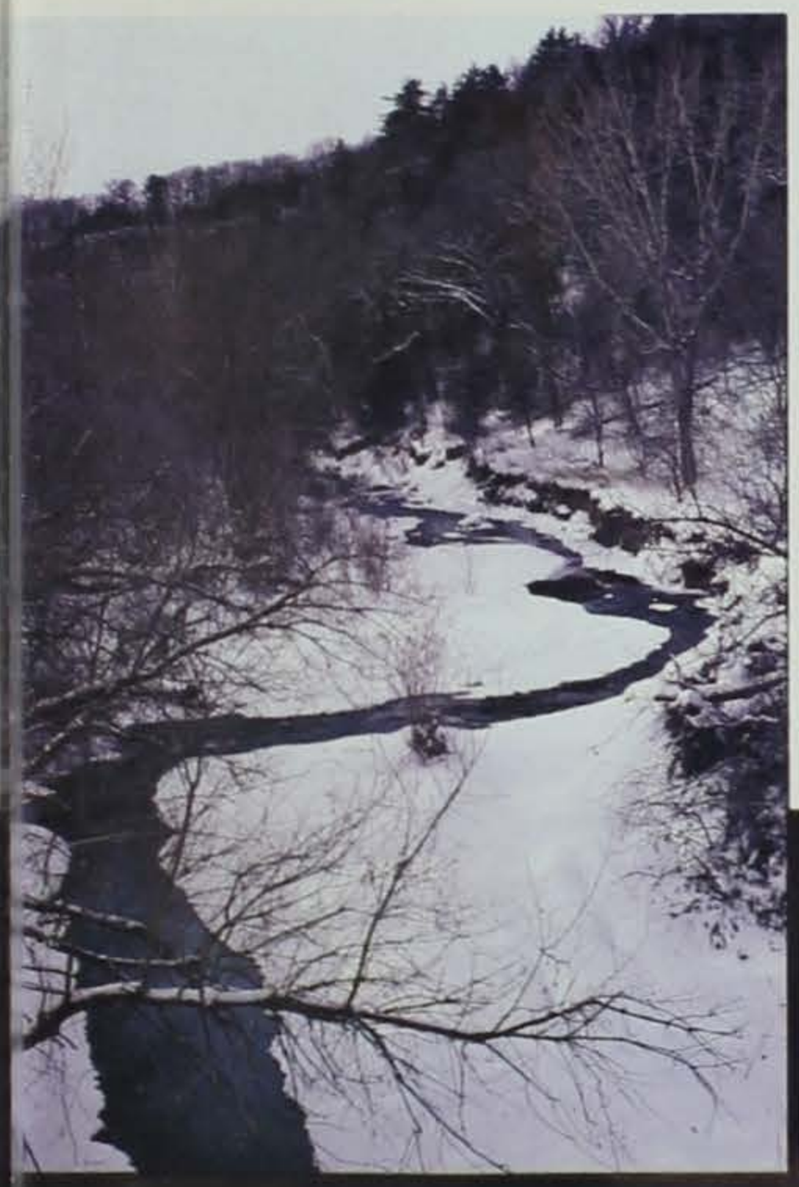
These Hills

These hills...
like an old friend, they rise to meet me.
Embrace me —
at times with fog
at times with snow
at times with the delicate scents of the seasons.

These hills
are not a new friend.
They are timeless; they are honest.
They share with me their secrets.
They are rugged, yet they have softened with age.

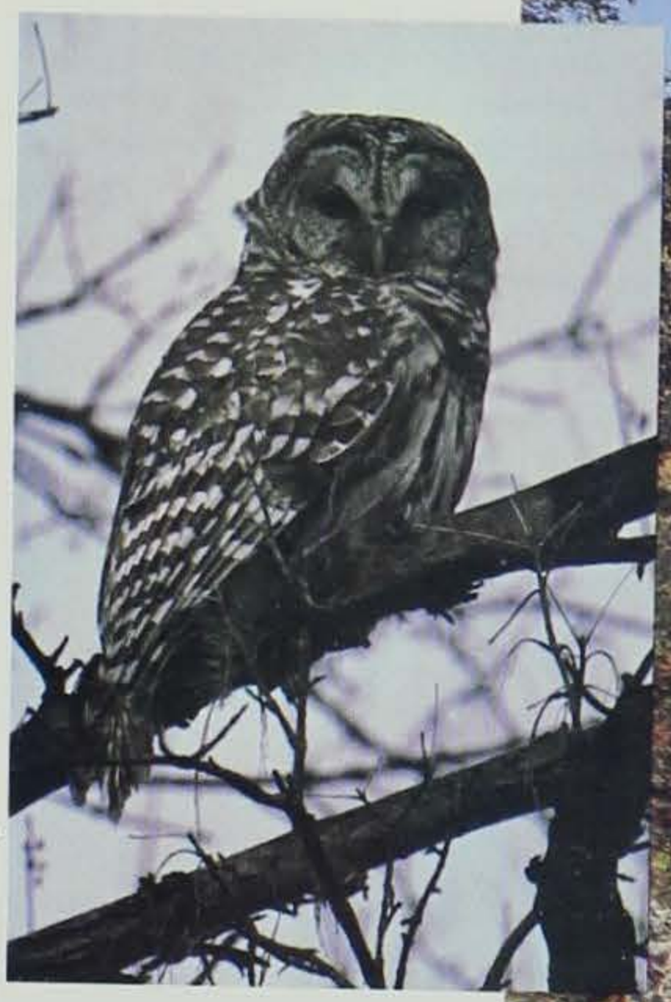


David Newhouse



A close look at northeast Iowa reveals an infinite variety of natural and cultural treasures. The rugged terrain is accented by features like this cool retreat at Malanaphy Springs; the summer solitude at Montauk, former home of Governor Larrabee; the change of seasons as accentuated by colorful leaves or the stark whiteness of winter.

Page 23: ***Rich woodlands like White Pine Hollow State Preserve harbor the shaggy mane mushroom.***



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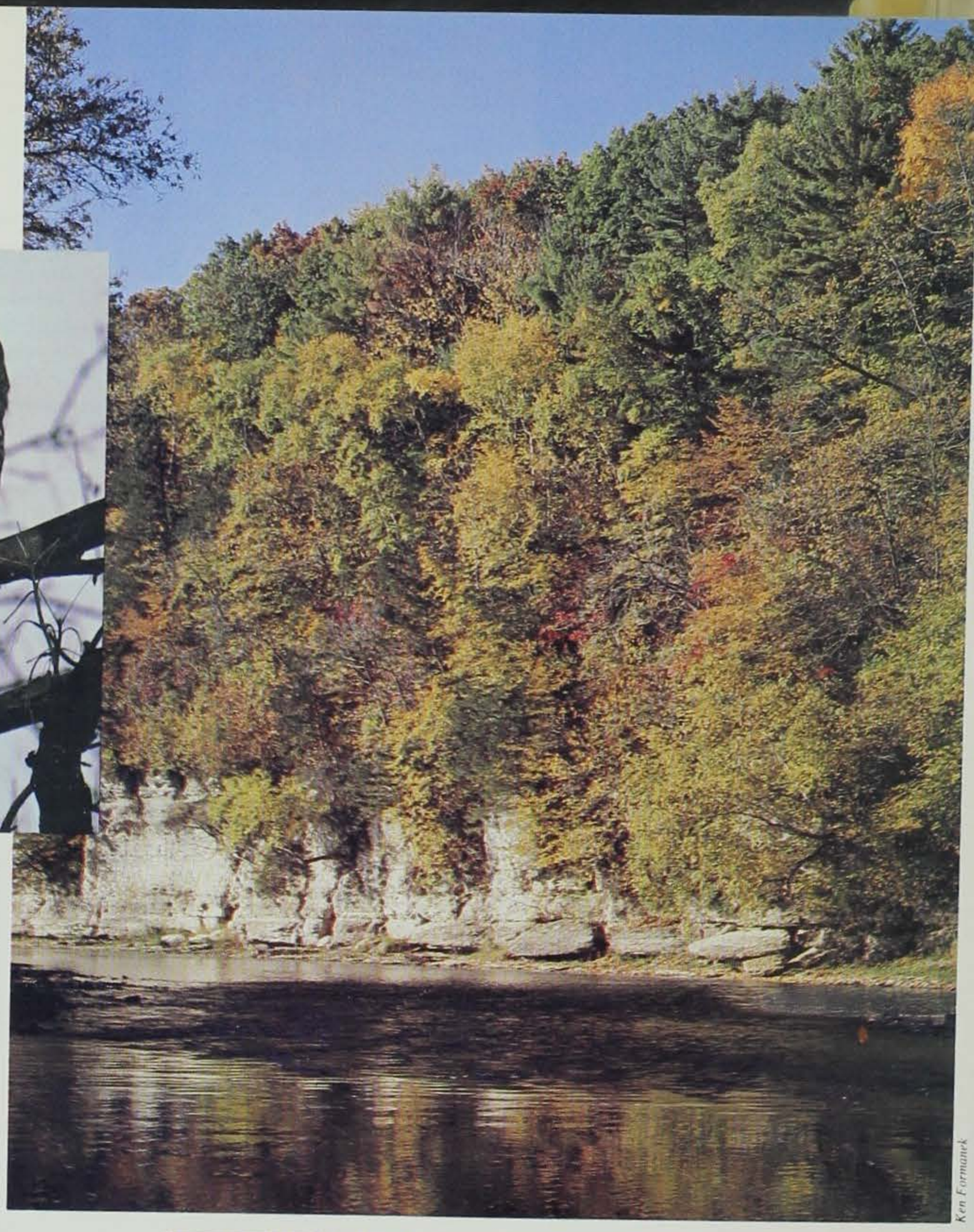


Ken Formanek

Early Iowa residents made their mark on the land, occasionally evidenced by hand-hewn buildings of nature materials. The Upper Iowa River palisades near Bluffton present one of northeast Iowa's most spectacular views. Extensive woodlands provide habitat for many wildlife species such as the barred owl.

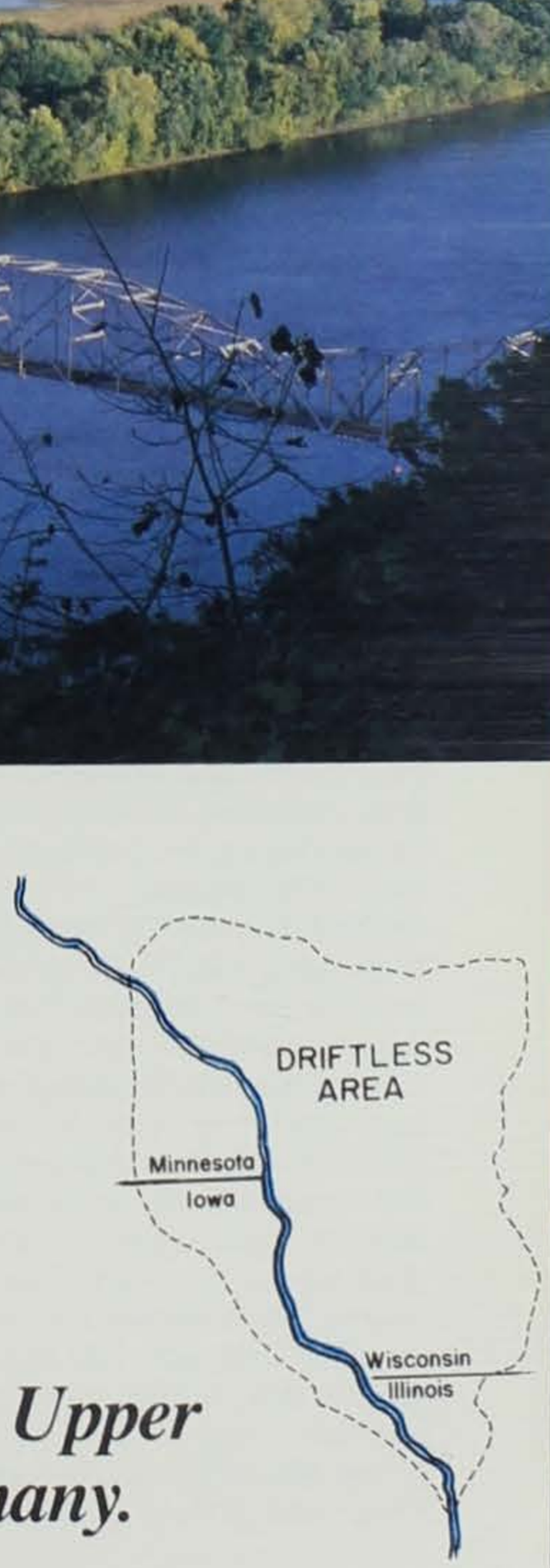
These hills
harbor new acquaintances.
Like that wind in the trees.
Like that calling owl.
Like myself.

Old friend, I've much to learn.
Teach me.

Mary Jean Huston

David Newhouse

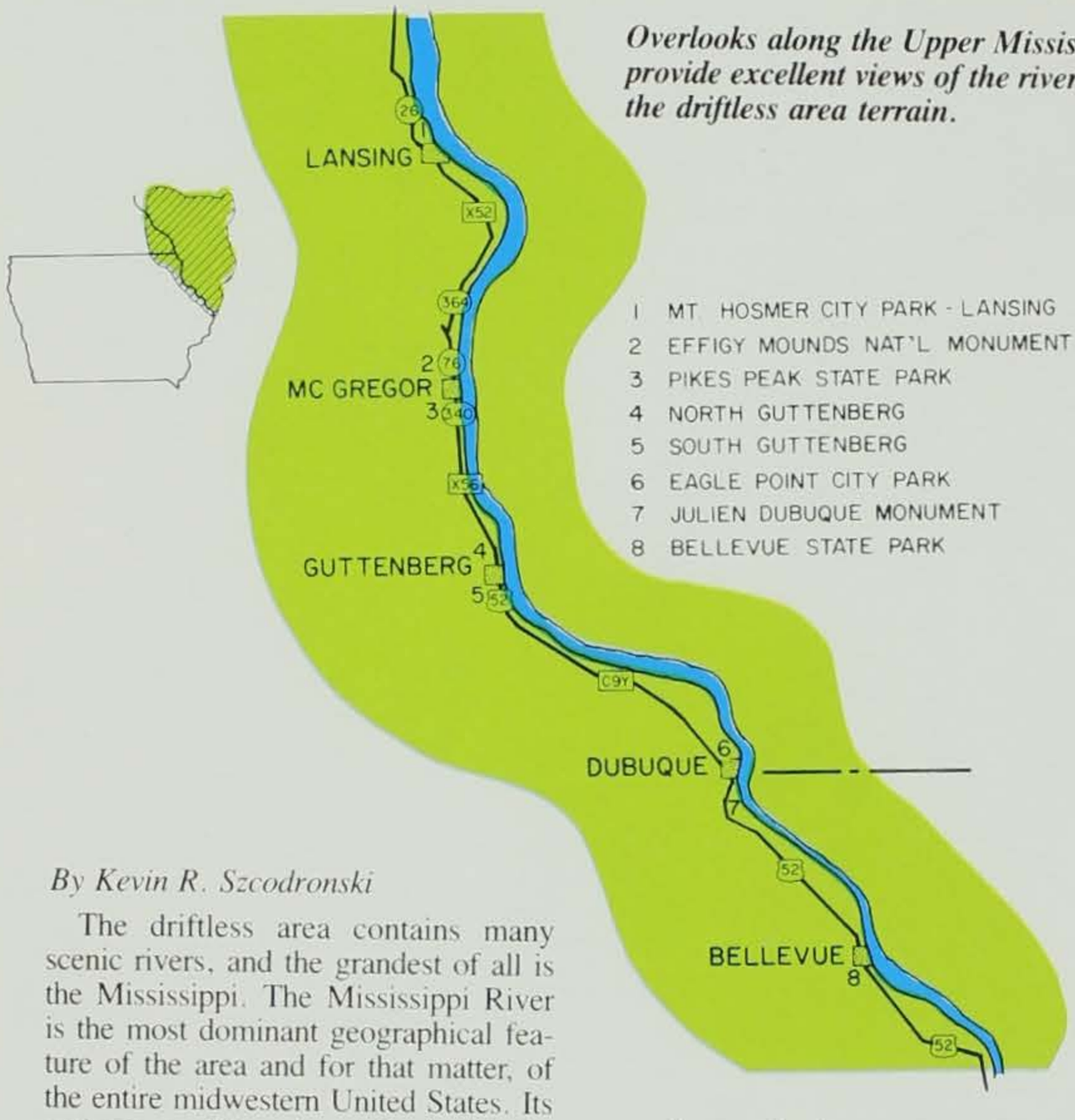
A RESOURCE FOR ALL



Etching its way through the Driftless Area, the Upper Mississippi River provides life and leisure for many.

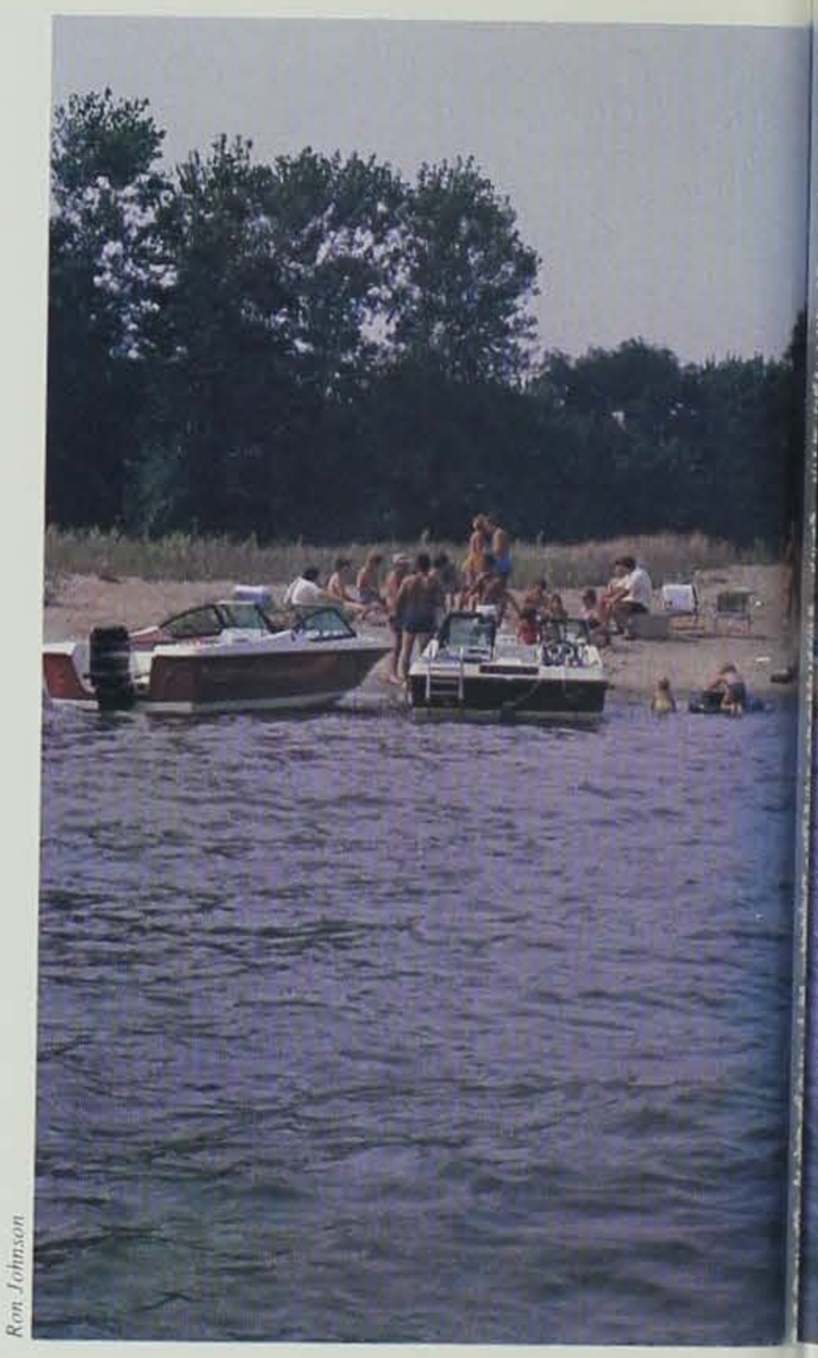
Ken Fermoile

David Newhouse



1 MT. HOSMER CITY PARK - LANSING
2 EFFIGY MOUNDS NAT'L MONUMENT
3 PIKES PEAK STATE PARK
4 NORTH GUTTENBERG
5 SOUTH GUTTENBERG
6 EAGLE POINT CITY PARK
7 JULIEN DUBUQUE MONUMENT
8 BELLEVUE STATE PARK

Overlooks along the Upper Mississippi provide excellent views of the river and the driftless area terrain.



Ron Johnson

By Kevin R. Szcodronski

The driftless area contains many scenic rivers, and the grandest of all is the Mississippi. The Mississippi River is the most dominant geographical feature of the area and for that matter, of the entire midwestern United States. Its majestic qualities when joined with the unusual geological history of the area provide residents and visitors with some of the midwest's most scenic landscapes.

The driftless area is located in portions of Iowa, Minnesota, Wisconsin, and Illinois. The map shows how the Mississippi River dissects the area and serves as a boundary for these states.

The area's terrain is relatively rugged when compared to surrounding land. This landscape character originates from numerous rivers and streams and the varying hardness of underlying bedrock. The rivers have continuously whittled the once flat landscape to form steep-sided valleys. Since the bedrock has different hardnesses and rivers are different sizes, the terrain is carved at varying rates which result in many sizes and shapes of valleys. Rivers and streams in the driftless area have also had more time to carve valleys into bedrock since it was not covered with thick layers of glacial deposits like surrounding areas. Rivers in the surrounding areas have had to cut through glacial drift before reaching bedrock material.

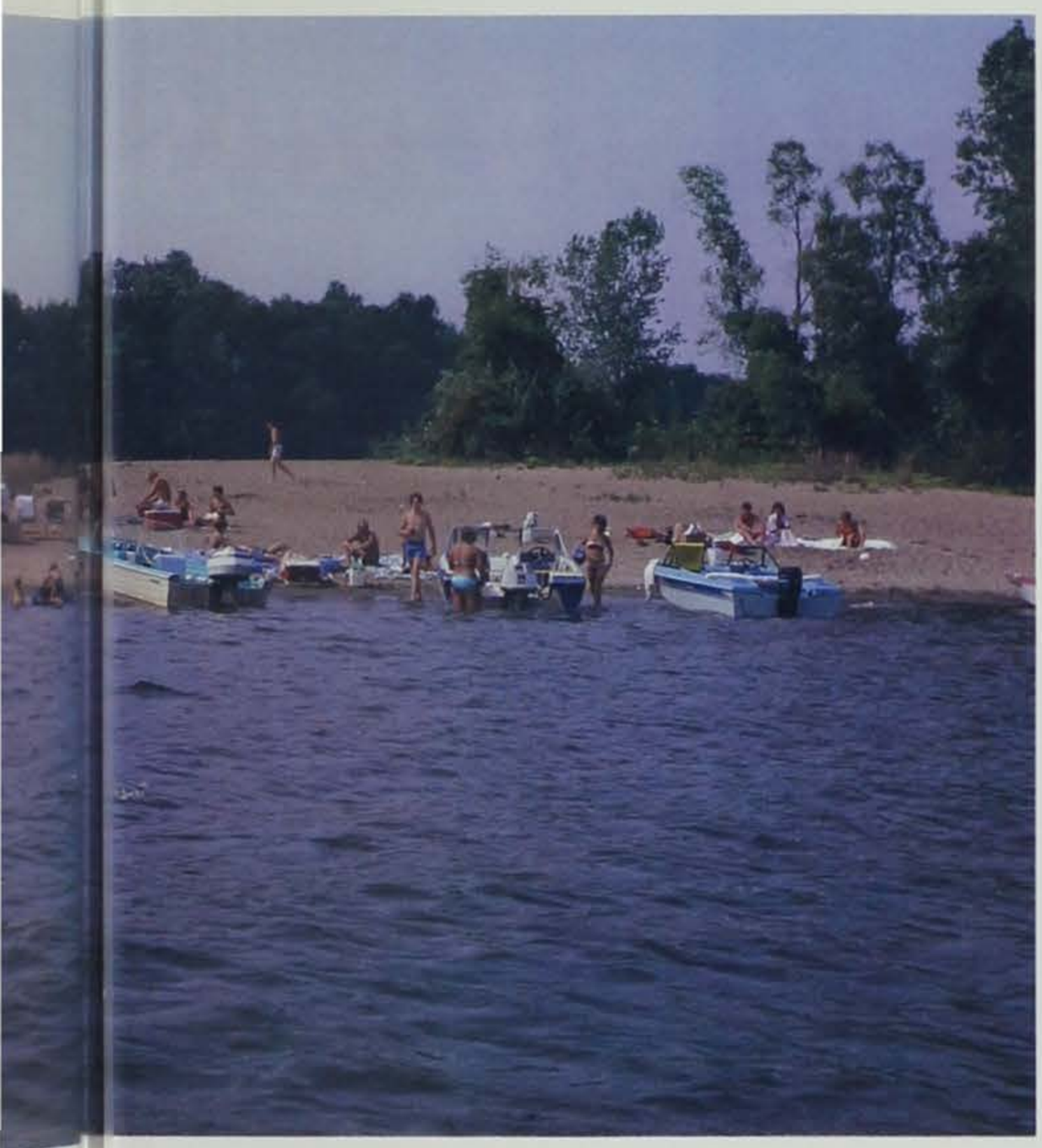
The Mississippi River is the primary focal point of these geological processes. All the flowing water in the creeks, streams, and rivers within the driftless area pours into the Mississippi and is carried on down to the Gulf of Mexico. Geologists refer to the Mississippi River as the base level stream of the area since all of its tributaries are working to carve their valley floors down to the same level as the Mississippi's. This process is still occurring, but it happens too slowly for us to see.

A panoramic view of the Mississippi River in the driftless area can be enjoyed from a number of overlooks atop adjacent bluffs. The landforms carved by the Mississippi River and its tributaries can readily be seen from these overlooks. A person standing atop the bluff can also see much of the river's present-day character. It's a mixture of river channels, lakes, marshes, islands and sand beaches. These features all have a role in making the Mississippi River one of our nation's diverse natural resources. Everyone who visits the river quickly appreciates that it offers many things to many people, animals and plants.

The U.S. Congress in 1924 recognized the value of the Mississippi River to fish and wildlife and designated portions of it as a National Fish and Wildlife Refuge. This refuge includes much of the river corridor from Wabasha, Minnesota to Davenport, Iowa. Congress in 1958 designated a second National Fish and Wildlife Refuge within portions of the Mississippi River between Davenport and St. Louis, Missouri. These two refuges include about 227,000 acres of area distributed over 534 miles of river.

The basic purpose of the refuges is to maintain a breeding and resting place for the nearly 365 species of birds, mammals, fish, amphibians and reptiles which are native to the area. Special emphasis is placed on wintering bald eagles, breeding woodducks, migrating waterfowl and resident furbearers. The Mississippi River valley is the nation's primary travel route for migrating waterfowl and songbirds. The river within the driftless area is also a home for many rare and endangered animals. The article in this magazine entitled "Animals of the Driftless Area" contains information on these special critters.

The Mississippi has always been "home sweet home" to many people. Indian tribes and some of our country's earliest settlers typically located near rivers where fish, game and water were plentiful. In fact, the name "Mississippi" is an Indian term meaning "big river" or "great waters." The numerous



Kevin Szcodronski, River Resources Planner, has worked for the Conservation Commission since 1978. He has a B.S. degree in Forestry and Wildlife from Virginia Tech and an M.S. degree in Parks and Recreation Resources from Michigan State University.

Left: *Sand beaches are numerous on the Upper Mississippi and are utilized frequently by recreationists.* Below: *Multiple-use of the river also includes commercial navigation. It provides efficient transportation of commodities such as grain, coal and petroleum products.*

Indian burial mounds along the Mississippi River's bluff are evidence of the driftless area's popularity to its original inhabitants. Effigy Mounds National Monument located about four miles north of Marquette is a good place for the public to see and learn more about these Indian burial areas.

The Mississippi was also a convenient transportation route for early Americans. Joliet and Marquette were the first white men to travel down the Mississippi River. The driftless area was the first "Iowa land" they saw as they reached the mouth of the Wisconsin River across the Mississippi from what is now Pikes Peak State Park.

As more settlers came to this area, trading posts were located close to where commercial hunters and trappers worked and where other supplies could be transported by river into the area. The more prosperous posts eventually grew into communities, which in turn became river towns as we know them today. Towns in the driftless area such as Lansing, McGregor, Guttenberg and Dubuque owe their heritage and continued existence to the Mississippi River.

Similar to early Americans, our U.S. Congress also recognized the value of the Mississippi as a travel route. Beginning as early as 1924, Congress authorized the development of the river for commercial navigation. Snags and other local obstructions were removed to allow passage of riverboats. The navigability of the river has ever since been continuously improved and eventually evolved into our present-day system of locks and dams. It's interesting to note that the Mississippi River is the only Congressionally authorized, dual purpose river in the country. It is designated as both a National Fish and Wildlife Refuge and a commercial navigation system.

The majority of the locks and dams were built between 1930 and 1950 to make a deeper, more dependable channel for modern-day towboats and barges. Twenty-nine locks and dams are strategically located from St. Paul, Minnesota to just below St. Louis, Missouri to provide our nation with its most efficient travel mode of bulk commodities such as grain, fertilizer, coal and petroleum products. Early riverboat captains would surely be awed and envious about the modern travel route of the Mississippi.

The same qualities that led early Americans to the Mississippi River are now attracting "modern-day explorers." These adventurers engage in many of the same activities as the area's original settlers, but they do them more for outdoor recreation than physical subsistence. Also, several people still depend on the Mississippi for at least part of their livelihood by commercially fishing, clamming and furbearer trapping.

The Mississippi has a lot to offer for anyone who loves the outdoors. It's an enormous resource that provides more outdoor recreation opportunities than any other area in the midwest. The driftless area is particularly attractive for river recreationists since the surroundings are very scenic. Do yourself and family a favor by visiting the Mississippi River. Many public parks and recreation areas are located along the river. The nationally designated Great River Road goes by many of these areas and provides motorists and bicyclists with a picturesque route.

In conclusion, the Mississippi River in conjunction with the driftless area's geological make-up is truly a special place. It has always been used for many things by many people and animals. This multiple use should always be available and care must be taken to not jeopardize any of it. In other words, the river and its valley must always be "A Resource For All."

Trout Springs

By Vaughn L. Paragamian

Spring water cold and clear bubbled out from the base of the rock bluff. Below the spring a large, unsuspecting trout lurked in a deep pool. This was a special spring, one of many special springs in northeast Iowa. I tried to imagine what the spring was like 20,000 years earlier. Many things were different then. There were plants and animals none of us will ever see other than in museums. Perhaps a herd of forest dwelling mastodons drank from this very spring. Great sheets of ice covered portions of the land at that time, sheets of ice that came from the north carving, gouging, and plowing the land.

In time the last ice sheet receded leaving deep layers of glacial sediments over most of the land we call Iowa. But the ice sheets were not as consequential in the northeast region of our state. For this reason bedrock that is buried over most of Iowa is near the surface or exposed in the northeast corner, bedrock that had been subjected to nearly 800 million years of weathering and erosion.

The nature of this bedrock, primarily limestone, had previously allowed a very important event to occur. Water seeking the path of least resistance filtered through the porous rock eventually dissolving many underground channels. Water, flowing through these channels, has surfaced at many locations in northeast Iowa. These coldwater springs are usually found at the base of hills and bluffs. The springs are special because the water emerges at a near constant temperature of about 52° Fahrenheit. When compared to air temperatures they are cool in the summer and warm in winter.

Many other events were taking place as the glaciers receded. Among those events was an invasion of plants and animals. Among the invaders was the brook trout. They probably thrived in many of the streams in northeast Iowa. However, as the air temperatures increased so did the water temperatures of streams. The brook trout were then restricted to the streams that were continuously nourished by coldwater springs. Early fish records from the 1800's indicate brook trout were restricted primarily to tributaries of the Upper Iowa River.

The brook trout is the only native member of the salmon family, more appropriately known to scientists as the brook charr. Brown trout were introduced to North America from Europe while the rainbow trout was brought in from the western part of our country. Brown trout are the most tolerant of warm water, but none of these fish do well in water warmer than 70° Fahrenheit.

Trout have always stimulated the interests of anglers in Iowa. The first hatchery dedicated to trout culture was constructed near Anamosa around 1873. Today there are three facilities. The Manchester Trout Hatchery is responsible for the production of all trout in Iowa, spawning and raising of fish to fingerling size. Decorah and Big Springs are important for the raising of trout from fingerling to catchable size, about 10 to 14 inches.

Iowans have always been dependent on hatchery reared fish. This dependence has been due to the fact there have been dramatic habitat changes. Large forested and prairie regions of northeast Iowa have given way to intensive agriculture. The lack of shade, rapid run off of water, siltation and pollution factors have all caused these special streams to decrease in quality particularly for natural reproduction of trout.

Each year hatchery and management personnel stock about 300,000 catchable-size rainbow and brown trout. These fish are released into 48 coldwater streams and two lakes. In addition about 50,000 brown trout fingerlings are released into 50 streams. Catchable-size trout are released into streams with easy entry while fingerling fish are released into streams with more difficult access. Brook trout have also been released but on a very restricted level. Rearing and releasing trout is important but there are other significant portions of the trout program.

Land acquisition and habitat enhancement work continues to increase in importance to the trout program. A management issue is the fact over 80 percent of the coldwater streams in Iowa are under private ownership. Al-

Ron Johnson

Brook trout are Iowa's only native member of the salmon family. A limited number of brook trout as well as several hundred thousand browns and rainbows are stocked in the beautiful, cool-water springs of Northeast Iowa.

Vaughn Paragamian has served as a fisheries research biologist since 1973. He earned a B.S. degree from Iowa State University and an M.S. degree from the University of Wisconsin, Stevens Point.

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though fishing access is permitted by many landowners, intensive management is not possible. In general, streams with the best habitat are under public ownership. This is due to the fact the streams in private ownership are usually associated with agriculturally oriented interests rather than fish and wildlife.

Habitat enhancement work has met with great success on public coldwater streams. Habitat work has stabilized banks, improved areas for food production, produced cover for trout, and improved each stream's ability to maintain cool water. Habitat work on private streams has been permitted by few landowners. Continued acquisition of these special streams by the state, habitat enchancement work and increased cooperation with private landowners can ensure improvement in coldwater streams and trout fishing.

Creation of greater diversity in the trout program is another goal of fisheries personnel. Diversity provides the angler with the choice of a variety of trout fishing experiences. Among these are the artificial lures-only segments of Spring Branch, Bloody Run and French Creek. These segments of stream are also regulated as trophy fisheries with 14-inch minimum-length limits on brown trout. Anglers can also fish for brook trout reestablished in South Fork of Big Mill; fishing is allowed with artificial lures only, while only brook trout 12 inches and larger may be taken.

A new experience is a winter trout fishery at Mitchell Lake in Black Hawk County. The winter fishery provides an opportunity for urban residents to try their luck at catching trout through ice.

Another relatively new trout fishing experience is the once-per-month stockings of a few streams with catchable brown trout. These streams offer a put and take fishery that does not attract as many anglers as the other put and take streams. In addition, the hook-wise brown trout are not fished out as quickly as the rainbow.

Trout fishing in Iowa has increased in popularity nearly every year. Today there are over 28,000 licensed trout anglers. These anglers help support the trout program through the purchase of a special stamp required of all licensed anglers.

Popularity of trout fishing lies in the catch success of put and take trout fishing in this scenic region of Iowa. Trout anglers average two trout per trip. This success is nurtured by the fact each hatchery provides a stocking agenda every day after fish are released and a free trout map and fishing guide is available on request.

Fishing for trout in northeast Iowa can be a simple and rewarding venture. The major factor the beginner wants to remember is to fish with light tackle. This means light line, (4-pound test), size 6, 8, and 10 hooks and light action rods and reels. Popular baits include worms, salmon eggs, sweet corn, marshmallows, and cheese baits. Popular lures include weighted flies, jigs, Rooster Tails, Panther Martins, and Mepps Aglia. I prefer black, brown, and yellow tackle on dressed lures.

Some advanced trout anglers use fly fishing tackle and have a multitude of flies to match aquatic insects trout feed on. These fishermen have learned from trial, error, and in-depth reading. An important point to always remember is that most trout fishing is done on private land as the landowner's guest, anglers should behave that way, which includes taking litter home and respecting fences and property lines.

The trout program in Iowa is growing with the popularity of trout fishing. For this reason fisheries biologists made a three-year assessment of the entire program. The assessment was accomplished by inventorying the habitat on all of Iowa's coldwater streams; interviewing trout anglers to determine their needs and success; and by evaluating management objectives and hatchery production. Preliminary findings indicate the need for more public-owned streams, intensified habitat improvement work including accomplishments on private streams, preservation of existing habitat, and greater use of fingerling trout. The final outcome of the research investigation will be the format of a trout program for our future.

As I stood there at that clear, bubbling spring I wondered once again what it would be like 20,000 years from now? I thought how fortunate the landowner was to have such a spring, a spring cold and clear enough to provide a home for a dandy trout. I then cast my black 1/16 ounce Rooster Tail to the head of the pool. I carefully brought the lure near the unsuspecting fish and within an instant the fight was on. In time the trout tired and I gently removed the hook while it was still in the water. How lucky I was to be here today!

Vaughn Paragamian

Springs, pouring from bedrock, keep the water in many of the driftless area streams cool enough to support trout.

Ron Johnson

FORESTS AND FORESTRY

By Jerry Kemperman

"This doesn't look like Iowa" is a common reaction of many visitors to the northeast corner of the state. The rugged landscape and forested hills just don't fit the stereotyped, preconceived idea of what Iowa should look like. While the topography is often striking, the forests and associated plant communities create much of the beauty found in this driftless area. In addition to beauty, these forests provide many tangible benefits, including timber production, wildlife habitat, recreational opportunities and erosion control on steep land.

With the forests dominating much of the driftless area's landscape, we tend to assume the forest is a stable community and has always looked much as it does now. Unless cut, it is assumed that the forest will not change much in the future. Actually, today's forest is barely a snapshot within a continuum of change. The landscape during presettlement, early settlement and today has changed. Even the present forest is changing its species composition with many of our common trees being replaced by an invasion of others. Unfortunately, today's forests are also being invaded by the bulldozer and if present trends continue, little forest land will be left at the end of this century. Let's take a look through at the past, present and possible future forest communities in the driftless area.

Past Forests

During the age of the Wisconsin glacier some 10,000 to 15,000 years ago, the driftless area was a non-glaciated island. With ice fields nearby, the climate was cold and wet. The forests were similar to those found today in northern Canada and Alaska, consisting mostly of conifers, such as spruce, balsam fir and pines, and a few hardwoods, such as aspen and white birch. Some of these northern species like balsam fir can still be found on cool north-facing slopes as are found at the Bluffton Fir Stand State Preserve in Winneshiek County. Canadian yew and white pine can be found at White Pine Hollow in Dubuque County and Yellow River State Forest in Allamakee County.

After the glaciers receded, a warm dry climate forced the conifer forest northward, replacing it with a combination of oak forests and prairie. These conditions probably persisted until 400 to 500 years ago, when a change to a cool wet climate favored an invasion of the northern deciduous forest characterized by a mixture of sugar maple, basswood, white ash, yellow birch and red maple. By the time of settlement, however, this forest type was found only on steep, protected slopes with yellow birch and red maple almost entirely disappearing.

Prior to settlement, periodic fires maintained prairies and savannas, preventing the spread of forests. In 1811, Zebulon Pike, for whom Pikes Peak State Park in Clayton County is named, described the currently-forested hills along the Mississippi River at McGregor as "...more than three-quarters prairie on both sides (of the river) or, more properly, bald hills."

With settlement, the landscape changed rapidly. Some areas were plowed, but many of the oak savannas and brushlands developed into some of the forests of today. Much of the brush probably consisted of oak and hickory trees that kept resprouting after periodic fires and therefore grew rapidly once the fires were controlled. Likewise, acorns from the savanna oaks could germinate and a forest develop. Occasionally these old savanna trees can still be found. They are quite distinct from the forest that developed around them. The new forest developed with typical tall, well-pruned, and small-crowned trees of which most are about 130 years old today. The surviving savanna trees, however, are characteristically short with a very broad crown, thick low branches and large diameters. They are over 200 years old.

Present Forests

In today's driftless area, the mature trees in the forests typically originated in the mid-1800's. These forests generally consist of large red and white oak

Jerry Leonard

Lumbering yields $1.6 million to northeast Iowans each year. This harvest does not result in the clearing of forests as young trees grow rapidly in response to increased sunlight. The forests are being lost, however, to livestock grazing and bulldozers.

Jerry Kemperman has served as district forester for 6 years. He earned a masters degree from the University of Michigan.

on the more fertile sites and black, pin and bur oak on the drier sites. Mixed with the oaks are scattered shagbark hickory, walnut, butternut, bigtooth aspen, black cherry and elm. This association of species is often called the "oak-hickory forest." It is very productive in wildlife food and habitat. The oaks, for example, produce large quantities of acorns, contributing a major portion of the diet of deer, turkey, squirrel and grouse. This oak-hickory forest was intensively used by settlers to build log cabins and barns and as firewood for heating and cooking. Many young forests were also cut along the Mississippi for riverboat fuel.

In addition to the oak-hickory forest, three other general associations of species exist. Earlier, the northern deciduous forest of sugar maple, basswood, white ash, bitternut hickory and other minor species had survived the period of fires on the steep slopes near the rivers. They developed into the current mature stands of the maple-basswood forest.

Another striking community is the red cedar glades, found on the very steep, rocky and dry south-facing slopes. Conditions are so severe that red cedar is one of the few woody plants that can survive in such areas. On the other extreme, the wet lowlands along the Mississippi and other larger rivers support forests of typical bottomland hardwoods, including silver maple, cottonwood, elm and boxelder.

Robert Hibbs

Northeast Iowa woodlands produce fuelwood for a growing number of homes.

Today, the forests in the driftless area are used in diverse ways. Each autumn, thousands come from throughout Iowa to enjoy the fall color change. About this time, hunters also take to the woods in annual pursuit of squirrel, deer and grouse. While many could find good hunting closer to home, they come to enjoy the unique landscape of the region.

There is also considerable commercial use of today's forests. Some of the best and most valuable walnut in the world is harvested from the driftless area. While value depends on size and quality, walnut trees up to $15,000 in value have come from this area. Other species also have good markets and provide substantial returns to the landowner. From Northeast Iowa some 19 million board feet of lumber is harvested annually, yielding $1.6 million to Iowa landowners. The newest major use of these forests is also one of the oldest uses. The woodlands are producing firewood for a growing number of homes and even businesses.

Often people are concerned that harvesting sawlogs and cutting firewood will result in a clearing of the forest of the driftless area. While a chainsaw can kill a tree, it doesn't kill a forest. The more a forest is cut, the faster the young trees grow in response to increased sunlight. The forests are, however, being lost at a very rapid rate to both livestock and bulldozers. With continuous grazing, no young trees survive to replace the large trees that die or are cut. Ultimately such a forest degenerates into prickly bush. Frequently a woodlot is in such bad condition after many decades of grazing that the owner feels there is little value left and has the remaining trees bulldozed. Forests on relatively level land are cleared and planted to corn. Surveys in 1954 and 1974 document a loss of 128,600 acres of forests in five northeastern counties. That is over 6,000 acres per year as this trend continues and perhaps even accelerates in the 1980's. Hopefully, this rate will slow soon, as much of the better land has already been cleared, leaving the remaining forest on steeper land that is highly erodible if converted to crop production. Passage of the 1982 "Slough Bill" may also slow the rate of land clearing, since there will now be no property tax on land placed in the Forest Reserve.

Future Forests

Over the past 10,000 years, there have been many changes in the driftless area forests. We are currently witnessing a gradual change in much of our oak-hickory forest. Oak-hickory forests generally become established where full sunlight can reach the ground. Most species of this forest type simply cannot regenerate in the shade of their own kind. Other species that comprise the maple-basswood forest, however, regenerate well in shade conditions. The seed source for these species was available from remaining maple-basswood forests described earlier. For the past hundred years, this seed has slowly spread out through much of the oak-hickory forest and has become well established in the understory. As the older trees gradually die or are harvested, the understory maple-basswood species are ready to fill any gaps in the overstory. Often over 10,000 seedlings per acre of these species can be found in some forests.

This new maple-basswood forest will be at least as beautiful to most visitors as the oak-hickory forest that is being lost. The fall colors will be more spectacular and the dense shade will kill out most underbrush, making the spring wildflowers more visible. However, with this change there will be a loss of many common species, including the oaks with their acorns for wildlife food and walnut with its high value veneer logs. Only in areas that are managed by periodic cutting or are converted from other uses such as open pasture are the conditions ideal for regeneration of the sun-loving oak-hickory association.

Conclusion

Changes are occuring in the forests of Iowa's beautiful driftless area. It is somehow comforting, however, to know that with simple protection from grazing and the bulldozer, Mother Nature will keep regenerating the forests naturally. Given a chance, our forests will continue to be ideally suited to the multiple use concept of producing timber, wildlife, recreational opportunities and beautiful landscapes for our pleasure.

PARKS, PRESERVES AND SPECIAL PLACES

Much of Northeast Iowa's uniqueness is on display at state parks, forests preserves and county conservation board education centers.

State Parks and Forests

By Larry Davis

Ron Johnson

Campground at Yellow River State Forest

Whatever your particular interest in outdoor Iowa may be, you'll find a great variety of pursuits available in the state parks, recreational areas and historical sites to be found in the northeast corner of the state.

The Paint Creek Unit is of primary interest. Opportunities for enjoyable hiking through the acres of native timber await the visitor. In a setting of sheer limestone bluffs, clear trout streams and a variety of wildlife, the quiet beauty of Mother Nature seems undisturbed.

On the north side of the Paint Creek Unit is the sawmill, operated by the forestry section of the Iowa Conservation Commission, where most sawing is done in the spring months. Most lumber logs are brought to the sawmill and the lumber produced is used for various commission projects.

Picnic sites, fireplaces, excellent trout streams, primitive camping spots, seasonal hunting, bridle trails and unloading ramps for horses; these recreational facilities can be enjoyed at Yellow River State Forest.

About one and one-half miles south of McGregor is Pikes Peak State Park, the highest bluff on the Mississippi River. In the heart of one of the nation's most picturesque regions, it is a unique combination of beauty and history and offers a magnificient view of the great river. Beginning with the first frost and until the leaves have fallen, Pikes Peak attracts thousands of visitors.

Julien Dubuque Monument

Pikes Peak is also rich in history. Standing atop this 500-foot bluff and looking south, the confluence of the Wisconsin River with the mighty Mississippi may be seen, the twin suspension bridges connecting the two rivers making an inspirational view. Indians traveled their canoe route from the St. Lawrence River to the Mississippi via the Wisconsin, and here on the banks of the Mississippi they found the long, narrow prairie ideally suited for encampment to hold their councils. Views seen at Pikes Peak today vary little from those that greeted the eye of primitive man.

There are 75 camping units at Pikes Peak State Park, and campsites are classified as modern. Camping permits are issued by the park ranger.

From McGregor, sightseers can travel up river through Marquette to Effigy Mounds National Monument, Iowa's only national park, on to Harper's Ferry, another old river town, or cross the river to the Wisconsin side to view Iowa across the mighty Mississippi.

Northeast Iowa literally abounds in a wide variety of recreational opportunities. Here, within a small area of five counties is a section of scenic, historical, and geological settings to meet the needs of any visitor who enjoys Iowa's great outdoors.

The Volga River Recreation Area is located in Fayette County just east of State Highway 150, about five miles south of U.S. Highway 18, making it readily accessible to major population centers in the eastern part of the state.

Situated on the extreme western edge of the Paleozoic plateau, the 5,400-acre Volga River site offers a contrast of rugged topography, geologic features, and substantial timber cover as compared to most of Iowa's hills, farmland and scattered timber stands.

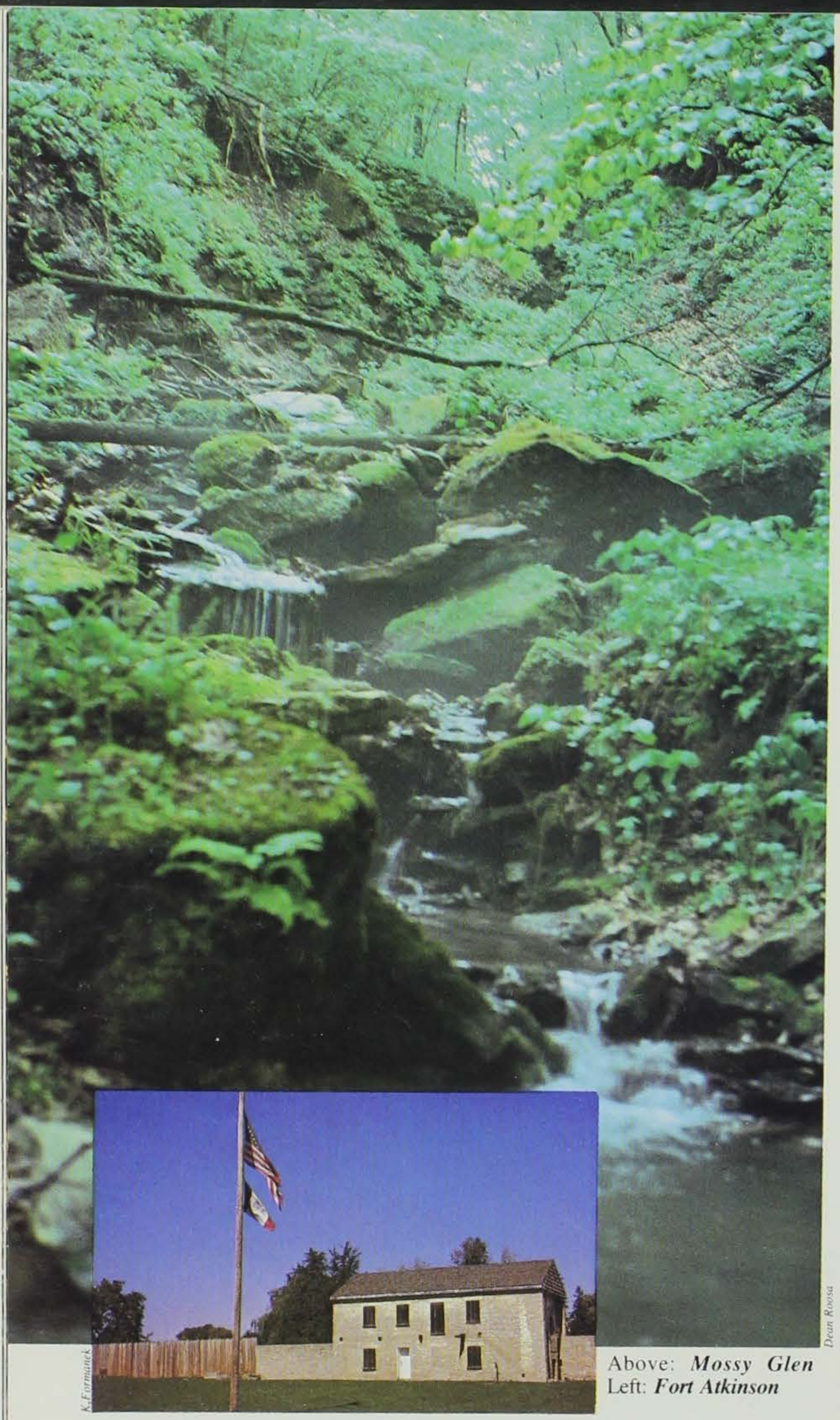
The area provides habitat for a variety of fish and wildlife species. The Volga River holds smallmouth bass and channel catfish and harbors fair numbers of nesting wood ducks and shorebirds. Songbirds abound and wild turkey flocks are numerous.

Scenic features include the Volga River itself, striking rock formations, and natural woodlands with unusual stands of aspen. Changes of season provide bright wild flowers and foliage in spring, shady woodlands in summer and vivid colors in autumn.

Canoeing, cross country skiing, camping and snowmobiling, as well as hunting and fishing opportunities are now available in the Volga River Recreation Area.

Echo Valley, located about three miles southeast of West Union just off Iowa Highway 56 in Fayette County, is a small park offering splendid scenery for hikers and picnickers. Trout fishermen enjoy two clean streams, both designated trout waters, located within the boundaries of the area.

North of McGregor just off Iowa Highway 76 lay the timbered hills and valleys of the Yellow River Forest. The 6,548-acre forest in the midst of spectacular bluffs along the Mississippi River offers outdoor recreation in its most primitive form.



K. Formanek

Dean Roosa

Above: ***Mossy Glen***
Left: ***Fort Atkinson***

Preserves

By Dean M. Roosa
State Ecologist

The rugged landscape of northeast Iowa — the driftless area, Paleozoic plateau, or Little Switzerland of Iowa — contains the greatest natural diversity in our state. From tiny land snails to giant pine trees; from cool, moist, mossy slopes to hot, dry hill prairies; from small trout streams to a giant river — and nearly everything in between.

There has been numerous pleas through the years for preservation programs, beginning even late last century. Louis Pammel, Bohumil Shimek, Thomas Macbride, giants of Iowa natural area preservation, all extolled the virtues of the driftless area and spoke for saving those scenic and scientific gems. All these men were among the founders of the McGregor Wildlife School which did so much to further the preservation of natural areas

The State Conservation Commission, County Conservation Boards, The Nature Conservancy, and the State Preserves Advisory Board have been influential in protecting significant tracts in northeast Iowa. The State Preserves System will be highlighted here.

The State Preserves Advisory Board was created by legislative action in 1965. It consists of seven members, appointed by the Governor. It is the responsibility of this board to establish a statewide system of preserves.

If an area contains sufficient quality to be considered as a state preserve, the State Preserves Advisory Board recommends to the Conservation Commission and the Governor that it be formally designated. Once designated as a state preserve, it is afforded protection under Chapter 111B, Code of Iowa, and is declared "put to its highest, best and most important use for public benefit. It shall be held in trust and shall not be alienated except to another public use upon finding by the board of imperative and unavoidable public necessity and with the approval of the state conservation commission, the general assembly by concurrent resolution, and the governor." It may not be taken under the condemnation statutes of the state without such finding. This means an area is safe from pipelines, highways, utility corridors, — any type of intrusion not in keeping with the original intention of the area upon being designated as a state preserve.

The goal of the State Preserves Advisory Board is to preserve at least one example of each type of natural community, archaeological site, historical

site, and geological site in the driftless area.

Presently, there are 17 State Preserves in the Paleozoic plateau. They will be briefly described below:

Bixby State Preserve: Located in southern Clayton County, this 184-acre area is managed by the Clayton County Conservation Board. It has been of interest to botanists and geologists since before the turn of the century because it contains splendid examples of geological formations associated with the Niagran escarpment, and requisite habitat for numerous rare plant species such as dwarf scouring rush, muskroot, ground pine, and northern currant. It contains a glaciere and several very unusual lichens. Because it is a fragile area, extreme care should be exercised when visiting. Its great significance is evidenced by the occurrence of species which are listed on the federal endangered and threatened species list.

Bluffton Fir Stand: A 94-acre relict area located near the small town of Bluffton in northern Winneshiek County. It is the largest known remnant of Balsam Fir *(Abies balsamea)* in Iowa. These relatively few trees remain from the many that grew here during post-glacial times. On a steep, north-facing slope, a cool, moist micro-climate results from limited sunshine and protection from drying winds, and provides an environment similar to that of a much earlier time. On this slope is a complex of boreal species, including some of our rarest mosses. Unusual vascular plants include northern lungwort, water speedwell, paper birch, rattlesnake plantain, Canada yew, and white pine.

Brush Creek Canyon: This 217-acre natural area is located near Arlington in Fayette County and is owned and managed by the state conservation commission. Brush Creek winds through a rocky, steep-sided, wooded gorge. Limestone outcrops furnish many plant habitats, as do the valley flats adjoining the stream. The preserve provides habitat for at least 268 species of vascular plants, some of which are boreal relicts. Examples are Canada yew, shinleaf, sullivantia, and cliff brake fern.

The preserve is significant geologically as its steep slopes and exposed bedrock mark important changes in regional landscape patterns and in the age of underlying bedrock formations. The steep bluffs are formed by outcropping Niagaran dolomite, a particularly resistant Silurian formation. The land surface southwest of the preserve is open and gently rolling in marked contrast to the sharply dissected terrain encountered at the preserve and on to the northeast.

Coldwater Cave Spring: This geological and nature preserve is located northwest of Bluffton in Winneshiek County and is owned and managed by the state conservation commission. Coldwater Spring issues from beneath a towering bluff of Ordovician-age Galena dolomite. The spring marks the primary natural entrance of Iowa's largest known underground cavern system. The cave, located beneath private property, contains stalagmites, stalactites, and colorful flowstone formations in an atmosphere that remains at 47° Fahrenheit throughout the year.

Decorah Ice Cave: Located at the north edge of Decorah in Winneshiek County, the Decorah ice cave is owned and managed by the Decorah Parks and Recreation Department. The ice cave underlies a wooded bluff of Ordovician-age Galena dolomite along the Upper Iowa River. It is the largest ice cave in eastern North America and has unique geological features, a history of scientific investigation and an international reputation. The cave passage follows an enlarged joint fracture or crevice, expanded in part by the slippage of large blocks downslope. The cave has natural deposits of ice which coat the walls beginning in March and remaining until August or September. The cave was formerly commercially shown and was featured in Ripley's "Believe it or Not" column in 1932.

Fish Farm Indian Mounds: Located near New Albin in Allamakee County; owned and managed by the state conservation commission.

At least 28 mounds are located on an ancient terrace overlooking the Mississippi River. They were built by prehistoric peoples of the Hopewellian culture between 250 B.C. and 350 A.D. This mound group is one of the few remaining of the many that dotted hilltops and terraces along the rivers at the time of settlement; most have been destroyed by cultivation and pillaging.

Fort Atkinson State Preserve: Located on the northwest edge of the town of Fort Atkinson, this fort was established as a federal military post in 1840 to protect the Winnebago Indians from the Sioux. The major buildings, stockade, and fort well were built between 1842 and 1845 from limestone quarried nearby. The fort was abandoned in 1849 and in 1853 was auctioned off to private owners. In the 1930's, the state conservation commission acquired the fort and have recently reconstructed the palisade and some buildings.

The quarry west of the fort furnished stone for the foundations and buildings of the fort complex. This limestone contains abundant fossil crinoids, resistant nodules of chert and occasional fossil brachiopods. This quarry is the "type section" of the limestone member of the Maquoketa formation. A type section is a location where the rocks are most typically exposed and may be used as a reference in later studies.

There is a museum located in a building formerly used as a barracks.

Hartley Fort: Located near New Albin in Allamakee County, this privately owned preserve marks the site of prehistoric fortified Indian encampment situated on a terrace overlooking the Upper Iowa River. Built in approximately 900 A.D., the stockaded fort may have protected the Woodland Indians from Oneota people.

Little Maquoketa River Mounds: Located near Sageville in Dubuque County, this 24-acre preserve is owned by the State of Iowa and managed by the Dubuque County Conservation Board. The complex of 24 conical and linear mounds was discovered in 1977 during studies related to the Great River Road project.

The mounds sit atop a bluff, and are attributed to the Woodland Indians who occupied the area from 1300 - 700 A.D. The mounds range in height from 10 to 50 inches, and from 12 to 40 feet in diameter.

Geologically, the site provides a view of the best known example in Iowa of "stream piracy". This occurred when the Little Maquoketa River was diverted from a tight bend to a shorter, more direct route to the Mississippi River.

Development of the area was in accordance with native American concerns that burial mounds not be disturbed. A fence surrounding the mounds prevents visitors from walking on the mounds. A parking lot along the highway, a trail leading up the 200-foot bluff, and a scenic overlook of a spectacular view enhance visitor enjoyment.

Merritt Forest: Located in Clayton County, near the town of Millville, this 20-acre woodland is owned and managed by the state conservation commission. It was donated to the State of Iowa by the Merritt family for the purpose of being maintained as a state preserve. It is a near-virgin woodland dominated by oaks, maples, and basswoods, with occasional Walnuts, hickories, and elms.

The woodland slopes gently toward the Turkey River, located about a half-mile north. Abundant wildflowers, ferns, mosses, and lichens are found here.

Mossy Glen: An 80-acre woodland, located several miles northwest of Edgewood. This outstanding mature woodland was donated to the State of Iowa by Mrs. Mildred Hatch in memory of her father, Charles A. Hesner, and her uncle, Henry Hesner.

It is located on the Niagara escarpment and contains geological features typical of the driftless area of northeast Iowa. It is a superb natural area, with numerous rare or unusual plants. It is rich in legend, with moonshiners taking refuge here, tales of mysterious murders, a locally known man called himself the "poet of Mossy Glen".

Its rich history, important geological features, and native flora make it one of Iowa's natural treasures.

Retz Memorial Woods: This 49-acre woodland is located southeast of Elkader. It is owned and managed by The Nature Conservancy.

A haven for many spring wildflowers, it is a mature upland woods dominated by oaks, sugar maples, and basswood. The rugged topography of the area and the relatively undisturbed condition result in habitat for a great diversity of plant life. Massive limestone blocks are present and covered with lush growths of mosses, lichens, liverworts, and walking ferns.

Roggman Boreal Slopes: This 20-acre site, owned by The Nature Conservancy, is located near Garnavillo in Clayton County. It is an important site for the protection of endangered, threatened and rare species of plants and animals. It was donated to the Nature Conservancy by Arnold Roggman and Bernadine Fiete in honor of their parents, Charles and Anna Roggman. Some of Iowa's rarest plants occur on this north-facing, rather steep slope, so fragile that damage is caused by walking on it; it is open for visitation only by special permit.

St. James Lutheran Church: This historical preserve is located on the west edge of the town of Fort Atkinson, adjacent to the fort. Built during the period 1840-1850, it served as the site of services held by the German Evangelical Lutheran St. James Church Society. It was abandoned in 1894. The church is similar in construction to the fort buildings from stone quarried locally.

Slinde Mounds: This archaeological site is located northwest of Waukon and overlook the Upper Iowa River. It was recently purchased by the State under their "open spaces" program. The mounds are attributed to the Middle and Late Woodland culture of roughly A.D. 300 to A.D. 1400.

The preserve is also of natural significance, with native prairie grasses and a view of a deeply entrenched stream meander which exposes underlying bedrock.

Turkey River Mounds: A 62-acre tract lying southeast of Guttenberg, this preserve offers some of the most spectacular variation in Iowa. The preserve sits atop a long, narrow, forested ridge that rises 200 feet above the confluence of the Turkey River with the Mississippi River. The steep sides are nearly perpendicular cliffs composed of the Galena dolomite which has weathered into picturesque pinnacles.

The preserve contains conical and linear burial mounds built approximately 2000 years ago.

Because of the variety of habitats, it supports an extensive vascular plant flora.

White Pine Hollow: This 712-acre forest, situated near Luxemburg in Dubuque County, contains perhaps the largest white pine stand in Iowa. The preserve was investigated by representatives of the National Park Service who determined it to be of sufficient national significance to be designated as a National Natural Landmark, and was so dedicated in 1972. It has proved to be a national treasure as it is habitat for several species that appear on the federal threatened and endangered species list. New discoveries of rare animals and plants continue each year. Much of the preserve was purchased by the Dubuque County Conservation Society in the 1930's and donated to the state. A total of 519 species of vascular plants, 95 species of mosses and 12 species of liverworts have been identified from the preserve.

FUTURE PRESERVATION NEEDS

Because of the rich archaeological history, the high diversity of vegetation, and the presence of rare animals, the rugged portion of northeast Iowa presents a challenge to conservationists and preservationists. Much has been done to protect the diversity; much is left to be done.

Archaeology

The majority of the effigy mounds have been destroyed — some in recent years. This makes those remaining all the more precious. An enlightened society such as ours should have enough respect to protect all such forms from a prehistoric era. Clark Mallam, Luther College archaeologist, has surveyed the area for remaining effigies, mapping those which are still present, discovering some previously unknown.

Rock shelters, containing rock carvings, or "petroglyphs" still remain, though many have been vandalized or destroyed. These need the strongest form of protection — for an added dimension to our cultural history, for further interpretation in the future.

Although numerous mound sites have been protected, little has been done to protect campsites, forage areas, hunting areas, and winter habitation sites.

Natural History

Recently, Terry Frest located and described a new habitat-type in northeast Iowa — the "algific talus slopes", described elsewhere. These are highly significant sites containing rare plants and endemic snails. Perhaps half of those formerly in existence have been destroyed. These nationally prominent features should be given the highest protection possible. Several are in state ownership, but still vulnerable to damage. Protection of these is perhaps our highest preservation need.

An attempt is presently being made by the Iowa Natural Areas Inventory to locate all the hill prairies in northeast Iowa. Numerous prairies exist, none are in state ownership. While fairly common in Wisconsin and Illinois, they are a rarity in Iowa due to the exposure of the bluffs. They provide habitat for plants not found elsewhere. The most outstanding examples should be protected.

Perhaps our most endangered habitat is the floodplain forest. These are proving to be valuable for certain sensitive

Ken Formanek

Fish Farm Mounds

species of animals, mainly birds. It is imperative that we locate examples of this rapidly disappearing community and provide protection. It is here that the red-shouldered hawk, brown creeper, and other unusual birds nest. It is these woodlands that provide migration corridors for migrating birds.

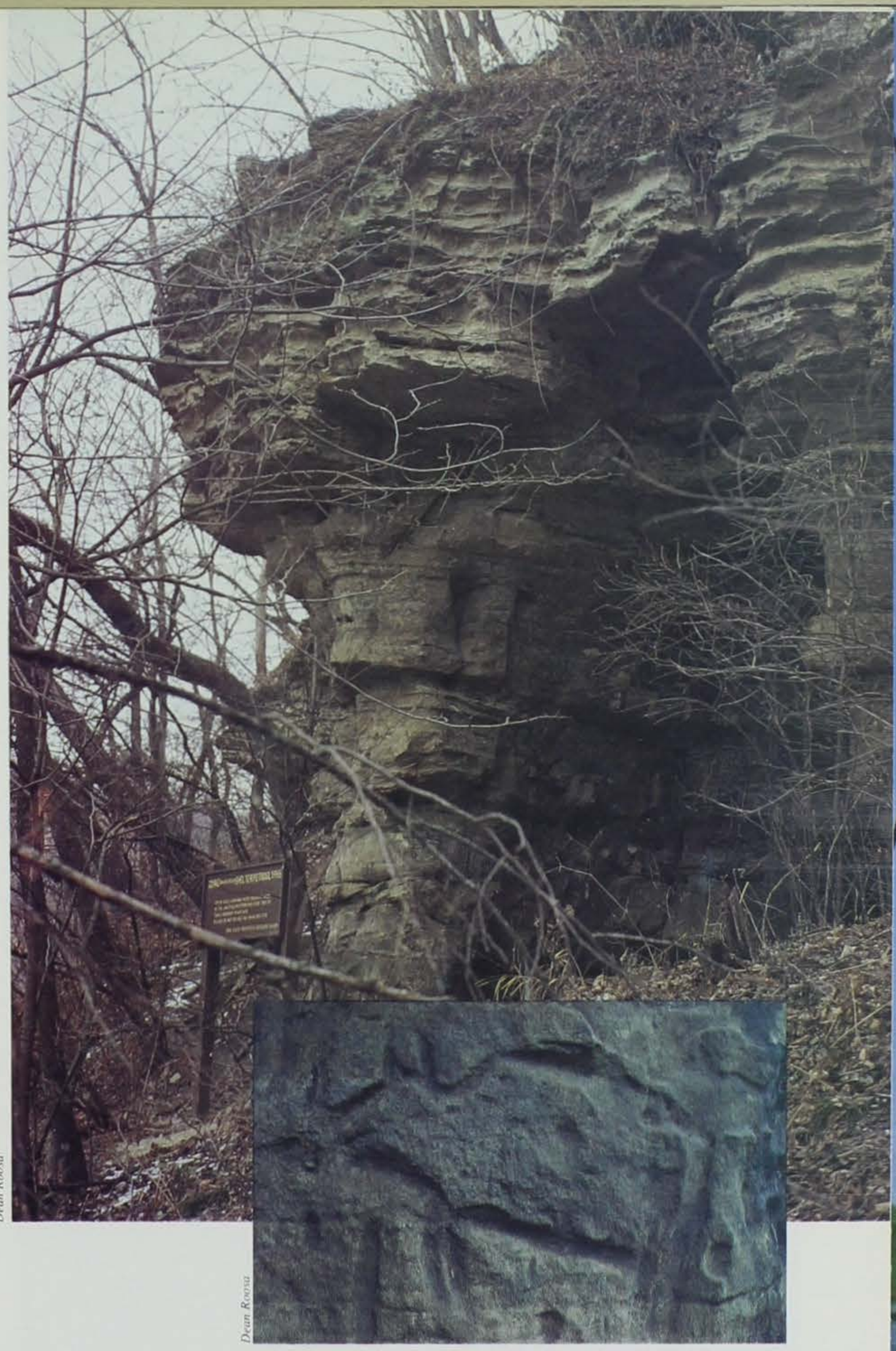
Streams like the Upper Iowa, Yellow, Volga, and Turkey are treasures, some nationally prominent. The "Protected Waters Program" of the State Conservation Commission will go a long way towards adequate protection. Acquisition by state and county agencies should continue and be accelerated. These streams are a precious recreational resource and will become even more so in the upcoming years.

Undisturbed upland forests, once so plentiful in colorful northeast Iowa, are becoming increasingly uncommon. These are utilized by a variety of organisms which add much to our quality of life. It is being learned that certain sensitive species of wildlife require extensive tracts of woodland. We must rapidly locate and protect the best examples of this community-type.

Historical Sites

The grinding mills along northeast Iowa streams have not been adequately addressed by preservation organizations. There are a few excellent examples remaining; these should be restored as living history lessons.

Fort Atkinson stockade, unique among forts, should be enlarged to include the perimeter buildings. Portions of the trail that connected Fort Crawford and Fort Atkinson, still visible in places, should be given permanent protection.



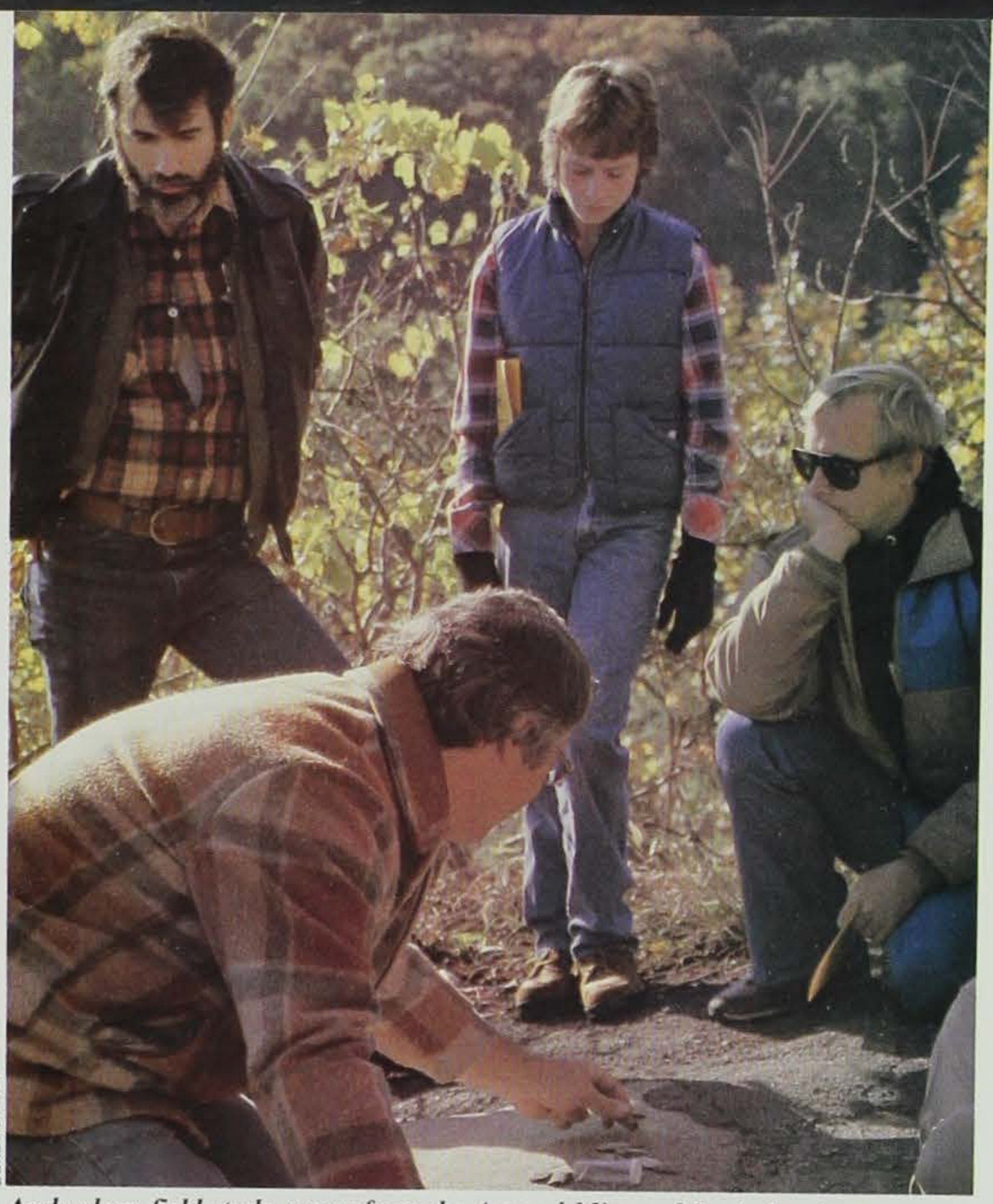
Dean Roosa

Dean Roosa

Petroglyphs or rock carvings still remain from ancient cultures and are protected in several state preserves.

A lot is riding on the conservation and preservation efforts of Iowans in the next decade. The "have not" nations cannot afford to set land aside. Our nation, a "have" nation, (and state) cannot afford to fail our land-protection responsibility. Future Iowans will judge us as harshly as we judge those who have gone before and failed to adequately provide for us in terms of public recreation areas, natural areas, protection for endangered species, scenic areas, historic sites — places where can gain solitude and serenity. These places will become more important in the future.

We must keep what we have in the driftless area, add to what we have, in just consideration of those Iowans not yet born.



David Newhouse

Archeology field study group from the Annual Mines of Spain Seminar

Education Centers

By James Zohrer and *James Dorion Rooks*

County Conservation Board Administrator — *Director of E.B. Lyons Nature Center*

The uniqueness of Iowa's driftless area is a central theme exhibit in the programs and facilities provided by a number of conservation education centers located in northeast Iowa. These centers provide the opportunity to view and learn about the geological and biological richness of this part of the state.

Osborne Conservation Center

The Clayton County Conservation Board maintains the Osborne Conservation Center located five miles southwest of Elkader on Highway 13. The live animal exhibit is one of the main attractions of this center. Elk, bison, deer, coyote, raccoon, wild turkey, and other birds can all be seen. A number of well planned learning trails are open to the public along with an exercise trail. A Conservation Practice Display Farm is also on the conservation center grounds.

Much of this center's educational efforts are aimed at school children. Numerous programs are put on throughout the year. A mobile learning center is also available to bring the conservation message to groups away from the center.

Swiss Valley Nature Center

The Swiss Valley Nature Center is located in Dubuque County along the southeastern edge of Iowa's driftless area. This center is located approximately seven miles southwest of Dubuque in a picturesque valley in the upper reaches of Catfish Creek. Today, over 600 acres of this unique valley are under the management of the Dubuque County Conservation Board. Dissected by many smaller tributaries, the Swiss Valley area exhibits deep valleys, abundant limestone outcroppings, crevices, caves, and sinkholes. In many of the deeper ravines, the actual contact point between the limestone and underlying impervious shale has been exposed, causing many springs to seep outward. At several of these seepage areas on the preserve, spectacular "hanging bogs" have been created, dominated by marsh marigold and skunk cabbage in the spring.

Because the steep slopes of the valley were unsuitable for cultivation, most of the area had retained its native forest cover and abounds with many rare species of wildflowers and other wildlife.

The headquarters for the Swiss Valley Nature Center features an interpretive center fashioned from an existing dairy barn. The visitor center contains displays concerning the history, wildlife, plants, ecology, and natural history of the Swiss Valley area.

Twelve miles of self-guiding nature and hiking trails radiate outward from the nature center through forested slopes, prairie, and wetland areas. Other features of the preserve include demonstration soil conservation practices, live wildlife displays, arboretum areas of grasses and shrubs, restored prairie areas, and demonstration wildlife food and cover plots.

The Swiss Valley Nature Preserve is open on a year-round basis, with excellent cross-country skiing available in winter months. Seasonal nature hikes, programs and workshops are held on Sunday afternoons for the general public. Special programs for schools and other groups can be arranged by contacting the following address: Swiss Valley Nature Center, Rural Route 1, Peosta, Iowa 52068, telephone number 319-556-6745.

Lake Meyer Nature Center

The Lake Meyer Nature Center is located in the heart of Iowa's "driftless" area between Fort Atkinson and Calmar. It is an A-frame structure scenically located overlooking a 36-acre lake. The Lake Meyer Park is a 126-acre park containing the lake, a campground, and a picnic area.

The nature center has general public displays on the main floor. Examples of these displays include artwork, charts, bulletin boards, and information concerning various conservation topics. These include a live beehive, a geology display, a birdhouse display, a wildflower display, a weather station,

aquariums and a habitat display showing the four major habitats in northeast Iowa. Also included are displays on *Sights and Scenes of Winneshiek County, Indian Life* and *Artifacts*. Free handouts are provided covering such topics as Iowa's birds, Iowa's geology, birdhouse patterns, trees of northeast Iowa, forestry, and stratigraphic maps of Lake Meyer.

Programs given at the center are multifaceted. These include spring wildflowers, geology, trees, water analysis, forestry, animal homes, archaeology, bird sights and sounds, insects and honeybees, edible wild foods, and canoeing. In the summer and winter, programs are usually for the general public. These programs include lectures, slide shows, walks, and talks given on the nature trails. The winter offers cross-country skiing and snowshoeing. Traditionally an adult education program is offered on winter recreation and survival. These courses and programs are offered free of charge. All materials are provided by the center. There is also a self-guided nature trail on the area.

Lyons Prairie-Woodland Preserve

Central to nature interpretation in this area of the Heartland, is proximity of a nature facility to an urban population. Lyons Prairie-Woodland Preserve is located only minutes from Dubuque and is pivotal as the jumping-off place for access into the States' newly acquired Mines of Spain.

This innovative nature complex was designed as a 'Forest Preserve' at the bequest of the late philanthropist and long-time Dubuque conservationist, Edwin B. Lyons. The preserve opened its trails and rolling field and forest interior three years before the official completion of its interpretive center in 1977.

The center itself reveals the outside through glass-walled rooms, letting animals and birds go about their business. A 'Window Watch' is a "living" exhibit, perched high on a prairie-woodland promontory and lets viewers look across the deep forest valley toward Catfish Creek and the Mississippi River.

Seasonal walks are a thrust of the area's interpretive program. Collective themes programmed by the staff, run from *Remnants and Ruins* to *Land Stewardship* and back again, as interest among walk attendants builds throughout each of the nine progressive walks.

A popular caravan-trail walk is called *Naturalists in the Parks* was instituted and designed as a formative attraction for visitors in 1975. The site and walk times, together with a natural history sketch is posted with the media in advance of the activity. Then everyone hopes for good interaction from all the elements, such as a recent perfect autumn walk into White Pine Hollow, a State Preserve, where the attendance was marked at 65 for the afternoon. (Colorful local outdoor figures are selected ahead of time and asked to interpret their views and knowledge of the natural area to be visited that season.)

Volunteers and naturalist interns under the direction of a professional interpretive staff have made it all happen...the area features built-in learning stations, lecture and demonstration areas...a landmark heritage farm complex has been restored complete with organic farm gardens, herb gardens, wild gardens, and an old farm atmosphere. Original farm plantings of native North American red pine, introduced Scotch pine, European tamarack and a classic 1860 pioneer stone chapel contribute to the subtle originality of the 37-acre sanctuary.

Additional assistance to the Preserve comes in the form of a private, nonprofit support group called 'Friends of Lyons Prairie-Woodland'. This is to help assure and insure future growth. The 'Friends' show where one's interest, talents and available time will be put to work in areas of program planning, homespun and native crafts demonstrations and workshops, guided hikes, and lastly, though most important, financial assistance to the preserve and center itself.

Fayette County Education Center

A new conservation education center has recently been opened in Fayette County. This facility is operated by the Fayette County Conservation Board and is located five miles north of the City of Fayette, and one and a half miles west on County Road W-25.

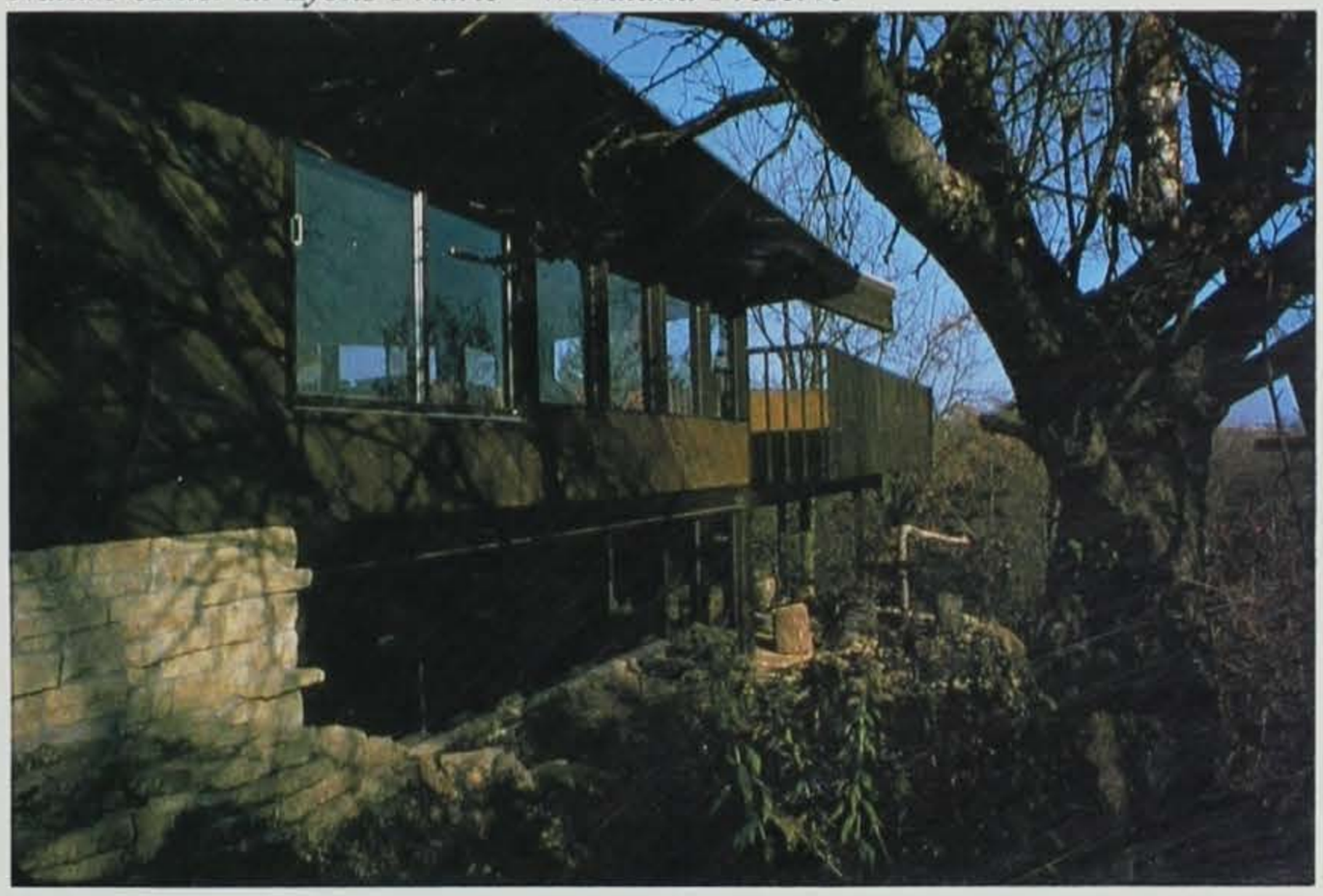
The center is used as both an educational unit and an administrative/maintenance headquarters. Although suited to handle small groups in its two classrooms, most of the educational programs are taken out to the various school districts, parks, and private groups. This allows for better communication and public relations.

Some educational programs presented cover topics which include: animal groups and their roles in the environment, wildlife habitat, soil conservation, plant and tree identification, energy conservation, edible plants, and others. There are also special programs that cover cross-country skiing, fly-fishing, canoeing, attracting birds, and survival skills. The board hired a full-time naturalist in January of 1982.

The center contains several exhibits which include: Iowa's trees (identification board), amphibian and fish displays, and an expanding collection of snakes found in northeast Iowa. The center also has a small, live wildlife display.

These facilities are provided by the various county conservation boards located in every county of Iowa except Allamakee. These boards also manage many excellent parks and wildlife areas for public use. Be sure and add a visit to these county conservation board areas on your list of things to do when in Iowa's beautiful driftless area.

Nature center at Lyons Prairie - Woodland Preserve



Driftless Area Plants

(continued from page 10)

In the midwest, its typical habitat is damp, shaded rock crevices of the driftless region of Illinois, Iowa and Wisconsin; but it has a worldwide distribution in the northern regions extending into South Dakota and along the Rocky Mountains to New Mexico. Thus, the muskroot is an interesting example of one of Iowa's rare plants by virtue of its being at the very edge of its range in the refugium of the northeastern part of our state.

The muskroot displays an interesting flowering syndrome. The flowers of the upper portion of the flower arrangement, the inflorescence, are four-merous. This means the plant produces its flowers in four parts: four petals, four sepals, four stamens and four styles. However, at the lower portion of the inflorescence, the flowers are five and sometimes even six-merous. The fruits are also of interest. These structures are botanically known as drupes, which have a fleshy outer covering with a hard, stony inner coating which encloses the seed — much like an olive or a peach. the drupe of *Adoxa* mimics a small, dry, olive in shape and color.

Slender Lip Fern *(Cheilanthes feei)*

Sometimes also called the baby lip fern, the slender lip fern is found infrequently on the dry exposed limestone cliffs growing in cracks from a stout, scaly underground stem. If viewed at the appropriate time of the season, one may find the reproductive spores enclosed within structures called sori. Sori may be partially hidden by the incurved margin of the leaf. This is one of the easiest ferns to recognize because the leaves, or fronds, of this species are reddish-brown in color and are very hairy. The stem or rachis from which the frond arises has a dark brown coloration.

Sometimes, the slender lip fern is called a resurrection fern since upon drying, the fronds curl up and lose much green coloration for long periods of time; but after a rain it will uncurl and function normally.

Rock Tripe *(Umbellicaria vesca)*

A recent and most interesting discovery was made within Iowa's driftless area. For the first time ever, the rock tripe was reported growing in Iowa. Botanists classify this organism as a lichen, a most curious organism indeed. It is both a green alga and a fungus living in close association with one another. This symbiotic association is mutualistic. That is, both organisms derive mutual benefit from their association. The fungal portion of the lichen absorbs moisture and inorganic material from the rock habitat and provides an anchored environment for the alga. The alga meanwhile provide organic nutrition for the fungus by trapping sunlight and carbon in the atmosphere. In this way, both organisms can survive under the harsh conditions of growing on barren rock; a harsh environment where neither might survive without this mutualistic relationship. It is not uncommon to find lichens such as these inhabiting a barren rock surface or growing on the surface of shaded tree trunks as pioneer species.

Umbellicaria grows on a surface without having either a true root or stem. It looks much like a ragged umbrella without a handle which has been turned partially inside out by a strong wind. Its dark greenish-brown to black color and leathery texture helps it blend into the bare rock surface where it is attached.

The genus *Umbellicaria* is widely distributed in Canada and ranges down to the southeastern part of the United States; however, lichenologists are becoming increasingly concerned about the survival of many of these species. Due to the ever-increasing loss of virgin timber and an apparent intolerance for the increasing concentration of sulfur dioxide in our atmosphere, it appears that some species of rock tripe are unique barometers of the possible degradation of our environment.

These are but a few of the special plants of Iowa's historic driftless area. Many must go unmentioned, for the plant diversity in this region is truly remarkable. A few more noteworthy disjunct species should be mentioned: Iowa golden saxifrage, showy lady's-slipper, kidney-leaved sullivantia, northern lungwort, jeweled shooting star, white pine and balsam fir, Canada yew, northern currant, yellow birch, and velvet-leaf blueberry to name a few.

The Iowa Natural Areas Inventory would be interested in knowing where these and other special plants of the Paleozic plateau reside. We welcome your help and appreciate your efforts to see that these species are protected for the many generations of Iowans who follow.

Archaeology

(continued from page 22)

established in the driftless area. There, especially along the great terraces of the Upper Iowa River and its tributaries, members of this lifeway constructed large villages and farmed the rich soil of the floodplains. Archaeological data reveal that this culture, referred to as Oneota, also engaged in extensive bison hunting, either further west, or, as Dale Henning of Luther College has suggested, among possible resident herds in the driftless area.

The origins of this culture which left such an indelible impression on the environment and in the archaeological record in the form of villages, cemeteries, earthen enclosures and petroglyphs, remain uncertain. Some see it emerging from the resident Woodland hunting and gathering mode, a product of diffusion emanating from Mississippian centers to the south. Others consider it to be a direct consequence of migration. Regardless, its impact on the local population was considerable. In short order they either became Oneota or moved. It seems that the Oneota even used, on occasion, the mounds of the Woodland peoples. In the 1930's Ellison Orr, while conducting excavations in mound groups along the Upper Iowa River, discovered intrusive Oneota burials. This practice may have signified Oneota respect for the preceding lifeway, or, alternately, served to symbolize their aggregate strength through appropriation of the sacred ground of others. Few, though, would debate either the success or power of this culture. Operating within a new mode of production, its remains can be found in many other midwestern states. In Iowa most ethnohistorians would agree that the Oneota, following European contact, emerged historically as the Ioway.

The preceding review of the archaeology of the driftless area should be regarded as tentative. It contains concepts, interpretations and theoretical propositions which would not necessarily be acceptable to others. Using the organizing principle of modes of production, it is offered here in the form of a general explanation for the purpose of acquainting readers with one person's perspective of an environmentally and culturally distinct region.

The explanation, however, serves only as a construct for much remains to be done. We need to continue to stress

explanation as a goal and to seek its achievement through more extensive multidisciplinary and interagency programs. But, while so engaged we must not lose sight of a far greater issue. Today, the management, conservation and preservation of Iowa's natural and cultural resources have become paramount concerns which need to be addressed in all research programs. We need to keep in mind that should we eventually realize our goal to understand and to explain the past but, in the process, lose the context in which it occurs, the environment, we really will have gained little. Perhaps at this point, as we evaluate the significance of the driftless area from a variety of disciplinary perspectives, we need to "listen" to those themes that have been generated through thousands of years of Native American adaptations. In doing so, by preserving and appreciating them and their context, we might recognize that "feeling" the past and the environment is as valid as experience as "knowing" it scientifically.

Driftless Area Symposium

A special symposium on Iowa's "Driftless Area" — that rugged portion of northeast Iowa — is being held in conjunction with the annual meeting of the Iowa Academy of Science at Decorah on April 22.

The driftless area of Iowa, also called "Little Switzerland of Iowa," is being highlighted in a three hour special symposium, sponsored by the Iowa Natural History Association and the natural history sections of the Iowa Academy of Science. The meeting is held in Valders Hall on Luther College campus and convenes at 2:30 p.m. Presentations have been prepared by Iowa scientists on various aspects of the driftless area, ranging from an overview of the geological history, vegetation, specialized communities such as algific slopes, to the archaeology, streams and preservation needs.

A field trip for members of the Iowa Natural History Association, Geological Society of Iowa, and the Association of Iowa Archaeologists is being held on Saturday afternoon, beginning at Decorah and proceeding toward the Mississippi River.

This is the fifth consecutive year that a special symposium has been sponsored on some aspect of Iowa's natural history.

WARDEN'S DIARY

God's Country

By Jerry Hoilien

I was born just up the Wisconsin River not too far from the mighty Mississippi, early one spring morning (I won't mention the year) and from that day on, I've been a part of this country. Sure, like others, I left it for awhile but returned like a salmon to where I belong.

There's not a warden in the state who doesn't look with envy to the northeast corner. Not that each part of our state doesn't have its specialities. The southeast, has rich farm ponds and strong rivers such as the Des Moines, the Skunk and the Iowa. The southwest displays bountiful rolling hills full of pheasants and quail, to say nothing of Riverton, Forney Lake and the Missouri River with clouds of snow and blue geese. Northwest has its natural lakes and marshes. Yup — Iowa has quite the variety, but then there's the northeast; particularly the "Driftless Area". If you stand in the right place and get the right perspective, you can see how the valleys and hills were formed as the glacier melted. As I always say, "We don't have high hills, we have deep valleys." Depends upon your viewpoint I guess.

I work with squirrels, ruffed grouse, wild turkey, deer, trout, smallmouth bass, northerns and walleyes — such a life. And the people, that's another story. Not only the influx of hundreds of individuals and families on vacation and holidays but the local people, fiercely protective of this area and things they hold dear; but generous, with hearts of gold and wanting to share with everyone. There are staunch Norweigen and Irish where traditions and histories are kept alive and believe me, having a name like mine and being "Norsky" helps a lot at times. They're wonderful people.

Here is a county you can still get lost in (in more ways than one) with its Upper Iowa, Yellow and Turkey Rivers, not to forget the backwaters of the mighty Mississippi. I remember getting a call from a city policeman one night. Seems a concerned individual had stopped him and told him about a raft floating down one of our smaller rivers. He was worried about the two small children with the man and women because of the lateness of the hour and because the air was getting cooler.

We checked and located a vehicle parked at the bridge near the mouth of the river. A few phone calls confirmed the sighting of a party fitting the description, floating the river close to dusk. I put out the call and everyone came running — wardens bringing their boats and canoes, park officers and off-duty policemen. Highway patrolmen and sheriff's deputies started checking roads and bridges along the river.

Have you ever tried to paddle down a fast flowing river with lots of rapids and logs to dodge? Try it at night with only a flashlight held in the hands of another officer who is also trying to steer your tippy canoe. Fun, huh? Try it when it's cool and getting colder and it's four hours of hard paddling to the next bridge.

It seemed to go on forever and then came the call — *We found them — everyone's O.K. We're bringing them out*. They were wet, cold and scared. Down to one paddle and no light — it could have been a disaster. There wasn't much darkness left when we got them put up for the night. Gathering up equipment, everyone looked at each other, said thanks and went home.

I guess the good Lord looks out for some people — especially in God's Country.

Of course, then there are those who learn to look out for themselves.

Did I ever tell you about the old man on the river who was always coming back with a boat full of fish? Naturally this attracted the wardens attention, because nobody else was having much luck.

One day the warden met him at the dock, inquiring as to how he had been so successful. He was a man of few words and only grunted. Finally the warden asked if he could go along the next time, to which he only got a short nod. Early the next morning they met at the dock and motored way out and back into a secluded cove. As the boat stopped the old man opened his tackle box, pulled out a stick of dynamite, lit the fuse and threw it overboard.

Boom! The water flew and fish started coming up. The old man started picking them up with a dip net. "You can't do that!," the warden yelled, "That is illegal." The old man continued to dip. "Hey" said the warden — "Section 109.32 specifically states you can't take fish with dynamite. I'm going to have to arrest you!" With this the old man stopped, sat down, opened his tackle box, took out another stick of dynamite, lit it and handed it to the warden saying, "There — you gonna talk or fish."

People of Northeast Iowa

By Julie Holmes

Photos by Jennifer Gale

As a part of this special issue, I was assigned to interview a few of the colorful characters and long-time residents of the northeast Iowa area. Jerry Hoilein, conservation officer for Allamakee County, set up a number of interviews for me, and I can honestly say that I learned more in two days of "visiting" than by reading any textbook.

When asked why they chose northeast Iowa as their home or why they liked it, I got a variety of responses with essentially the same meaning — "There's no place any better," "Don't think the grass is greener anyplace else," "We're like one big happy family up here, you know what everyone's all about." But Sara Smerud, 69, of New Albin answered the question in terms any conservationist would understand, "It's great human habitat."

Together Sara and her mother Clara, 93, have witnessed many changes in their area. The changes Sara has seen have both upset her and made her happy. "It really irks me," she says "when they play around with the water level (of the river). Sometimes they leave the water too high, the bottoms flood, then freeze and there's a tremendous wildlife kill."

On the more optomistic side, she has seen a lot of improvements. She's seen more swans on the river in recent years and is very proud of the fact that the only bald eagle's nest in Iowa is not far from her home.

I'm convinced that a couple of days on the river with John Spinner, 64, or "Wimpy" Cooper, 70, would teach any greenhorn college graduate more about fish and fishing than any college course could. It's the years of experience working the river that gave these Conservation Commission employees their "fish sense."

Both John and Wimp are retired and make their home in Lansing right where they began work in the 1930's. "Back then, you got paid $2.50 for nine hours of work," says John. And that $2.50 paid them to catch fish for the Des Moines fair, rescue fish during high-water, stock fish and even make their own nets.

On occasion, their jobs left them enough time to "hinky dink" around with northern pike as John puts it. And their "hinky dinking" was enough to get Lansing the first northern pike hatchery in Iowa. It was here that John helped develop a jar culture method of hatching that increased the success from 15 percent to 75 percent. And fisheries experts came from all over to learn how to use this method.

While visiting with John and Wimp, I learned about clamming and the once-thriving pearl button industry it created. I heard about the Armistice Day storm of 1940, and how it took the lives of many duck hunters and fishermen. "Yea, that river takes its toll each year," states John, referring to that storm and the drownings that occur annually. But I got the feeling listening to John and Wimp that the people up there just roll with the punches the river and the elements throw at them. Like the folks who ran the fish markets used to stake the commercial fishermen to get them through the winter, the people up there stick together and are willing to help someone when they're down and out.

A "fill up" at Vernon and Vivian Huffman's could mean a tank full, an ear full or a stomach full depending on who you ask. The Huffman's run a small gas station/grocery store in Rossville. And while Vernon fills up your car, Vivian can fill your empty stomach with some of her delicious baked goods as she tells you the most interesting tales of her childhood days in Waukon Junction.

She'll tell you her closest childhood friend was Emiline, the daughter of an Indian couple that lived on the corner of

her parent's property. Vivian claims she spent more time in their tepee than at home. "I was fascinated by (Emiline's) mother. She could do anything. We'd always sit 'Indian style' — she'd either be weaving or making jewlery, and she could chew tobacco like you wouldn't believe. Then she'd spit it right through that tepee opening every time."

Vivian doesn't like to mention her age, but says she'd like to hang around a while longer; because as she puts it, "I want them to make a big fuss over me when I turn 100. I want to be known as one of those *sweet* old ladies," she laughs. At 62, I think she'd be a sweet lady in anyone's book. She is in mine.

Walleyes are Doc Field's speciality, not medicine, as his name implies. He'll tell you just how and where to catch those walleyes, too. "I got no secrets," he says. Doc, 72, once farmed in Floyd County — that's where he was tagged 'Doc'. He used to help the local vet and became quite good at "pulling pigs". He's retired from farming and now runs a boat rental in Harpers Ferry.

He's happy about retiring here. "You've got your trout streams, grouse, turkeys, and deer. Walleyes are my favorite, though. They're a sporty fish to catch, and a 'purty' smart fish, too."

Doc tells how he recently required some surgery and the anesthesiologist wouldn't take cash — he wanted 20 pounds of walleyes instead!

Doc's grandson was there to tell us that his grandfather waterskied on his 65th birthday. "Yep, ol' Lord's been purty good to me so far," he says.

Babe Easley, 59, lived in Harpers Ferry all his life, and most of those days were spent commercial fishing on the river. Now, he has a boat rental down the street a ways from Doc Field's.

From the conversation we had, I could see this was a man that prided himself in his work and was dedicated to it. "I'd never sell a fish that I wouldn't eat myself," he says. "There's more to fishing than catching fish — you have to take pride in the catch."

He laughs at fishermen now that try to claim territories. "I've never seen any names on the areas."

The commercial fisherman is rare, and I wondered why. Babe seems to think there's plenty of rough fish to be taken. A commercial fisherman has to be out year-round in all kinds of weather. I wonder if today's young men are willing to work that hard. The gill nets have to be pulled from under the ice. The wind blows, and you have to handle the fish with bare hands.

While I was winding down my interview with Babe, I glanced out his big picture window which frames a beautiful view of the river bottoms. I watched a lone boater move upstream. Jerry later informed me that it was Doc probably going out for some walleyes. In the same glance, I caught sight of another fisherman, gliding effortlessly through the bottoms — a bald eagle.

These people I've met are a different breed. They exude a warmth and charm I've never experienced. And observing their surroundings it's easy to see why this land and the river attract people and gain their loyalty.

And now here I sit in my cubicle they call an office, at a plastic board they call a desk, wondering how I can convince my boss that I can carry out all my duties from an office in Northeast Iowa.

Julie Holmes recently joined the staff of the* Iowa Conservationist *as assistant editor. She holds a B.S. degree in animal ecology from Iowa State University.

Randall Maas

Profile of an Endangered Species

GOLDEN SAXIFRAGE

By Dean M. Roosa

Sufficiently fragile as to be killed by a footstep — sufficiently fussy about its habitat that it grows in perhaps only eight sites in Iowa and three in Minnesota — sufficiently rare that most botanists have not seen it. That describes some aspects of this month's featured species, golden saxifrage *(Chrysosplenium iowense)*, which, in the United States, is a driftless area endemic.

It is a diminutive plant, growing normally to a few inches in height, and is easily crushed or damaged. The flowers, small and inconspicuous, lack true petals and cluster together in small, sessile cymes. The leaves are alternate, reniform (kidney-shaped) and only the lower ones have long petioles. Its specific name, *iowense*, comes from its "type locality" — an area in Winneshiek County where it was first collected.

In the arctic, the favored habitat for this genus is at the toes of glaciers, where cool air continually bathes the landscape; in Iowa, its requisite habitat is below ice-caves. These populations probably represent remnants of a widely distributed plant present in Iowa at the time of the glaciers. Its Iowa habitats are among the most fragile and sensitive in the state and every precaution should be taken as even walking in its habitat can do irreparable damage.

The Fish and Wildlife Service routinely investigates the status of rare plants throughout the United States to determine if they qualify for federal protection. This tiny saxifrage is currently under review.

Many habitats suitable for this species as well as numerous other sensitive plants and animals have been destroyed in the past fifty years. Iowans should jealously guard against further destruction of fragile habitats — particularly in the driftless area of Iowa. Sensitive species have persisted in these areas probably since the retreat of the glaciers; we have a moral obligation to assure that they continue to exist for future Iowans to enjoy.

WILDFLOWER OF THE MONTH

Randall Maas

By Dean M. Roosa and Mary Jean Huston

RATTLESNAKE PLANTAIN
(Goodyera pubescens)

Randall Maas

Left: ***The basal leaves of Rattlesnake Plantain give the plant its common name.*** Above: ***Inconspicuous flowers appear throughout the summer.***

When you wander in the woods, be it springtime, summer or fall, you may notice an intriguing rosette of dark green leaves highlighted with a network of white veins. Let your mind also wander...imagine the leaves as the designs on rattlesnake skin. You have discovered rattlesnake plantain, an uncommon member of the orchid family which graces rich woodlands in the eastern third of Iowa.

This similarity — of the plant's leaves to a snake's skin — brought about a medicinal use for the plant. If chewed and applied to the wound, rattlesnake plantain was once considered a cure for poisonous snakebites. The medicinal use of plants based on a plant's resemblance to the source of the problem is known as the Doctrine of Signatures, and was once a common practice.

Rattlesnake plantain grows to a height of eighteen inches. Inconspicuous flowers bloom between July and September, and are densely arranged on a spike at the top of the bracted stalk. The flowers are irregular, and one-half inch in length. A hood formed by the upper sepal and two petals is over a sac-like lip, made of the third petal. Although the plant is not a plantain, as the common name suggests, the flowering stalk slightly resembles plantain. The stem is wooly, indicated in the species name *pubescens*. The genus name *Goodyera* honors John Goodyear, an early English botanist.

Rattlesnake plantain is one of the treasures to be discovered in Iowa's driftless area. It is a sensitive species. Take care when treading in the woodlands this year — and look for this colorful member of Iowa's woodland flora.