

IOWA CONSERVATIONIST

Volume 11

JUNE, 1952

Number 6

THE ROCK STORY OF WILDCAT DEN

BATS ARE AMAZING

By Glen C. Sanderson
Game Biologist

It is dusk. On the bank of a cool clear stream the long purple shadows are creeping slowly across the water. A fisherman is trying to tempt a large bass in a deep clear pool near the opposite bank with bits of feathers tied to resemble an insect. Imagine his surprise when suddenly his lure, line, and all head toward the sky instead of settling quietly on the water. Spooks? Flying saucers? No! A bat, following its erratic course through the deepening twilight, literally "scooping" its evening meal from the air, mistakes the fisherman's artificial fly for one of the myriads of insects which hover over the stream. It is impossible to say which is more surprised—the fisherman at his line's apparent defiance of the laws of gravity, or the bat when it finds it has caught something which it can neither swallow nor turn loose.

What small boy hasn't stood near a barn, along a stream, in his front yard in the country, in a vacant lot, or in the street of a town or city at dusk throwing small sticks and stones in the air just to watch the bats dive for them. Sometimes the bats will follow these offerings right to the ground. Perhaps they hope for a meal or perhaps they just want to investigate. Probably most of us have seen bats flitting around as twilight and dusk deepened into darkness, for it is at this time of day that bats are out feeding. Few have ever seen a bat at close quarters, unless by accident, or unless a special effort has been made to find them.

Most of us know that bats are true mammals. At this point our real information too often ends and fiction begins. Many people believe that a woman's hair holds an irresistible attraction for bats. Bats are supposed to take a fiendish delight in getting tangled in women's hair. If, by chance, a bat did

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The Nye Mill on Pine Creek in Wildcat Den State Park is one of the features of this beautiful area. The rock work in the mill is of limestone found in the vicinity.

THE MATHEMATICAL MUSKRAT

By Paul L. Errington
Iowa Cooperative Wildlife
Research Unit
Iowa State College

EDITOR'S NOTE: This article in two parts by Dr. Errington is of importance to all who would understand more of our wildlife population ups and downs. It also reveals the seriousness of the basic research being conducted throughout the United States to enable fish and game administrators to more intelligently manage fish and game populations. It is on the basis of such studies that administrators have discarded many ancient laws, philosophies and beliefs.

The popular thought of nature's book lying open to human scrutiny does have its appeal. We may, I suppose, consider it to be true in a figurative sense, but what is in the book has ways of being illegible. Furthermore, the answers to some of our complicated problems may not be arranged in what we might consider their logical order, nor does nature even seem to be concerned about whether we arrive at correct answers at all!

My own work as a participant in the Iowa cooperative wildlife research programs has dealt mainly with that familiar fur bearer, the

muskrat. Although an animal of simple motivations and a believer in direct action, the muskrat can get plenty involved in its population mathematics. Of course, the muskrat isn't the only species of which this may be said, but it should here serve well enough to illustrate the things we need to watch out for in philosophizing about nature and her open book.

How Many Left?

It is a very understandable temptation to put down on paper some figure for the number of young that a female may be expected to give birth to, then to make out a balance sheet. If minks kill so many, if dogs, coons and horned owls kill so many more, if so many die of disease, if so many are killed by other muskrats or abandoned by their parents, if so many drown, etc., how many should we have left by the trapping season? And, how many may be trapped and still give us as many muskrats the next

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By Charles S. Gwynne
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Have you ever had the pleasure of a visit to Wildcat Den State Park? If you have, did you take a good look at the sandstone cliffs? Did you walk through the park, up some of the tributaries of Pine Creek, and really examine all the wonderful exposures of this rock? If not, you have a treat in store. These sandstone cliffs are some of the finest to be seen anywhere in the midwest. They tell the story of a river which existed long before the Mississippi.

The park, an area of about 400 acres, is located in Muscatine County, about 10 miles east of Muscatine. It is on Pine Creek a mile or so from the confluence of the stream with the Mississippi. Since it is so near the deep valley of the big river, the creek has cut a correspondingly deep valley. Its tributaries also have cut deeply into the sandstone which underlies this part of Muscatine County. Thus, the park area is a region of steep slopes, ridges and rocky canyons.

Most visitors to the park are attracted by the sandstone cliffs which they see bounding the picnic area near Pine Creek. These cliffs are easily accessible and have many interesting features. The rock is banded in a peculiar fashion, and brilliantly colored in shades of yellow, red and brown. The cliffs are vertical in many places. There are passageways between steep rock walls. There are recesses—these are the "dens"—in the rock walls, and large blocks of the sandstone down the slope. There are even large pieces out in the stream. What is the story back of this interesting area?

The rock is believed to have formed as a deposit of sand in an ancient river which flowed through this part of Iowa. This was during the period which geologists have named the Pennsylvanian. They so named it because rocks of that age were widespread in the state

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Iowa Conservationist

Published Monthly By The
IOWA CONSERVATION COMMISSION
East 7th and Court—Des Moines, Iowa
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CIRCULATION THIS ISSUE.....47,000
Subscription rate.....40c a year
3 years \$1.00

Entered as second class matter at the post office at Des Moines, Iowa, September 22, 1947, under the Act of March 24, 1912. Subscriptions received at Conservation Commission, East Seventh Street and Court Avenue, Des Moines, Iowa. Send cash, check or money order.

NAME IOWAN PRESIDENT OF IZAAK WALTON LEAGUE

Iowans rode the range at the National Convention of the Izaak Walton League of America held at Tulsa last month and when the votes were counted John Tobin of Vinton was the choice for national president.

The league could not have made a better choice. We have known John Tobin for many years. He is an ardent outdoorsman, asking nothing for himself, always fighting for the sound use of our natural resources, no matter where those resources may be.

Over 20 years ago we sat in meetings with John Tobin discussing Iowa's needs conservation-wise and we marveled at his knowledge and understanding of the multitude of conservation problems. He will bring to the league a splendid background of years spent in conservation work.

Two more Iowans gained posts on the roster of league officials. Rod Fitch of Clinton was named national treasurer, and as always, will give a good accounting of his trust.

Fitch has done much for the Clinton chapter and the Iowa division. Cliff Hollowell of Dubuque, who never gave up when the going was toughest for the Waltonians, was elected a national vice president.

Iowa, with the largest membership of any state in the U. S., came away from the Tulsa meeting with a fair share of the national offices, which is as it should be.—The Nomad, *Davenport Democrat*.

ROUGH FISH REMOVED

Thousands of big fat carp and buffalo have been milling around in the shallow waters of this lake this week. The state took 8,000 pounds of rough fish from the inlet trap Monday and another estimated 12,000 pounds Wednesday, but apparently this represents only a small part of the total tonnage of these vermin here. It is too bad that we can't get rid of these bottom rooters once and for all.—*Storm Lake Pilot Tribune*.

BACK PRESSURE ARM-LIFT METHOD FOR ARTIFICIAL RESPIRATION

By Ralph C. Scroggs
Director of First Aid and Water Safety Services

On December 3, 1951, newspapers throughout the country carried an announcement that the various organizations interested in the teaching and the uses of artificial respiration had adopted a new method of artificial respiration.

During and after World War II experimentation was carried on by the Armed Forces, particularly by the Air Force, who made important contributions to the knowledge of respiratory physiology and of the asphyxial process. These experimentations resulted in the awareness that there needed to be a review of the problem.

The American Red Cross in 1947 requested the Council of Physical Medicine of the American Medical Association to review the methods of artificial respiration and at that time it was found that there was very little material or evaluating statistics available concerning the various methods of artificial respiration proposed.

The military services continued their research during this time and in January, 1950, organized research teams since they were faced with the problem of giving artificial respiration to large numbers of people in event of warfare when poison gas or nerve gas might be used. Arrangements for research teams were made by the Army Chemical Corps at the University of Pennsylvania Graduate School of Medicine under Dr. Julius H. Comroe; University of Illinois Medical School under Dr. Archer S. Gordon; Springfield College under Dr. Peter V. Karpovich, and Harvard University under Dr. James L. Whittenberger.

The research was to be carried on to determine which method gave the greatest exchange of air, also consideration for the ease of teaching the various methods and ease of operation and it was requested that all of these teams arrive at and agree on one method of artificial respiration.

Report Research Findings

On October 1, 1951, the findings of this research was presented to the National Research Council for their approval, which resulted in the following recommendations:

"It is the recommendation of the conference that the method generally preferred is the 'back pressure-arm lift method' originally described by Holger Nielsen; that other methods acceptable under special circumstances include the hip lift-back pressure method and the modified Silvester method. The techniques recommended are those described in C. C. Med. Labs. Report No. 79, except that the first phase will be expiratory rather than inspiratory. The technique of the Silvester method is described

in the 'Bureau of Mines First Aid Manual.'"

This recommendation was submitted by the National Research Council, American Red Cross, Department of Defense, and Public Health Services, the Council of Physical Medicine and Rehabilitation of the American Medical Association, which resulted in the approval and the acceptance of this new method, the Back Pressure-Arm Lift method, by the Council of Physical Medicine and Rehabilitation of the American Medical Association, American National Red Cross, and many other organizations including the Armed Forces, Civil Defense Administration, Public Health Services, the Bureau of Mines, the Boy Scouts and Girl Scouts of America, the American Telephone and Telegraph Company, for use by the general public when dealing with cases of asphyxia.

You May Save A Life

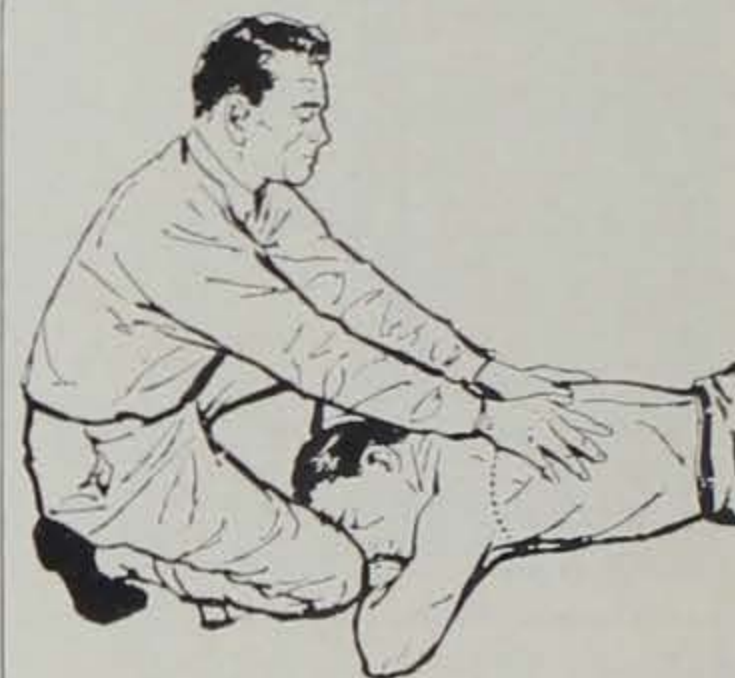
Time is of prime importance when stoppage of breathing exists, and seconds count. Artificial respiration is necessary immediately. Do not take time to move the victim to a more satisfactory place—begin operation at once. The loosening of clothes, the retention of victim's body temperature, etc., are of secondary importance. The main purpose is getting air into the victim's lungs. Quickly place the victim in a prone position with chin at the lowest possible level, slip your fingers in the victim's mouth freeing froth and debris and drawing the tongue forward, and begin artificial respiration at once.

Standard Technique for Back Pressure-Arm Lift Method of Artificial Respiration



Illustrations, Courtesy American Red Cross.

- 1. Position of the Subject.** Place the subject in the face-down, prone position. Bend his elbows and place the hands one upon the other. Turn his face to one side, placing the cheek upon his hands.
- 2. Position of the Operator.** Kneel on either the right or left knee at the head of the subject, facing him. Place the knee at the side of the subject's head,



close to the forearm. Place the opposite foot near the elbow. If it is more comfortable, kneel on both knees, one on each side of the subject's head. Place your hands upon the flat of the subject's back in such a way that the heels lie just below a line running between the armpits. With the tips of the thumbs just touching, spread the fingers downward and outward.



- 3. Compression Phase.** Rock forward until the arms are approximately vertical and allow the weight of the upper part of your body to exert slow, steady, even pressure downward upon the hands. This forces air out of the lungs. Your elbows should be kept straight and the pressure exerted almost directly downward on the back.



- 4. Expansion Phase.** Release the pressure, avoiding a final thrust, and commence to rock slowly backward. Place your hands upon the subject's arms just above his elbows, and draw his arms upward and toward you. Apply just enough lift to feel resistance and ten-

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Like other individuals whose big mouths get them into trouble, the largemouth bass prowls after dark.

NIGHTLIFE OF MISTER BASS

Like other individuals whose big mouths get them into trouble, the largemouth bass prowls after dark. It is a known fact among old-timers that the average weight of each bass taken at night is much greater than the daytime average, according to Heddon's research department.

There are some very logical reasons for this. To begin with, a really big bass got that way because it was smarter than many of its smaller brethren who wound up on a stringer, or in the stomach of a bigger, smarter bass.

Being smarter, it knows trouble is brewing when it sees a man wading or bouncing around in a boat, so, when the daytime traffic is heavy, Mister Bass doesn't feed until the night when things quiet down.

About the time most ordinary fishermen are leaving the lake, the veteran bass fishermen are just going out with such time-proven surface lures as the crazy crawler, chugger, lucky 13 and wounded spook.

And it's just short of amazing how these after-dark casters develop a sense of accuracy that allows them to drop a plug against the shore when they can't even see their companion at the opposite end of the boat. It's done through a keen sense of timing—and, of course, experience.

And here is where most night fishermen miss the boat and the bass. . . . They don't wait long enough after their plug hits the water before starting their retrieve because they are in too much of a hurry to make another cast.

Your plug might land 50 feet from Mister Bass. Give him a minute or two (and that's a long time when you're waiting) to swim to where he heard it fall. Now, that he has located its general area and is waiting for additional noise so he can pinpoint his target, don't move that plug so violently it scares him. . . . Do it gently and tantalizingly, like a creature injured and struggling toward shore.

When you hear a noise like 16 sticks of dynamite, set the hooks hard and head Mister Bass toward open water, then play him out. Don't ever horse a lively bass into your boat, either day or night, for a hefty bass flopping around with a face full of treble hooks is a first-class menace.

Play it out, grab it by the lower jaw and lift it into the boat. Then use pliers and flashlight, two indispensable tools for night fishing.

Big bass are where you find them and you'll find more of them after dark if you'll just give them time to come to the supper table.—Heddon Fish Flashes.

100 Soil Conservation Districts Operating

All of Iowa has now joined in the campaign against soil erosion.

Every county is organized to contour farming, terracing and other practices that will control surface water and prevent the constant wearing away of valuable topsoil.

All this has been accomplished in 12 years. The first county district was organized in 1939 . . . the last one just recently. One county has 2 districts, so Iowa is now blessed with 100 of these soil conservation



Every county now has a soil conservation district organized to carry out contour farming, terracing and other practices to control surface water and prevent erosion of topsoil.

districts.

Out of all the mass of new deal philosophy for the aid of agriculture, none was sounder than the conservation program. The farmer who negligently permits the rich topsoil of his farm to wash away

with every rain and freshet is in the same class with the individual who never cleans and oils his factory machinery or doesn't bother to keep his eye on the gasoline tank. He's headed for trouble.—*Burlington Hawkeye.*

INSPECTION NECESSARY FOR BOATS ON STATE-OWNED ARTIFICIAL LAKES

As many of you probably read, there was a near tragedy at Gladbrook Lake last week when a couple of gents overturned what seemed to be a very unseaworthy rowboat . . . but were rescued by the park custodian. It's a new deal this year that all craft on state-owned artificial lakes must be inspected and carry the inspector's tag of approval. How this craft happened to be on the lake we do not know.

It is our understanding that the park custodian is the inspector

and it is his job to police all boats, but he cannot be everywhere at once . . . a lot of folks carry boats on cars, in trailers and other ways to the lake, slide them into the water at the most convenient spot . . . and away they go. We feel that it is the responsibility for every boat owner to carry the state seal of approval and inspection on his boat for the security of his family and friends who may be riding with him. It's just good common sense!—By John Garwood, *Marshalltown Times Republican.*



All boats used on state-owned artificial lakes must be inspected for seaworthiness by the conservation officer in charge of the area.

DENVER UNIVERSITY FISHING COURSE

As one who bemoans the loss of the school of architecture at the University of Denver, may I view with alarm something far more serious—the course in fishing which has been announced with considerable fanfare this past week. This is radical and subversive; it undermines a great American tradition. America was brought up on the irreconcilable enmity between going to school and going fishing.

Playing hooky had one and only one sacred objective—to go fishing. It was ancient long before Huck Finn immortalized it. But now I ask you, what does Huck do if he wants to play hooky from the fishing class? Does he call on the chancellor to contemplate the Pythagorean doctrine of metempsychosis? Does he whisk over to the social science kiva to mull over the conquest of despair through fealty to transcendentalism? Holy Jumping! What have we come to? Apparently, the notion that anything that has to be learned can be taught.

Fishing must be taught and learned, but not in the classroom nor in any outdoor extension thereof. Here again we are confusing the mechanics of an art with its totality.

I would go too far were I to suggest that even the mechanics can be dinned in by any academic procedure, for success in casting a fly depends in no small measure on the mood, the psychic climate that justifies the fisherman to his own gods. You can teach a bear to ride a bicycle; you can teach a seal to toot "Yankee Doodle" and you can teach a boy to hit a tire-casing at fifty paces with a Ginger Quill. But fishing must be taught by fish, by canyons, by friends who laugh, lie, ridicule and boast; it must be

Alaskan Eagle Bounty Nullified By Federal Regulation

The claws of the United States' national emblem, the bald eagle, will no longer bring two dollars a pair to Alaska bounty seekers.

A long campaign by Audubon groups and other conservation organizations has culminated in a federal regulation forbidding the killing of Alaskan bald eagles, unless they are found "committing damage" to wildlife or domestic stock.

The eagle bounty law in Alaska, which has caused bounties to be paid on more than 100,000 eagles since its enactment in 1917, will be nullified by the federal regulation just issued.

In advocating that bald eagles be protected in Alaska, as they have been since 1940 in the United States, the Audubon Society has pointed out that the bird whose likeness appears on every dollar bill, half dollar, and quarter may make it's "last stand" in Alaska.

Research studies in Alaska have been cited, indicating that the bald eagle does not do any significant damage to the salmon or fur-farming industries, and that it is an important tourist attraction.

At its sessions in February of this year the Alaska Game Commission, recognizing the need for

taught by getting away from school, by getting away from your wife, by getting away from your responsibilities; it must be taught by willows wetter than river-water and the flickering tilt of the fire-side flask at the starry end of day! Adios, Al. I'll never speak to you again unless you bring me a basket of trout you caught yourself, having won a C-plus on your final.—*Denver Rocky Mountain Herald.*



United States' national emblem, the bald eagle, has been removed from the bounty list in Alaska. The bald eagle becoming rare in the United States has suffered more than 100,000 casualties in Alaska since the bounty law was passed in 1917.

conservation measures, recommended that the bounty on these birds be discontinued.—*Audubon News Release.*

RESERVOIR SILTATION

The question of silting of reservoirs has been examined thoroughly by the Soil Conservation Service for the city of Bloomfield.

In 1937 Lake Fisher was built to provide the city with a water supply. It is a 73.7 acre lake, with a drainage area of 1,440 square miles.

During the fall and winter of 1951, George Gutman of Ottumwa and George Fonken of Iowa City, engineers for the Soil Conservation Service, surveyed Lake Fisher to determine silting. They took soundings and samples of the bottom at many points in the lake.

The city of Bloomfield has been advised that in the 14 years the lake has lost seven per cent of its storage capacity because of silting.

This means one-half of one per

cent per year. John Glass of Milwaukee, regional water authority for the Soil Conservation Service, has estimated the effective life of the lake at 106 years. His estimate was made after analysis of the Gutman-Fonken survey.

The city and Soil Conservation Service of Davis County have been advised by the SCS that protection of the 1,440-acre drainage area from erosion by approved soil conservation practices could reduce silting from 65 to 95 per cent, extend the effective life of the lake many times.

Such treatment, according to Glass, would also increase farm return from the land by from 50 cents to \$3.50 per acre per year.

The lake is getting seven tons of silt from each acre each year at

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"Playing hooky has one and only one sacred objective—to go fishing. It was an ancient custom long before Huck Finn immortalized it."



Siltation of water reservoirs so vital in many communities can be prevented only by 100 per cent soil conservation practices carried out on the entire watershed of the impoundment.



E. B. Speaker Photo.
Our big, brown bat has a body length of about four inches and a wing spread of twelve. The wing and tail membranes are formed into a bassinet to catch new-born babies as the mother hangs head down from the wall of a ceiling or cave.

Bats . . .

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get tangled in some long soft curls (I don't believe even the most enterprising bat could get tangled very badly in the present day "poodle" cuts), he would be in a hurry to get free just as soon as possible. The longer he stayed around the more his own life and limb would be in danger. Even if a bat does get in the hair, death, or an unhappy love affair does not necessarily follow within one year as some would have us believe. Let's not blame the bat! I have repeatedly tried to tangle a bat in my wife's hair for the benefit of doubting Thomases. Never have I had a bat that would even stay near her hair if I did not hold it there. Not once have I been able to tangle one enough so that it couldn't free itself and take to the air in a matter of seconds.

When Hollywood movie-makers want to create a scary scene in one of their movies, they often show the dark form of a huge bat flitting about. Many people believe that these are vampire bats which are supposedly especially fond of sucking human blood. There are large bats, called flying foxes, that approach the movie creations in size. They have a fox-like face and wing spreads of up to four feet. However, they feed on fruits and flowers! These "Ferdinands" of the bat world are found in Australia, India, Malaya, and adjacent areas.

Vampire Bats

There are vampire bats, but they are not the huge creatures they are often pictured to be and they are never found in Iowa. The largest of the vampire bats has a wing spread of only twelve or thirteen inches and a body length of about four inches; this is approximately the size of our big brown bat. Vampire bats feed on the blood of a variety of mammals and have been known to attack humans while they were asleep. They do not show a special preference for human blood. They make a small incision through the skin with their sharp teeth and lap the blood much

as a cat laps a saucer of milk. They do not suck the blood as is commonly stated. The wound continues to bleed for a short time after the bat has finished feeding and it may be that the bat's saliva contains a substance that keeps the blood from clotting. Some of these bats have been found to be infected with rabies and could conceivably pass this disease on to other animals.

Bats the world over live on a wide variety of foods. As we have just read, the vampire bat lives on blood, while the flying foxes eat fruit and flowers. Some tropical forms prey on frogs, mice, small birds, and other bats. There is even a fish eating bat! It catches fish by scooping them up with its tail membrane. However, most of the bats found in North America live almost entirely on insects. There have been a few reports of big brown and hoary bats (both found in Iowa) eating smaller bats.

Bat Foods

Bats usually feed while on the wing, although they may occasionally feed on the ground. This tiny mammal has a high metabolic rate and requires a great deal of food to keep it going. Bats may eat a quarter of their body weight at a single meal and more than half their weight in a single night. For a man to equal this he would have to eat from 50 to 100 pounds of food in one day! Although information does not show that the bat is an especially important factor in controlling mosquitoes (some people believe that it does), it does eat tons of insects each year in the United States and plays an important part in nature's scheme of things.

Although a bat's course through the air is usually erratic and may appear to us to be haphazard, they are marvelous fliers. They drink while flying by scooping up water with their tongue and mouth. Some bats are even good swimmers.

Various parasites live on bats, but contrary to popular belief, the bedbug is not found on bats. Most bat parasites are specific in their requirements and live only on bats.

Predators of Bats

Bats are nearly free of predators. Few other animals seemingly have the desire or opportunity to feed on them. We have already noted that occasionally some of the larger bats eat a few of the smaller ones. In a Kentucky cave mink were found to be eating several bats. There is one report from Mexico of a bat being eaten by a rattlesnake. Apparently the bat was captured by the snake while it was hanging in its daytime retreat. In at least one instance, a blue jay in Texas attacked a female red bat and her two young and succeeded in dislodging them from their daytime sanctuary.

We have already said that a bat is a mammal, but it is certainly no ordinary mammal. It is unique among the mammal group. The bat is the only mammal that has wings and is capable of true flight. The flying squirrel merely glides with the aid of loose folds of skin that are attached to its feet. The bat's wings are membranes attached to its feet. The fingers and hands have grown fantastically long forming the ribs of the wing. Since the bat's arms and legs are held prisoner by the wing membranes, the elbows and knees bend only backward. The feet and hands are of little use except when the bat hangs itself upside down to sleep or hibernate. There is a curved thumb on the forearm which the bat uses to move clumsily along a flat surface or to scramble up the wall of a cave or the trunk of a tree.

Blind as a Bat

The expression "blind as a bat" should not be used to refer to a person who doesn't see well. Bats can see very well in daylight, and their vision is especially good in the soft light of a cave or in the twilight. Even though their vision is good, bats seem to rely mainly on their "hearing." Most of us

know that the bat had "radar" long before man ever thought of it. Tests have shown that bats with their eyes covered are usually successful in dodging obstacles placed in their path. When their ears or mouths are plugged, they will blunder into many of these same obstacles. They seem to guide themselves by emitting high frequency vibrations, not audible to the human ear, which bounce back from objects to their ears.

Bat dropping, called guano, is valuable as fertilizer. At one time the guano deposits in Carlsbad Caverns were one-quarter mile long, over one hundred feet wide and up to one hundred feet deep. More than 100,000 tons of guano have been shipped out for commercial fertilizers from these caves.

Most bats spend a good part of their life hanging upside down in the dark. They may hang on the ceiling or wall of a cave, in a hollow tree, behind a barn door, behind a piece of loose bark, in an attic (usually in spite of the owner's efforts to keep them out), or sometimes from a limb up among the dense foliage of a tree. Bats usually sleep through the day in the summer coming out in the evening to feed.

Cave Bats

Many bats, especially the big browns and other cave species, spend the winter in Iowa hibernating in caves or other places where the temperature remains above freezing. They go into a deep sleep, breathing and stirring only occasionally. If the temperature goes below freezing, the bat usually awakens. If it doesn't it will freeze to death. During periods of warm weather in the winter, the bats may come out to feed. Even when a bat is in hibernation breathing only occasionally, its body temperature near that of its surroundings, and its heart beating

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Jim Sherman Photo.
Many bats spend the winter in Iowa hibernating in caves such as this one in Wapsipinicon State Park. The temperature in the cave remains above freezing and during periods of warm winter weather the bats may come out to feed.



Large sandstone blocks have been separated from the main mass chiefly by frost wedging. Some have crept down the slope into Pine Creek. Jim Sherman Photo.

Rock Story . . .

(Continued from page 41)

of Pennsylvania. These rocks are sometimes called the Coal Measures. They contain the coal of all the midwestern and eastern coal fields. In addition to coal there are great thicknesses of shale, along with lesser amounts of sandstone and limestone, in the Coal Measures. The sandstone of the park is underlain with beds of shale.

Why do we believe this sandstone most likely to have been formed as a river deposit? The cross-bedding or cross-lamination which the rock so vividly exhibits gives evidence of this. You will note that much of the layering is on a slant, and seems to cross the general bedding. That is why it is called cross-bedding. It means that when the sand was deposited the currents were swift and shifting. This same type of bedding could be found along present day streams, in the sand deposits left after a flood. The bedding of the rock is not even, as it is in a limestone quarry.

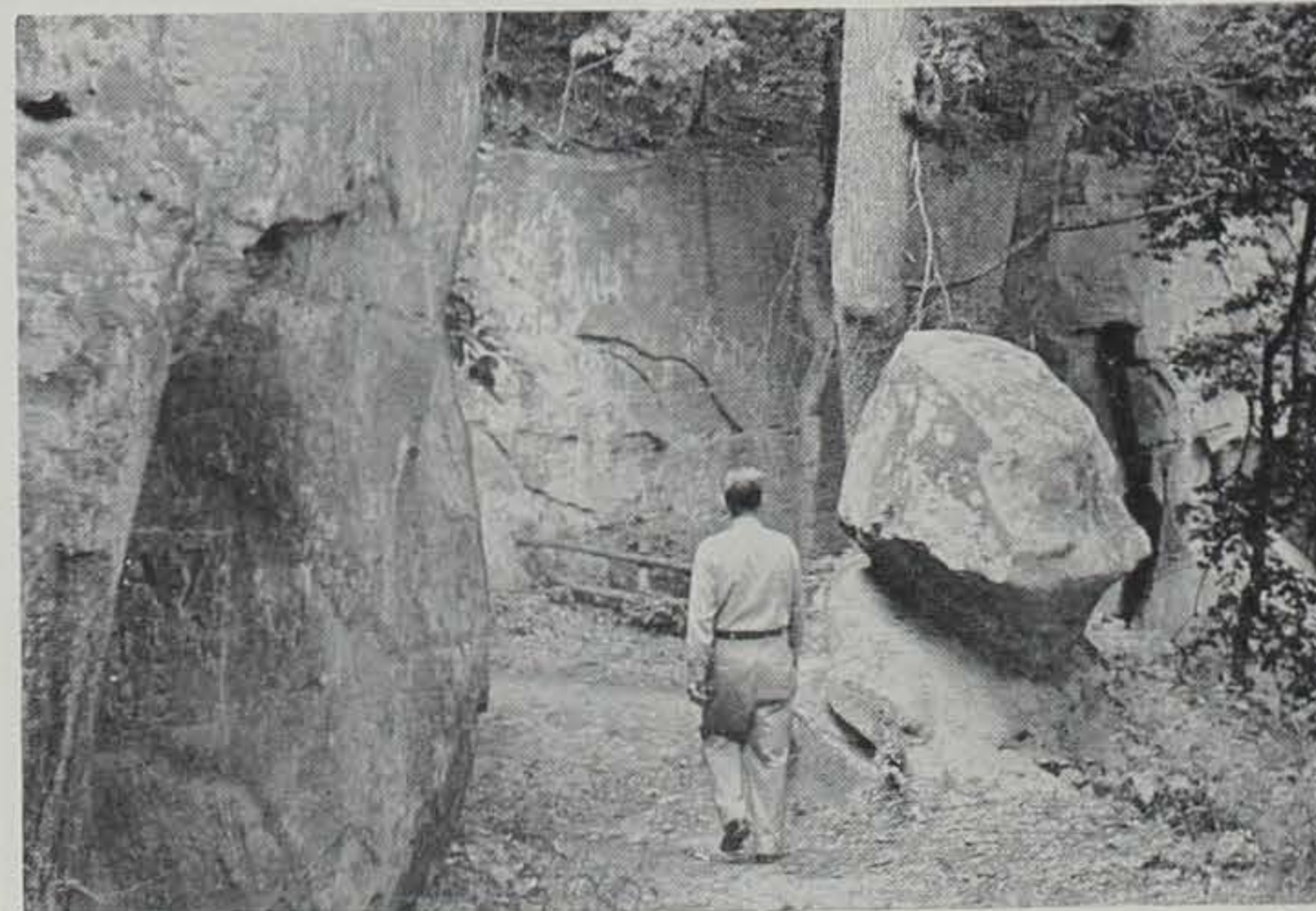
The sand grains of this rock are of the mineral quartz. Most sand is quartz. The brown color of the rock is due to the presence of an iron containing mineral called limonite. This serves partly as a cement, binding the sand grains together. Small glistening flakes of mica are also present.

Like all rocks, this sandstone is subject to weathering. The freezing of water in pores and cracks, the action of plant roots large and small, and solution of the limonite cement all tend to crumble the rock. In many places the sandstone can be seen to be disintegrating into sand.

The large blocks have been separated from the main mass chiefly by frost wedging. This has taken place along vertical cracks in the rock called joints. Thus, the vertical cliffs near the picnic area are accounted for. They are the sur-

faces of joints. The rock which once fitted up against them has fallen or "crept" away. In one place a great mass has separated, but is still upright. It has left a wide passageway between it and the cliff. This tremendous rock, urged by gravity, has slowly moved away, sliding on the shale beneath. It has also been split along a joint, leaving a passageway wide enough for a person to walk through. The large pieces of sandstone along the slope below the cliff and even out in the stream got where they are largely "creeping" down the slope.

Following up some of the small tributaries one finds rock walls on every side. The running water has carved out these tributary valleys in the sandstone. The cross-bedding is a study in itself. If you have a compass see if you can determine the direction of flow of the ancient river. The slope of the cross-bedding is in the direction of flow. In some places the cross-bedding curves back on itself. It looks as if it had been overturned. Figure that one out if you can.



Most visitors to the park are attracted to the brilliantly colored sandstone banded in shades of yellow, red and brown that bound the picnic area near Pine Creek. Jim Sherman Photo.

Much of the water seeping from the sandstone has iron in solution. Water moving down from the surface was able to dissolve some of the brown limonite of the rock. When the iron-containing water reaches the oxygen of the air the iron comes out of solution as a soft brown deposit. A glistening film is often formed on small pools of the water. This is sometimes mistaken for oil. Stir the film with a stick and it breaks up, showing that it is not oil. A film of oil would not break up in this manner, but would flow together again.

The area of Pennsylvanian rocks of which the sandstone is a part extends about 15 miles in an east-west direction and about five miles north and south. Muscatine is underlain with it. Besides sandstone, there is also much shale, as well as some coal. The shale was formed in ancient seas, as a deposit of clay, and the coal was formed on land, in swamps. Coal was once mined a short distance north of the park. Wyoming Hill, crossed by the river-highway about five miles west of the park, is composed of these Pennsylvanian rocks. They also come to the surface in several places on the hillside north of the highway. But the best exposures of all are in Wildcat Den State Park.

These beds of Pennsylvanian age rest upon an ancient limestone. This is exposed along Pine Creek near the mill, in the southern part of the park. It was formed as a deposit in a sea of the Mississippian period. The sea withdrew, and this part of North America was land for a long while. Then, with the sea again spreading over the continent, the Pennsylvanian deposits were formed. The surface between the two deposits represents a long time interval. It is called an unconformity. The limestone contains many fossil impressions of the animals that lived in the Mississippian sea.

The results of glaciation are very inconspicuous in the park area.

That is because it is so near the Mississippi River. Much of the glacial drift has been washed away. Still, here and there, one may find strange looking pebbles or larger stones, brought here by the ancient ice sheets. The last one to cover this part of the state was the one which has been named the Illinoian. It had its center, or so it is believed, in Labrador. It covered much of Illinois, but only a narrow strip west of the Mississippi in Iowa. This strip extends for a distance of about 100 miles, from northern Scott County to Lee County.

The present-day topography of the park is of course one which is the result of the action of weathering and running water. We are fortunate indeed that they have done so much to disclose to us these interesting pages in the very ancient history of Iowa.

PUT IT BACK OR TAKE IT HOME

One of my pet peeves and that of many other fishermen is to go along a trout stream and find suckers and chubs lying on the bank that some trout fisherman has hooked and not wanting them has thrown them on the bank to die.

Meat prices what they are, even a lowly sucker is welcome in most homes of fishermen. Every effort should be made to save the suckers and not let them go to waste.

It doesn't take much effort to toss the sucker out a few inches into the water or put it in your creel and take home to your neighbor who likes fish but can't go out.

Sucker fishermen comprise a large majority of fishermen who buy licenses and help make our trout fishing possible. In the future fishermen should be more careful when they catch a sucker. Either put it back in the water or take it home. Don't waste that fish.—*Quick Shots and Deep Waters, Decorah Journal.*

ANGLER FINDS BEAVER IN CATFISH

The catfish must be hungrier than usual this spring along the Rock River. From all reports coming in from local rod and reel men, getting the limit is no big chore and they appear to be bigger than those caught last year. According to Bert Leck who claims to have seen a few strings, a few of the mud cats are as big as they are claimed to be.

Butch De Bruin (Gerrit Jr.) has come up with the first "whopper" of the season and he can prove it. He caught an 18-inch beauty last week that appeared extra heavy for this time of the year. Upon cleaning the fish, believe it or not, Butch found a Beaver in its intestines. Of course, it was a baby beaver but sure enough it was a beaver, probably one born too soon.—*Rock Valley Bee.*



Jim Sherman Photo.
Dr. Paul L. Errington of Iowa State College whose long-time research on muskrats has made him an outstanding authority on this valuable fur bearer.

How Many Young?

We may also say of the number of young in a litter of muskrats: "It depends . . ."

It depends upon many things, but most of all upon what we know of as cyclic changes. Data on some nineteen hundred complete Iowa litters show averages rising from 6.3 in 1936 to 8.2 and 8.5 by 1941 and 1942, then declining to 6.4 by 1946, and rising once more to 8.2 by 1951. Approximately the same average sizes thus recurred at ten-year intervals.

Then again, mortality is itself a most tricky subject to handle on a balance sheet. A foremost need is to keep in mind the distinctions between losses that a population does or does not take in stride.

Severe losses, coming at the right time, may only stimulate breeding or improve the chances for survival of the remaining animals. For example, almost all of the young born to stream-dwelling muskrats of central Iowa in the first half of the breeding season of 1942 were drowned in floods, but, following the floods, we had prolonged late-season breeding and high rates of rearing of late-born young that we did not have on the unflooded areas. By fall, muskrats were filling the formerly flood-swept habitats to known capacity, early losses notwithstanding. Trappers weren't enthusiastic about the many low value "kit" pelts that they took, but, biologically, the flood losses were offset very neatly.

Mathematical Patterns

The years of records from our study areas show that muskrat populations tend to increase or maintain themselves pretty much according to mathematical patterns. Such patterns seem to be set chiefly by the amount of crowding the muskrats will tolerate, but this, too, is tied up with environmental conditions, and, apparently, with the so-called "ten-year game cycle," as well. Viewed against the



Jim Sherman Photo.
"Under some conditions four litters may be born per female. We have one specimen that had five litters totaling 46 young in a single year."

Muskrat . . .

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year, or fewer or more muskrats, as the case may be?

This procedure may appear quite scientific, and the "common sense" reasoning behind it may be reassuring personally, but it can fall on its face if certain facts are not taken into consideration. Unfortunately, the facts that must be considered include many that seldom are.

In the first place, we may say of the number of litters conceived per year: "It depends . . ."

If males are lacking at the right times for efficient mating, many females get through the whole breeding season without family responsibilities. If neighbors become unpleasant over property rights or if youngsters get too much underfoot, breeding may cease after the birth of a couple of litters. Under some conditions, averages approaching four litters a breeding season may be born per fully adult female. We have one specimen that had five litters totaling 46 young in a single year, which represents real out-putting for muskrats that keep themselves busy and undiscouraged.



Jim Sherman Photo.
"Although an animal of simple motivations and a believer in direct action the muskrat can get plenty involved in its population mathematics."

mathematical patterns, the numbers of young muskrats lost by autumn are ordinarily a matter of how many there may be in excess of the numbers required to fill the season's "quota."

Population surpluses are distinctly underprivileged, for, in nature's mathematics, when "enough is enough," anything extra stands an excellent chance of being wasted somehow. It is within the framework of the mathematical patterns that a lot of leeway exists, and here we may have an astonishing parade of counterbalancing and compensating during or shortly after the breeding season. Though this is typically the time of year when nature is bloodiest and most highhanded in disposing of unwanted increase, the shaking down has its limits, and, after it is finished, the muskrats may live for months in comparative security.

Over Population Losses

If minks do most of the killing of overproduced muskrats, the losses from other agencies tend to diminish in their turn. Round Lake had, in 1935, the heaviest local mink population we have recorded and also a top-heavy muskrat population. The five family groups of minks living about this 450-acre marsh thrived on a diet of young muskrats until late summer. The minks, however, not caring for unwholesome associations with dogs frequenting the east shore, practically restricted their hunting to the west half of the marsh, yet the west half reared about as many muskrats as did the mink-less but otherwise similar east half. In the east half, the muskrats did the murdering of their surplus innocents, thus substituting for the absent minks as agencies of mortality and doing a thorough if nastier and less professional job of it.

The point to remember is that the losses inflicted upon young muskrats by different agencies of mortality are far more likely to

substitute for each other in nature's equations than they are to add up to an overwhelming total that would actually cut the season's rates of gain below the rates allowed by the patterns.

Three factors are notably potent in causing population gains for a breeding season to fall short; and, when any one of these three factors shifts into high gear, all mathematical bets are off. One is drought, and we need not belabor the effects of drought on animals needing water as much as do muskrats. Another factor is disease, and some diseases may clean out the muskrats of an area and keep them cleaned out for years at a stretch. The third is that great biological mystery, or series of mysteries, that we call the "ten-year game cycle." It will be taken up in the July issue of the CONSERVATIONIST.

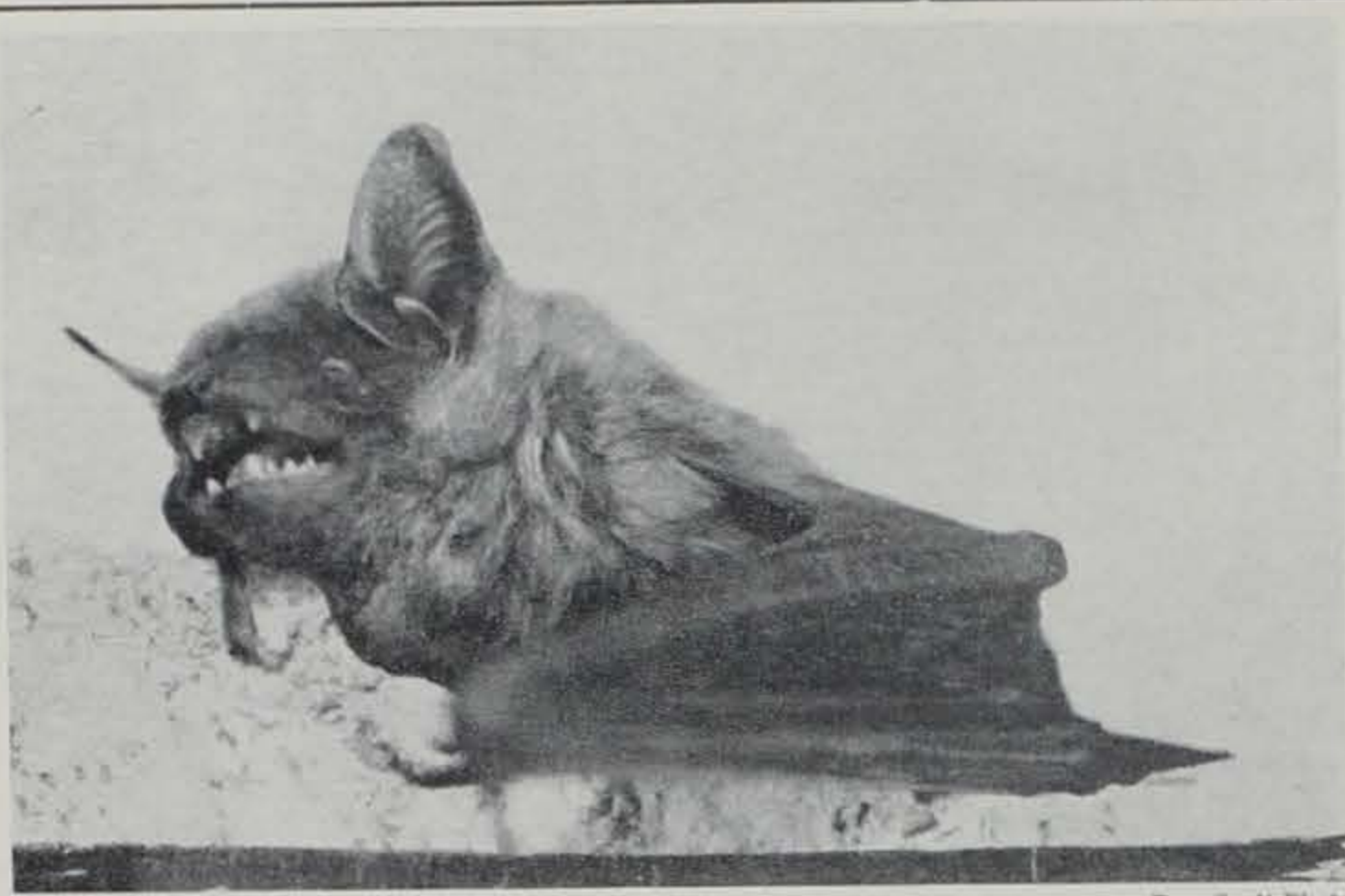
Artificial Respiration . . .

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sion at the subject's shoulders. Do not bend your elbows, and as you rock backward the subject's arm will be drawn toward you. Then drop the arms to the ground. This completes the full cycle. The arm lift expands the chest by pulling on the chest muscles, arching the back, and relieving the weight on the chest.

The cycle should be repeated 12 times per minute at a steady uniform rate. The compression and expansion phases should occupy about equal time, the release periods being of minimum duration.

It is advisable for everyone considering or interested in this new method of artificial respiration that they seek instruction in the technique to make it more effective and less fatiguing. First Aid and Life Saving classes conducted by the American Red Cross now include instruction in this Back Pressure-Arm Lift method.



Tom Scott Photo.
Most bats spend a good part of their life hanging upside down in the dark. They may hang on the ceiling or wall of a cave, in hollow trees, behind a barn door, or sometimes from a limb up among the dense foliage of a tree.

Bats . . .

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very slowly, it will become active in a very few minutes when taken into a warm place or held in the hands. Even in summer a bat will go into hibernation if placed in the refrigerator (provided the lady of the house doesn't object!) or other cool place.

Some of our Iowa bats, notably such species as the red, hoary, and silver-haired bats, migrate south for the winter. Normally these bats are found in trees or other open places and do not frequent caves. If the temperature of a cave in winter gets below the freezing point, the bats are forced to migrate to warmer quarters.

Bat Bassinet

Most species of bats give birth to a single offspring, although in some there may be two, three, or four young in a litter. In some species mating apparently occurs in the fall with the young born the following year. Young are usually born during May, June, or July. The female hangs head down from the wall or ceiling of a cave or from a tree. The wing and tail membranes are formed into a "bassinet" to catch the young. Being mammals, young bats are fed on milk until they are large enough to forage for themselves. This usually happens when they are two or three weeks old. At times the mother bat may carry her young with her on foraging trips in the evening.

Little is known about how long an individual bat will live. Five little brown bats banded in southern Illinois were recaptured from five to eight years after they were first banded. Two male big brown bats banded in Kentucky were recaptured 8 years and 3 months later. Another male banded at the same time as the previous two was recaptured 9 years and 3 months after banding.

There are approximately 2,000 kinds of bats found throughout most of the world. These range from the tiny Pipistrelle approximately two inches long (found oc-

asionally in Iowa) to the flying foxes with a wing spread of nearly four feet found in India, Maylaya, Australia, and adjacent areas.

Ten Iowa Species

In Iowa we have at least ten different species of bats with the possibility of another four or five species occurring within the state. Habits of cave dwelling species make them relatively easy to collect. However, tree dwelling species are harder to find and consequently are not as well represented in collections. It would be interesting to know much more about the distribution and habits of these amazing mammals in Iowa.

Some of the more common species of bats found in Iowa include the little brown bat, big brown bat, red bat, and hoary bat. Some of the others found only occasionally or for which few authentic records are available include the long-eared brown bat, Pipistrelle, silver-haired bat, twilight bat, big-eared bat, and free-tailed bat.

Thus, we see that bats are an amazing group of highly specialized mammals found living throughout much of the world with several representatives in Iowa. The truth about bats is amazing enough so that we shouldn't have to believe the stories concocted about them. They do us very little harm but do have some very important economic aspects to our lives. As a rule, man fears only the unknown. If we will only take the trouble to understand bats a little more we will appreciate them much better. If some evening at twilight your fly suddenly disappears into the sky taking your line with it, don't be frightened and leave your rod and reel on the bank and head for home. Take the time to investigate. You may have hooked into a flying saucer but you may have caught—just a bat!

The alligator snapping turtle "angles" for its prey by waving a worm-like appendage fastened just inside its lower jaw and attracts unsuspecting fish into striking distance. B.C.

WELL! HOW ABOUT IT?

How are your fishing manners? Not only is this a timely question, but in the minds of the members of the Iowa Conservation Commission it is a worrisome one. For the lack of good fishing manners has brought the loss of two trout streams in northeast Iowa and the partial closing of two others. Result has been to deprive Iowa anglers, who know how to behave, of some very fine trout fishing water.

Trout fishing in Iowa depends upon the cooperation of the landowner through whose land the creek to be stocked with fish flows. Without his consent there would be no trout fishing. The state of Iowa actually owns and controls very little trout water. Here and there in the state park system a trout stream is found. But for the most part the streams which are suitable for trout will be found flowing through some piece of pasture or grazing land.

Many farmers have willingly entered into agreements with the state to permit the stocking of the streams and public access. In spite of extremely heavy fishing pressure on many of the streams the conduct of the anglers has been good and the farmers have been willing to continue the stocking arrangements. Not so in the northeast corner of the state, where incidents taking place last season exhausted the patience of the landowners and this year they turned thumbs down on any stocking of trout. Maybe the ruffled feelings can be soothed, maybe they cannot.

Since Iowa has only 43 streams deemed suitable for trout, the incident assumes major importance because each time a stream is withdrawn from circulation it builds up additional pressure on the remaining streams. Can you imagine what would happen if one-third of the landowners in the trout country decided not to allow stock-

ing? With fishermen flocking to the remaining two-thirds how long would it take to exhaust the patience of the owners of these streams? Not very long, if we know the temperament of the landowners.

This column has often pointed out that the purchase of a fishing license, or hunting license, gives the purchaser nothing but a personal privilege, the right to legally take fish or game, or both. To enjoy the privilege requires, in most instances, the cooperation of the fellow who owns the land, and in Iowa, that's 97 per cent of all of the land area. Why an angler will jeopardize his sport by unmannerly conduct is beyond our comprehension. We sincerely hope that no more untoward incidents occur in the Iowa trout country.—The Nomad, *Davenport Democrat*.

Siltation . . .

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present—or more than 10,000 tons of silt a year.

Grass waterways, terracing, diversion of runoff, erosion control structures, and contour farming, are the effective methods recommended for the watershed.—*Ottumwa Courier*.

FIRE WITH FIRE

There are a lot of facts about nature that many folks do not know. We just learned over the radio how skunks don't like the smell of moth balls. A lady up in Wisconsin had a family of skunks living under her front porch. She put moth balls around and they left. We never heard of this before, but we heard of a fellow putting a moth ball in a teabag when he fixed tea for his mother-in-law and she cut her visit short.—*Monticello Express*.

It is easy to exchange soil and water for cash. But not all the cash in the world will buy back one particle of soil or water lost in the process of exchange.



Jim Sherman Photo.
Even more important to the trout fishing program than the success of the hatcheryman is the attitude of the landowner through whose property the trout streams flow. Good public relations on the part of the trout fishermen is a must, or public access to most trout streams may be denied.