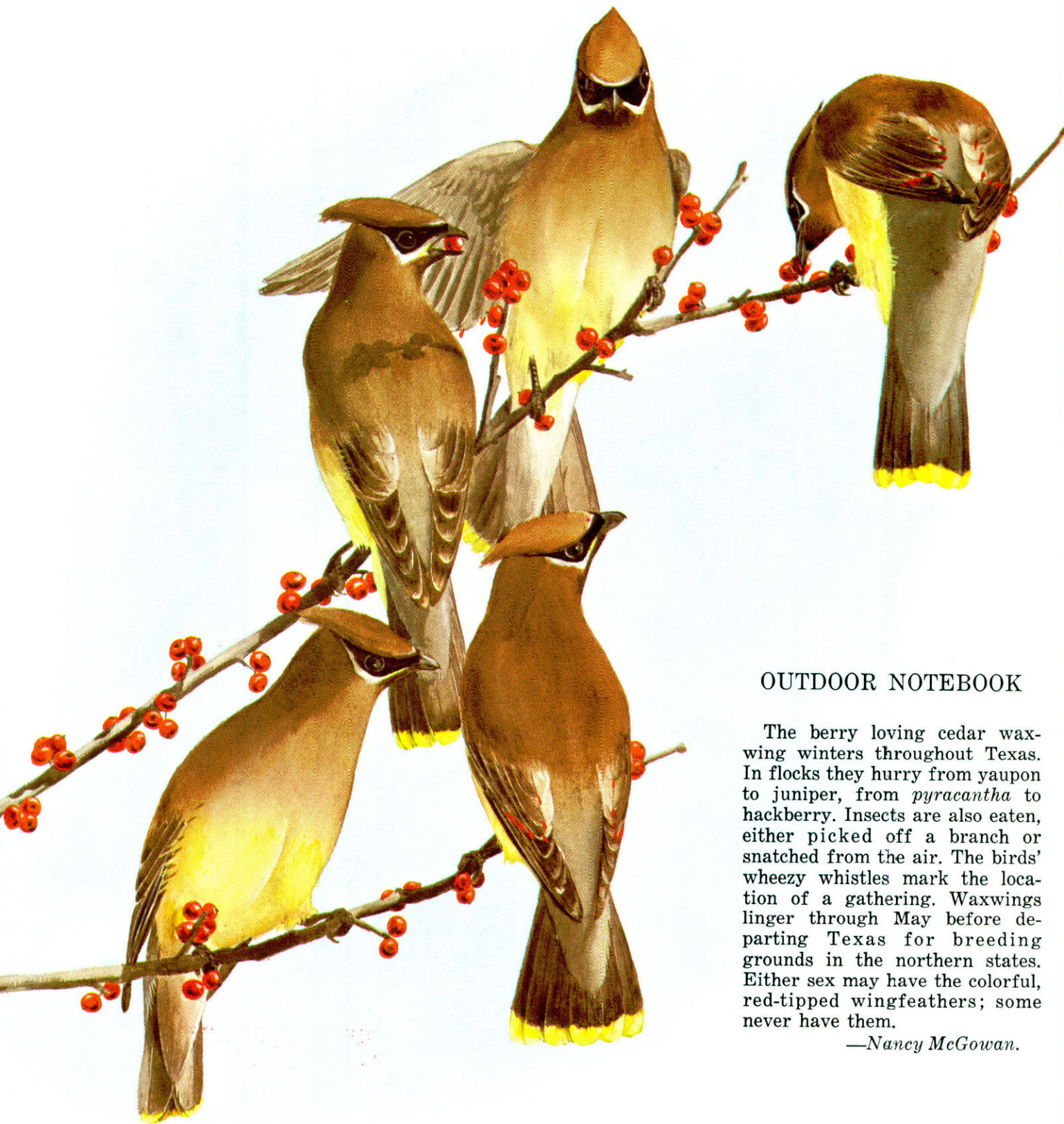


TEXAS

PARKS & WILDLIFE





OUTDOOR NOTEBOOK

The berry loving cedar waxwing winters throughout Texas. In flocks they hurry from yaupon to juniper, from *pyracantha* to hackberry. Insects are also eaten, either picked off a branch or snatched from the air. The birds' wheezy whistles mark the location of a gathering. Waxwings linger through May before departing Texas for breeding grounds in the northern states. Either sex may have the colorful, red-tipped wingfeathers; some never have them.

—Nancy McGowan.

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**TEXAS PARKS & WILDLIFE
magazine**

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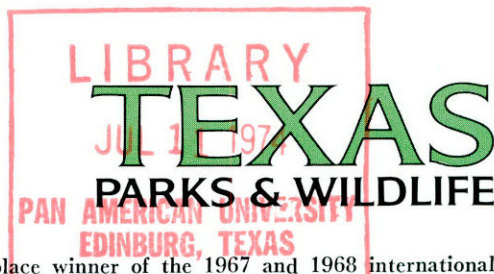
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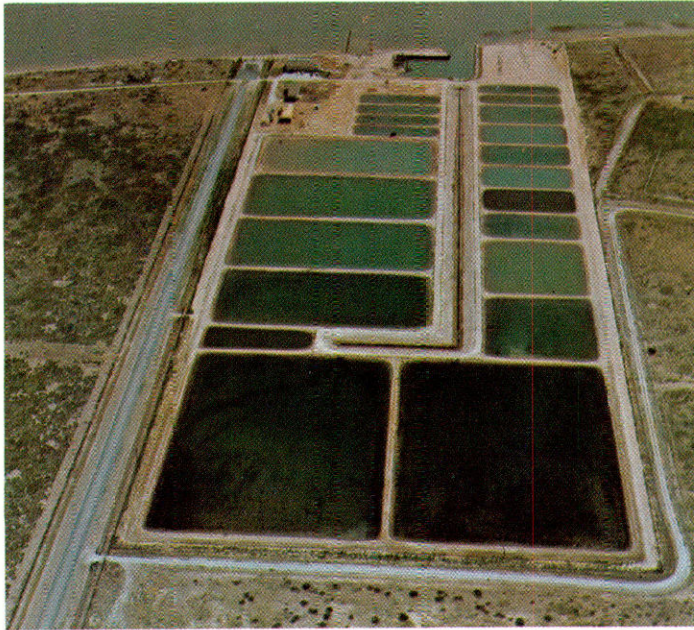


... first place winner of the 1967 and 1968 international award for magazine excellence given by the American Association for Conservation Information.

Cover: A magnificent trophy buck is the coveted prize of every deer hunter. Photo by Leroy Williamson.

Shrimp Farming





by

A. W. Moffett

Coastal Fisheries Biologist

SHRIMP MARICULTURE, or shrimp farming, is the rearing of saltwater shrimp in ponds. There are no shrimp farms in Texas, but hopefully such an industry will someday help supply the increasing demand for this high quality protein food without seriously competing with commercial fishermen.

A shrimp farmer's job is to get the largest possible harvest by careful control of the pond environment and the number of shrimp being raised. To be successful the weight of the farmed crop at harvest must be much greater than losses due to shrimp deaths during the rearing period.

Before examining shrimp farming methods, a brief review of the life cycle of shrimp caught off the Texas coast will be helpful. The principal species are the brown, *Penaeus astecus*; white, *P. setiferus*; and pink shrimp, *P. duorarum*.

Female shrimp lay their eggs in the Gulf of Mexico. Newly hatched shrimp are carried shoreward by water currents. They are one-fourth to one-half inch long when they arrive at tidal passes connecting coastal bays with the Gulf. Bay currents carry the young to salt marshes along bay shores and back bays where they find abundant food and protection from their natural enemies. They spend some time in these nursery areas where they feed and grow. As growth continues they move back through bays to the Gulf spawning grounds where the cycle is repeated.

Brown, white, and pink shrimp appear to be excellent for farming purposes. Their market value remains high even though catches are unstable. Furthermore, there is ample salt marsh area on the

Gulf Coast that could be converted to farming sites.

Marine shrimp spend their early life in estuaries where they can grow to market size without returning to the Gulf. Their growth rates are fast (especially white shrimp); thus extensive care of the young stages would be short and a crop could be harvested in a few months.

Shrimp are being farmed in India, East Pakistan, Formosa, Singapore, the Philippines, and Japan. On many farms shrimp and some species of finfish are raised in the same ponds.

The sizes and shapes of ponds vary. Portions of estuaries are usually diked off to form semi-estuarine ponds with sufficient tidal exchange to flood and drain the enclosed areas. Other farms are a series of connected ponds to hold different sizes of shrimp. Some Philippine farms, for example, have two nursery ponds to hold young shrimp for a short period, two rearing ponds where they grow to market size, and one catch pond.

Ponds are stocked with small shrimp caught with small mesh nets or by allowing the young to enter on incoming tides through screened intakes.

The Japanese grow as much as 7,000 to 8,000 pounds to an acre and raise young shrimp from eggs in small tanks. When the shrimp become small juveniles, they are placed in outdoor ponds. This technique is costly. After a harvest, however, the shrimp are shipped to market and kept alive until just before cooking to be used in a popular, but expensive, dish called *tempura*. The Japanese thus have a market for high-priced, cultured shrimp.

Feed and care of the crop increases selling costs.



The Japanese must feed their shrimp large quantities of ground fish and chopped clams. Juvenile shrimp in ponds with adequate tidal exchange are nourished by natural foods washed in from the estuaries.

In areas with distinct seasonal changes, farmers must harvest before winter. To catch the shrimp they use traps and nets or drain the ponds.

Evidently shrimp farming can be less expensive than catching shrimp at sea, but cultivation costs, carrying capacities of ponds, and production rates need further study. In general, a good shrimp vessel costs \$50,000 to \$70,000, and the catch should be 50,000 pounds of shrimp in one year. Sea farm pond dikes cost about \$1 per linear foot; thus U-shaped inlets or parallel land masses can be diked at narrow points to form large ponds at a relatively low cost.

A 100-acre pond in Charleston County was built for less than \$3,000. Such a pond could produce the equivalent of the annual catch of one good shrimp boat by yielding 500 pounds of shrimp to an acre per year. Vessel expenses include insurance, repairs, maintenance, fuel, trawls, and shares to crew members. In contrast, ponds need little maintenance, suffer only slightly from storms, rarely need repairs, and do not require a full crew except at harvest.

Despite this, an efficient industry will never exist along the Gulf of Mexico coast unless shrimp cultivation techniques, considered primitive by many people, are improved.

Stocking ponds with small shrimp, for example,

will be a critical problem. Natural spawning and water currents are not reliable. The practical solution hinges on the development of economical methods to rear huge numbers of small shrimp from eggs. Recently, biologists at the Bureau of Commercial Fisheries Biological Laboratory in Galveston have made great headway in the development of techniques to mass culture young shrimp in the laboratory.

Stringent control of pond environments to meet the requirements of shrimp will be difficult because scientists still do not fully understand how shrimp react to environmental changes. To lessen this problem, prospective farmers should build ponds in areas where shrimp thrive. Salinity, water temperature, and pollution levels must not be allowed to exceed limits detrimental to the well-being of juvenile and adult shrimp.

Animals that eat shrimp during cultivation must be controlled. Birds, otters, fish, and crabs are serious offenders. Placing small mesh hardware cloth over intakes helps prevent young stages of predatory fish and crabs from entering ponds. Dr. G. Robert Lunz recommends the use of rotenone (fish poison) at the rate of three pounds to the acre-foot to control predatory fishes. But care must be taken in determining the exact application rate because lower concentrations are ineffective and higher concentrations will kill shrimp.

Shrimp-eating birds pose a grave problem, especially in shallow ponds. At the Institute of Marine and Atmospheric Sciences in Miami, Fla., researchers graded the levees of their experimental ponds

Shrimp Farming

Photos by John Suhrstedt



To overcome some of the problems of shrimp farming, the practical solution hinges on the development of economical methods to rear huge numbers of small shrimp from eggs.



steeply to discourage wading birds from feeding on shrimp during cultivation periods. To slump the levees and prevent erosion, they faced them with 3/32-inch thick rubberized sheeting.

Modernized pond harvest methods are also needed. Traps and nets are not practical because many shrimp avoid capture. Even pond drainage is not fully effective because shrimp tend to burrow in the mud on the pond floor. In South Carolina researchers found that more white and brown shrimp were caught when ponds were drained at night.

Unfortunately, the species of shrimp farmed in other lands are not native to Texas. The cultivation of domestic species in quantity to profitable size is still in the experimental stage. Theoretically, at least two crops can be raised in Texas in less than one year. Brown and pink shrimp, for example, could be stocked in the spring and harvested before July; white shrimp stocked in June or July could be harvested in the fall.

White shrimp will probably adapt better to culture methods than brown shrimp because they grow faster and survive higher water temperatures. Recently, white shrimp, so small it took more than 43,000 to weigh one pound, grew so fast in a pond at the Bureau of Commercial Fisheries Biological Laboratory at Galveston that in five weeks it took only 79 shrimp to weigh one pound. In South Carolina, biologists found that white shrimp can live in ponds when the water temperature reaches 100°F, but died during sudden cold spells if the water temperature fell to 40°F.

Along with the commercial cultivation of shrimp, the idea of farming shrimp to be sold as live bait has caught the imagination of many bait dealers. There is a year-round demand for live bait in Texas and since anglers prefer shrimp somewhat smaller than sizes needed for the commercial market, production costs would be lower.

The need for shrimp farming research is certainly apparent. Important studies are underway at Bears Bluff Laboratories (S. C.), the Department of Wildlife and Fisheries Laboratory (Grande Terre, La.), the Bureau of Commercial Fisheries Biological Laboratory (Galveston, Texas), and the Institute of Marine and Atmospheric Sciences of the University of Miami (Fla.).

In Texas, the Parks and Wildlife Department now has a fully equipped laboratory and 21 experimental ponds, ranging in size from one-fourth to four acres, on Matagorda Bay near Palacios. The research program is designed to improve sea farming techniques. Growth and survival rates of shrimp, oysters, crabs, and fish under certain pond environmental conditions are being investigated. All significant findings will be made available to the public.

In conclusion, anyone going into the shrimp farming business at this time must be prepared to lose money. This is a difficult type of sea farming, and prospective farmers should wait until the many problems of farming brown, white, and pink shrimp are solved. Meanwhile, they should keep abreast of all new technical information concerning all types of sea farming. **



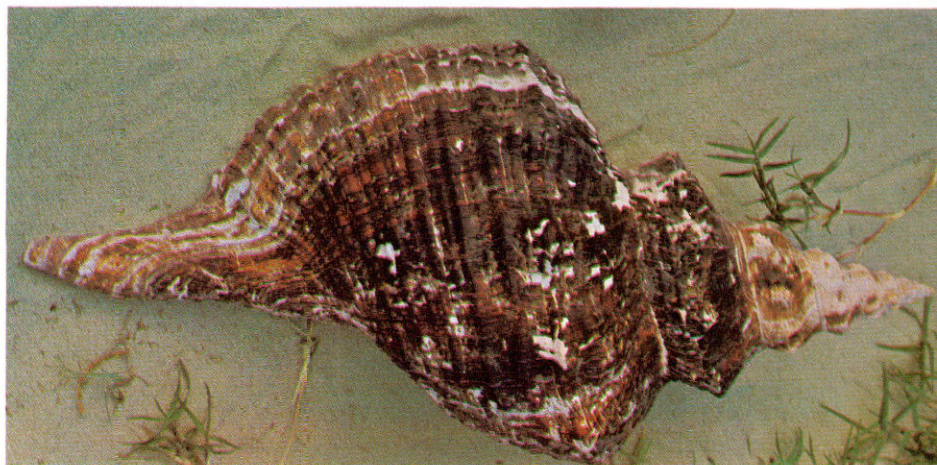
Mitchell's Wentletrap by John Suhrstedt



Oval picture—egg cases contain hundreds of shells that are miniatures of the adults. The operculum is a plate that attaches to the mussel's foot and acts as a trapdoor to keep enemies out.



Lightning whelk, egg case, and operculum by John Suhrstedt



Horse conch by John Suhrstedt



Jewel box on thorny oyster by John Suhrstedt



Cockles and scallops by Leroy Williamson



Gifts of the Surf

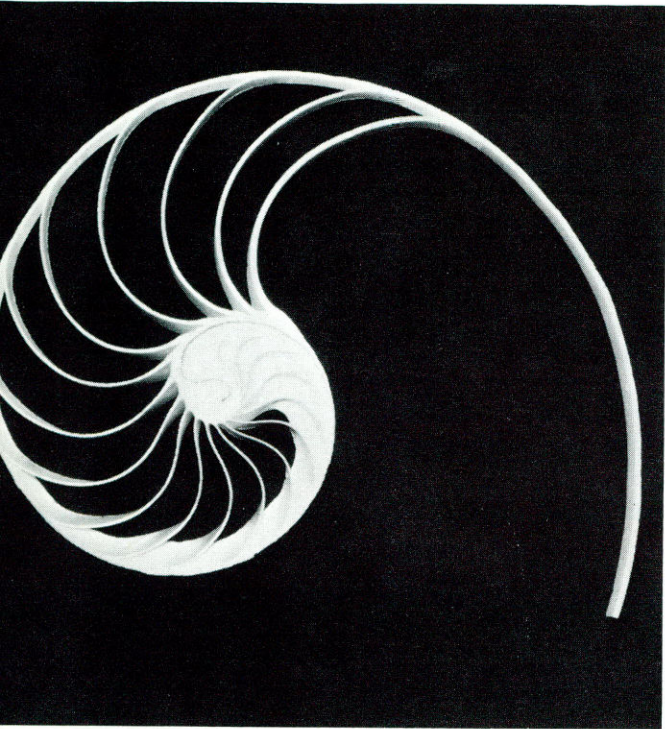
by Patti Swain

FOR CONCHOLOGISTS, better known as shell collectors, Texas' 370 miles of coast in winter offer exciting opportunities to comb the beaches in relative solitude. While most of the surfers and swimmers have deserted the beach in December, it is still a haven for the conchologist who can search the undisturbed shores for that special shell he always hopes to discover.

Collecting shells has much the same appeal as fishing; the search draws one to the edge of the surf, and the success of the venture depends on the elements of chance and skill. Collecting can be as much fun for the amateur as it is interesting for the serious conchologist. While chance must be left to

Angular triton by John Suhrstedt

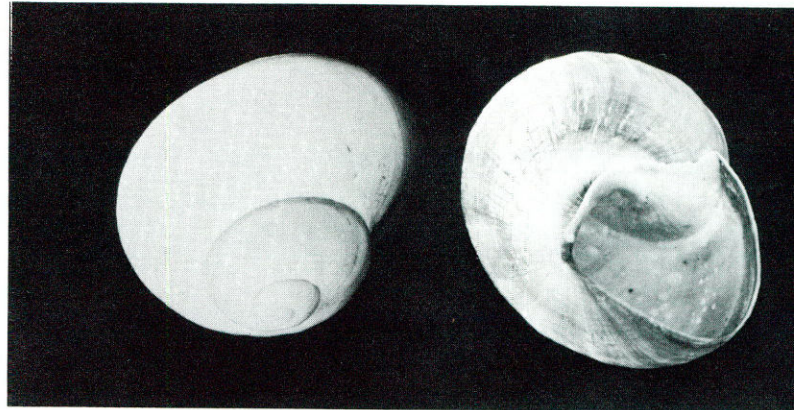




Cross-section of the nautilus (above) tells a fascinating story about the animal's progression through life.



Quahog by John Suhrstedt



Janthina "purple" by John Suhrstedt

itself, a few basic skills will help in the search.

One factor to consider in collecting is the tide. The best time to hunt is immediately after the new and full moons because the lowest tides occur then, and more shells are exposed. During each day, the best time to hunt is one hour before and after both low tides. Newspapers usually list the times of high and low tides. A point to remember is that tides each day occur about 50 minutes later than the previous day's.

Another area to explore for helpful information is that of equipment for collecting. On Texas' flat and sandy beaches, little more than a few cotton sacks or small boxes and a small hand rake or shovel is needed for collecting. In muddy areas, the use of a fine-mesh screen is helpful in bringing the shells to the surface. For a complete shell collection, deepwater collecting is a must. Over half of American shell species live below the low tide level and require the use of trapping or dredging techniques for collection.

Many dredging operations can become quite complex and should be investigated in detail. But an inexpensive dredge for use with a small rowboat can be made. This consists of a triangular or rectangular iron frame with a pair of iron bridles. A line is attached to the bridles for pulling the dredge. Fine-mesh fishing net is sewn to the frame

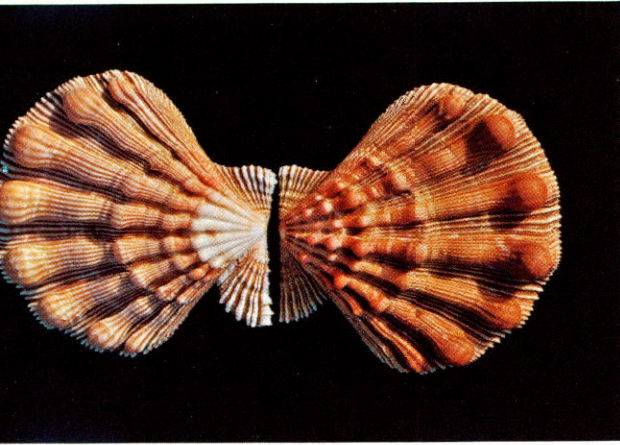
with an opening in the back from which the contents can be removed.

After the shells have been collected, they must be cleaned and displayed properly to establish the beauty and value of the collection. Most mollusks can be cleaned of their soft animal parts by boiling about five minutes. To protect the shell's surface, it should be placed in warm water, boiled, and then cooled gradually. The meat can be removed with a sharp object. If odors remain, a few drops of formaldehyde and a cotton stopper in the shell will eliminate them. Usually the natural state of the shell after it has been cleaned is best for display. In some cases, however, a stiff brush and soapy water may be needed to remove coral and algal growths. If growths remain after this process, the shell can be soaked in a strong chlorine solution for a few hours. This gives the shells a colorful, but unnatural, sheen.

The display of shells can be as unusual as the imagination allows; it can tell the story of their development in the many shapes and sizes they possess. The quality of shells is determined by color, rarity, shape, and unusual form.

For a winter pastime outdoors, shell collecting can be relaxing and informative. The solitude of the beach can produce endless hours of happy searching and hopefully a rare find. **

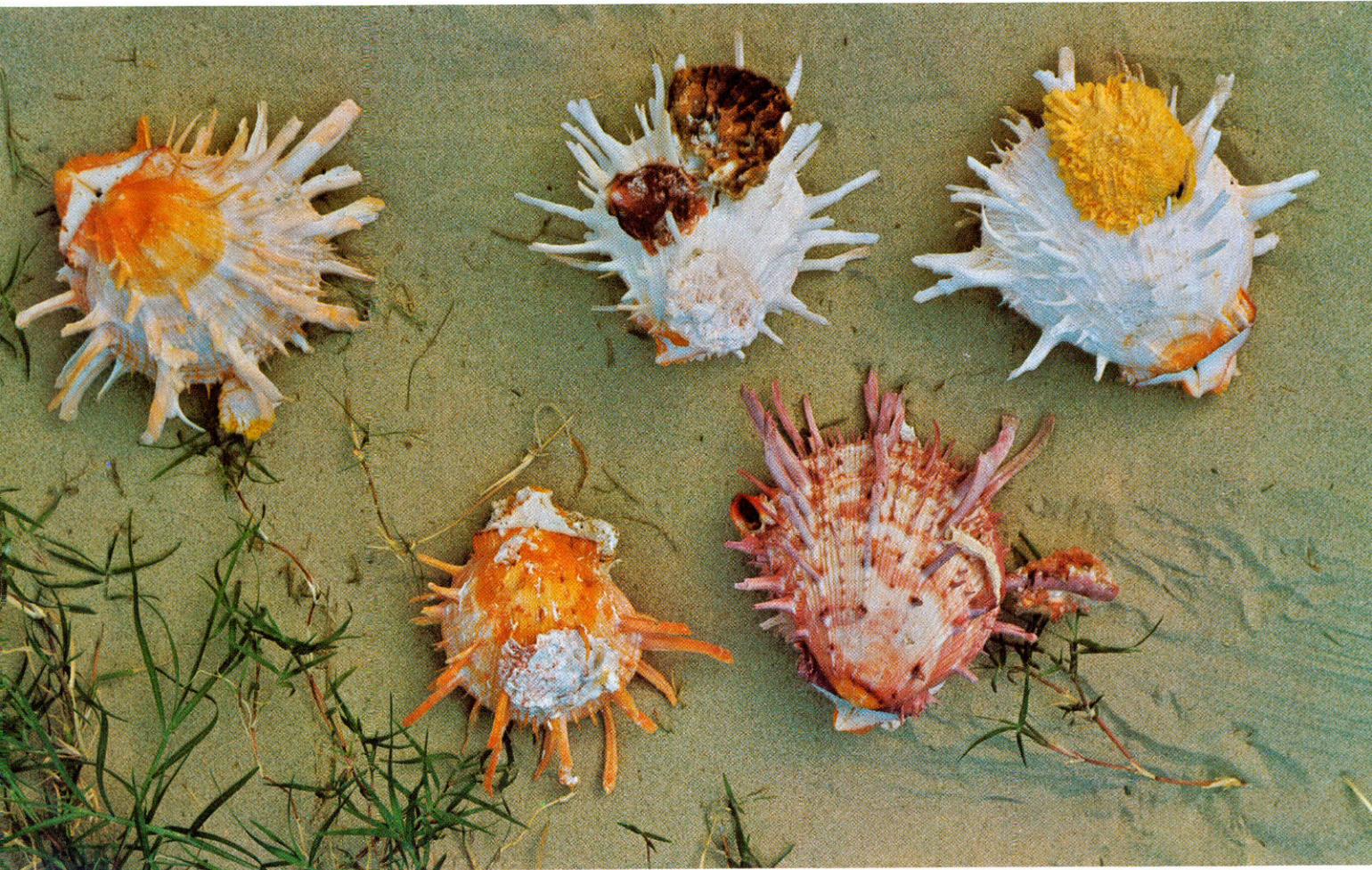
Lion's paw by John Suhrstedt



Shells found on Texas' coast can be a welcome addition to any collection. Man has been acquiring shells for thousands of years to use as tools, money, and jewelry.

Tellin by John Suhrstedt

Color variations of thorny oysters by John Suhrstedt



Outdoor Books



GREEN by Ben Masselink; Little, Brown and Co., Boston, Mass., 1969; 111 pages, \$4.25.

Ben Masselink, both a diver and fisherman, well-acquainted with the fauna of the sea, brings to life in *Green* the story of a Caribbean turtle's struggle for survival.

Green is an excitement-packed biography of a 260-pound green turtle, *Chelonia mydas*, and her experiences with land and sea predators. Lovingly and factually told, the book traces the life cycle of "Green" from the day her mother crawled wearily ashore and laid the golf ball-size eggs in the creamy white sands of the Yucatan Peninsula to the day "Green" must repeat the cycle.

Unlike most birds and mammals, the

mother turtle leaves her young immediately, unattended, to fend for themselves. The reader learns that fatality is extremely high among baby turtles of this species. "Green" was one of the two out of a clutch of 114 eggs that survived babyhood.

Although not a predator itself, the Caribbean turtle is highly sought by other predators. The turtle thrives off thalassia, a green grass that grows on the sea floor.

Before the baby turtles hatch, the discovery of their nest is constantly threatened by such predators as the boa and mongoose that roam the beach. If the nest is discovered by the jaguar, the slinky cat has a tasty omelet.

If fate permits and the baby turtles are allowed to develop, they erupt from

the nest 58 days after being laid. Their natural instinct is to head for the sea. They are unaware of the other predators—crab, jack crevalle, and barracuda—they must avoid as they swim with bird-like motions in the sea.

If the turtle survives its initial predators and reaches adulthood, it faces possible starvation, parasites, fungus, drowning (A turtle can stay submerged only 30 minutes), or capture by man. Man is by far its worst enemy. The meat is not only a highly sought delicacy of the islanders, but also brings a high price to fishermen.

The reader will find this story an intriguing drama of nature and will get a colorful picture of sea life and the islands that dot the Caribbean. The odds against these turtles' survival as a species and the special fate of "Green" make the story interesting and amazing.

—Wanda Freytag

THE WAY BIRDS LIVE by Edward A. Armstrong; Dover Publications, Inc., New York, N. Y., 1967; 97 pages, illustrated, \$1.50.

Perhaps from a bird's point of view, life is complicated to him also, but from man's standpoint it appears happy and free.

In a concise, interesting, somewhat humorous, and informal manner, the author presents a colorful sketch of the way birds live. The reader learns, for example, that the song of birds is not only the music of the forest, but that it holds purpose and meaning in the life of birds.

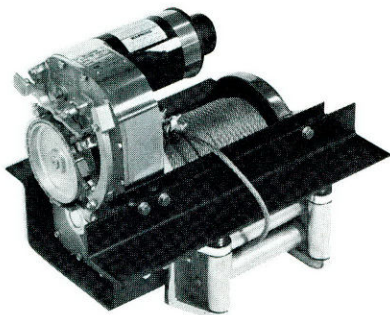
The Way Birds Live is a lively account of the author's observations. It is his opinion that watching birds is the best way to see their world, but he stresses that we should not look for human qualities in birds in order to understand them. Comparisons can be made between the actions and the emotions of birds and those of man, but it must be remembered that birds are governed by instincts while man forms habits; however, each learns from his elders, and gains perfection in his actions through experience and age.

The first time a bird builds a nest it is not going to be the best he will ever build. A bird learns by experience and imitation whether it be singing, preening, feeding, or any of the other daily rituals performed. Armstrong links what is happening inside the bird as well as what is happening on the outside with what it feels and what it sees.

In many ways the author uses his book to promote birdwatching as a pastime. From his observations of many different kinds of birds, he conveys to the reader some of the things unknown about birds and gives the reader an incentive to observe the habits of birds. Most of all he gives a remarkable insight into the fascinating and

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eccentric behavior of birds and the role birds play in the balance of nature.

The book is keenly illustrated with drawings and photographs, such as that of the Adelle penguin "proposing" and a cuckoo robbing another bird's nest. One of the most heartwarming and amazing illustrations shows a cardinal feeding goldfish.

Anyone who takes delight in observing some of nature's most beautiful creatures will find this book interesting and enjoyable. —Wanda Freytag

GUN DIGEST edited by John T. Amber; The Gun Digest Co., Chicago, Ill., 1969; 416 pages, illustrated, \$4.95.

The 1970 deluxe edition of *Gun Digest* is available. Serving as a "shooter's encyclopedia on handguns, rifles, shotguns, and accessories," it offers both historical and present-day information with distinctive photographs and diagrams of gun styles and ammunition.

Of interest to gun enthusiasts and dealers will be the editorial (reprinted from *The American Rifleman* 1969) entitled "The Ammunition Farce." While its author comments on the ammunition provisions of the 1968 Gun Control Act, the article provides an appropriate preface to the digest.

This book is a handy reference for technical literature on guns.

—Wanda Freytag

THE HUNTER'S BIBLE by W. K. Merrill; Doubleday and Co., Inc., Garden City, N. Y., 1968; 182 pages, illustrated, \$1.95.

With hunting season in full swing, it would be wise for most hunters to consult *The Hunter's Bible*, an inexpensive, well-illustrated handbook designed for both the novice and the experienced hunter. It tells the "how, when, and where of hunting, camping, fishing, and hiking."

For those especially interested in bird hunting, a helpful chart on game-bird resources of Texas and the nation's grasslands is available. The reader will be interested to learn that five Federal grassland areas in the Texas Panhandle offer public hunting. Where to write for full details is also included.

Techniques of hunting big game, upland birds, waterfowl, and small game and three chapters on weapon selection and use in relation to game hunted are especially informative. Topics such as planning a hunting trip, information on government parks and forests, food and its preparation, and a special section on survival techniques are discussed in detail.

The Hunter's Bible is one of a series of outdoor guides published by Doubleday. Add it to your collection or start a collection with this one. It will provide an adventure in reading as well as prepare you for an adventure in hunting.

—Wanda Freytag

Long Shots, Short Casts

compiled by Neal Cook

Coyote Suggested as Game Animal: Some wildlife workers in Alberta, Canada, are suggesting that coyotes be classified as game animals so that unethical methods of hunting them can be prohibited, and seasons and bag limits can be used to protect them. The concern for these interesting animals was brought about by the new "sport" of hunting them from snowmobiles. This "sport" involves groups of men on snowmobiles running the animal until it is exhausted and then either shooting it or clubbing it to death. Three Canadian hunters, using two snowmobiles, managed to take 200 coyotes in one winter and 319 in another.

Mothers and DDT: Human milk in most parts of the United States could not be bottled and shipped in interstate commerce because it contains more DDT residue than is allowed by Federal regulations.

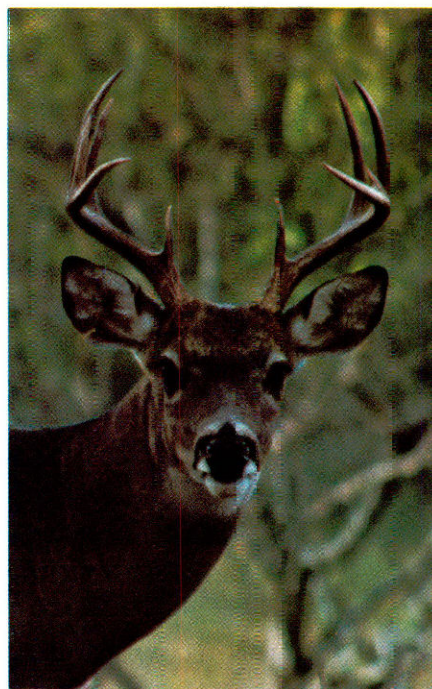
WARN: A new group has entered the conservation picture. Women Against Ravishment of Nature (WARN) is made up of women who are striving to educate other women as to the dangers of losing entire species of wildlife just to satisfy a fashion fad. WARN members are going to travel in Africa next year at their own expense to take pictures of animals that are being hunted to the brink of extinction by ruthless poachers to meet the demands of fashion centers of the world. After this trip, the members will travel throughout the United States lecturing to groups to generate interest in this subject.

Lantern Case: Outdoorsmen who receive new lanterns, camp stoves, or other camping supplies for Christmas can make a handy carrying case of the packing box in which the gift comes. Open the case by cutting around three sides to make a hinged top, remove the gift from the box, and then paint the box with two or three coats of a favorite color enamel, spar varnish, or polyurethane paint. The now water-resistant case will protect a Christmas present for many years.

Spreading the Species: Charles Darwin once raised 82 plants, belonging to five different species, from a mud ball taken out of the plumage of a bird.



Photos by Leroy Williamson



The Mystery Of Antler Development

by Dr. R. M. Robinson Department of Veterinary Pathology, Texas A&M University
and R. G. Marburger Wildlife Biologist



WHAT makes a trophy? How do deer grow antlers? What can be done to improve antler growth? Why do we have small bucks? These are questions that puzzle most hunters during November and December every year.

Deer are geared to an annual growth cycle, and antler growth is one of the most outstanding things about deer that emphasize this fact. A thorough knowledge of this annual cycle is basic in understanding the factors involved in attaining large antlers. As a first step, let us follow the annual cycle of a normal buck deer.

When we see that buck in hunting season, he is at his best. His antlers — hard and polished — are the culmination of the annual cycle. They are true bone. There is no blood in them, and they can be

sawed without bleeding at all. Their complete development coincides with breeding season, for their purpose is to serve as a weapon in competition for does.

As the buck's hormones change with the cessation of the breeding period, the bone at the base, or pedicle of the antler is eroded away and the antlers snap off. Slight oozing of blood occurs when the antler comes off, a scab forms, and the pedicle heals rapidly. Normally this event occurs between February and April. Each buck will tend to shed his antlers close to the same date each year, providing nutrition is adequate.

A short time after the antler scar heals, the buck must support a phenomenal rate of antler growth. His appetite increases, and he eats a great deal



Antlers are used as weapons in competition for doe.

more than during the rest of the year. He requires a large quantity of minerals — so much that his body bones may be depleted of minerals to support his antler growth. The antlers, covered with hair and skin called “velvet,” are full of blood vessels. They grow very fast at this time and are soft and hot to the touch. They seem to itch, as he often rubs them on his flanks.

The antlers grow at a tremendous rate for roughly three months, and the buck must eat in proportion to such growth. After completion of rapid growth, the “velvet” remains on the antlers while they are being mineralized (hardened) until about September, when the antlers have become fully developed.

As the days become shorter and colder, the complex hormone balance within the buck changes to prepare him for the breeding season. The hormones controlling antler growth also change and blood ceases to circulate through the “velvet.” This covering quickly dies, and peels away from the hardened antlers. The “velvet” hangs in strings and bothers the buck; he rubs his antlers on bushes, and shakes his head a great deal. As the strings of

“velvet” come off on the brush, he eats them and rubs again. He is restless, and trots from bush to bush, his antlers bright pink after the loss of velvet. This color rapidly changes to various shades of brown — stained by the sap of bushes and the slight amount of blood that remained when the velvet was shed.

The buck is now ready to breed and awaits the first indications of a doe in breeding condition. He eats less and travels more, picking favorite bushes or small trees within his range to mark. He marks these by scraping off the bark with his antlers and rubbing the branches with the lacrimal glands found just in front of his eyes. These activities gradually diminish as winter passes until the antlers are again shed and the cycle is repeated.

From observing the growth cycle, it is plain to see that the buck’s nutritional requirements increase during spring and summer, and here we find the first basic criterion in growing big antlers. If browse is adequate, maximum development for age may be attained. If, on the other hand, the range is overgrazed or overbrowsed by domestic animals and deer, browse of adequate nutritional value may not be available. Antler development then suffers in proportion to diet. The deer cannot, under these conditions, produce maximum growth.

Many people think that all yearling bucks are spikes. This is not the case. It is believed that spike bucks are an indication that something is wrong with the deer herd. In experiments with penned deer, this spike condition is usually nutritional in nature. Most yearling bucks on adequate diets should have four to eight points.

Mineral balance in the diet is also important. In Texas, many areas are phosphorus deficient. Research at the University of Pennsylvania has demonstrated very well the effects of this deficiency on antler development. So it may be expected that bucks in areas of marginal or deficient phosphorus levels will have poor or slowly developing antlers, unless they have found some other source of this mineral.

South Texas has long been famous for trophy deer. Although it is a semiarid region, the nutritional quality of the browse is high. Also conducive to good deer herds is the prevalence of large ranches and the rugged terrain.

The second factor, age, enters into antler development. Given time, deer may develop fair antlers, even on poor range. Thus, if we expect eight points on a yearling with an adequate diet, we might get those eight points in three or four years if the animals have only marginal diet, provided all other factors are equal. Old animals decline in antler development however, and may never have a chance to develop superior racks.

In addition to nutritional requirements and age, heredity is suspected of playing a big part in antler growth. This is a controversial subject, but never-



Antler size and shape depend on genetic characteristics, age, and the nutritional quality of the browse.

theless one of great importance when considering superior antler growth. With penned deer, it has been observed that antler characteristics persist from year to year. Some bucks may never have more than eight points, even if fed the best feed and allowed to live to a ripe old age. Others seem destined for trophies, even at three to four years of age, provided nutrition is adequate. Some bucks have high racks, some have wide racks. These genetic characteristics are very difficult to assess in wild herds where the paramount problem of antler development is nutrition. But genetic characteristics do exist.

It is unrealistic to bring breeding stock to a nutritionally deficient area, because it is entirely possible that potentially fine trophy animals may already be present. Only after the nutritional problem in the area is corrected will it be possible to assess the genetic potential of the herd.

Many problems have been revealed during attempts to correct nutritional deficiencies in deer. A standard method is to increase hunting pressure, thus removing more animals from marginal range.

This has been only partially successful. It has allowed utilization of more animals for food, but generally it has not removed enough deer to permit range recovery and nutritional improvement, especially when additional pressure on the range is applied by domestic livestock. This, however, is the most rational approach to correct diet deprivation.

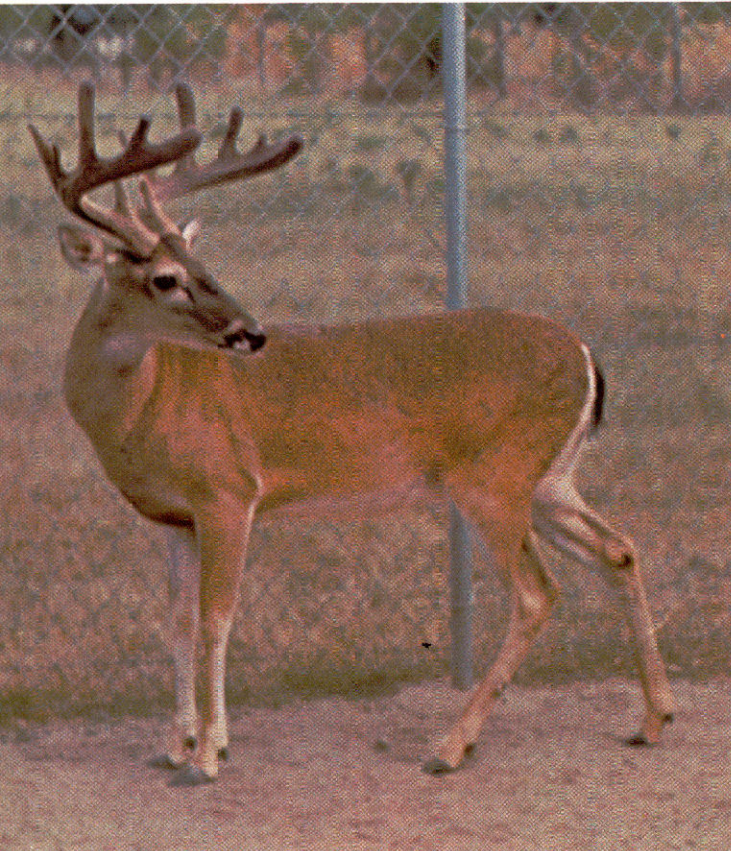
Many people practice supplemental feeding of deer on their ranches. This practice sounds satisfactory to begin with, but it too has undesirable aspects. First, most people underestimate the number of deer present, so that each animal doesn't get enough supplement to do much good. If each animal *does* get enough, reproduction then increases beyond bounds, and a *very heavy* harvest of animals is required to keep from exhausting the range. Often, people who have fed their deer usually do not want to harvest the deer as heavily as necessary and so the nutritional specter is with them once again.

Supplemental feeding does, however, have value on small ranches bounded by deer-proof fencing. On small areas such as these, rigid control of deer



Soon after the pedicles heal ...

By September, development is usually complete ...



... new antlers start developing in May

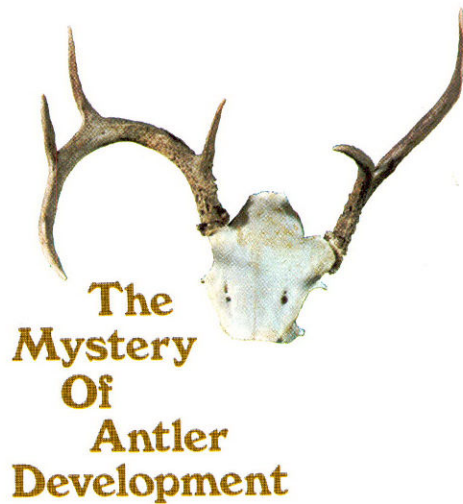
... and soon the velvet is shed





... and by June they start branching.

... leaving hardened antlers in the fall.



The Mystery Of Antler Development

Continued

numbers is possible and thus each animal may receive enough supplement for maximum growth if feed is available. Consequently, maximum antler development may be anticipated under these conditions.

Lastly, many things can happen to the buck during the time antlers are developing. Antlers in "velvet" are subject to injury and many accidents occur. Cuts and abrasions usually heal with little change in antler form. Breaks or severe lacerations, often resulting from fighting or accidentally catching the "velvet" antlers on fences or brush, may severely alter the antler growth pattern, resulting in strangely bent tines, or completely broken antlers.

A study near Kerrville revealed that antler deformities may result from gunshot wounds in the body received by the buck the previous hunting season. This may shed some light on the cause of the most common antler abnormality — deformity.

Degeneration of the buck's testes is observed from time to time in Texas. This results in an upset in the hormone balance; the antlers become very bizarre in form and do not lose the "velvet" normally. Similar changes are seen following castration.

Barring occasional physical accidents, the largest factor in development of antlers of trophy size is nutrition from March to August. During this critical period, bucks must obtain adequate high quality food. Maximum antler development is possible only under optimum range conditions. Until these conditions are established, the possibility of bringing home a trophy deer remains unlikely. **

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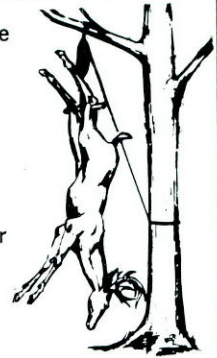


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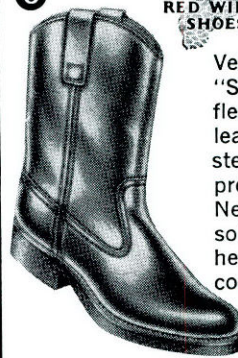
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CRAFTY IMPORT

by
Joe T. Stevens
Wildlife Biologist

WHITE-TIPPED TAIL and black leg markings distinguish the red fox, *Vulpes fulva*, as one of Texas' most handsome carnivores. Although not native to the State, he was first introduced by early pioneers who pursued the fox for sport with well-trained packs of hounds. The importation of red foxes increased in proportion to the number of hounds with ability and gameness to run the so-called red ranger. Just after the Civil War, relatives of the Walker brothers, famous hound breeders from Kentucky, moved to Texas bringing with them a pack of these swift foxhounds.

A biological survey of Texas in 1905, reported that between 1890 and 1895, 40 red foxes were released near Waco four miles north of where the Bosque River runs into the Brazos. These and about 60 more released thereafter provided the first brood stock of red foxes in Central Texas. Their offspring migrated in different di-

rections and red foxes soon began to appear in Bosque, Hamilton, Erath, Hill and surrounding counties. Numerous other releases have been made through the years in many sections of the State. Thus, the hardy runner has increased his range to cover a wide area.

Because of his exceptional ability to outrun hounds through sheer speed and endurance and to elude them with numerous wily tricks, he is still providing a challenge to foxhunters. According to a recent survey by Parks and Wildlife Department biologists and a review of trapping records of the U. S. Fish and Wildlife Service from July 1968 to February 1969, the highest red fox populations seem to occur in the north central part of the State. The present range extends over practically all of southeast, east, and north central Texas to the Red River and as far west as Reagan, Glasscock, Howard, and

Borden counties. A red fox would be a rare find in the Rio Grande and Gulf Coast plains or in most of the Edwards Plateau. He is also absent in the Panhandle and Big Bend.

Legend would lead one to believe that the red fox is a large animal; however, he is relatively small, normally weighing from 8 to 12 pounds. His color, especially in the winter, is breathtaking. Above, his golden-yellow coat glows like flame, and underneath, his fur is a soft, snowy white. His piercing, dark eyes are widely set in a rusty, dull yellow face grizzled with white. Fine jet-black fur, like stylish silk gloves, extends up to the elbow on his forelegs and to the outer thigh on the hind legs. His strong, streamlined body is adapted for running. Apparently enjoying every minute of a chase, he can easily run in front of an onrushing pack of baying foxhounds all night, and is capable of sudden bursts of

speed up to 45 miles per hour.

On cold nights in late December and January, the shrill squall of the vixen (female fox), is generally answered by two or three short barks of interested males. During years of high red fox populations, competing males often engage in fights over their preferred partner. The evidence of abundant tracks then tell the story of their pairing and traveling together in search of a suitable burrow or previous fox den to inspect for a nursery for their forthcoming young. When a well-drained home is found, it is cleared of debris and generally provided with two or more openings.

The litter, only one each year, is born in March or April, 51 days after mating. Litters vary in size from 4 to 15, but 5 or 6 is the usual number. Their lead-colored pelage is deceiving, and few people could distinguish them from the kittens of a common house cat. They are blind until nine days old and are constantly attended by the mother for the first few weeks. The male, a most affectionate father, brings food to the female during these days of intensive maternal care and continues to help raise the young until late summer. He is on almost constant guard and often warns his family with an anxious bark when an enemy approaches. Then, if possible, he lures the intruder after him and dashes away at top speed bringing safety to all.

The agile pups receive food at the mouth of the den as soon as they are sufficiently developed, and then under parental guidance, they venture outside to wrestle and fight over each morsel. After feeding, they lick themselves clean in dog-like fashion. When the food digests and the fresh energy surges into their growing bodies, they roll and tumble like playful children until exhausted when they will sprawl about in restful sleep. As a natural protective measure, little red foxes play with amazing quietness unless one gets too rough and forces a squeak of mild protest from his playmate.

The next four months are spent mainly outside of the den learning to discover, stalk, and catch insects, frogs, lizards, mice, shrews, rats, young rabbits, and birds. They also forage on fallen ripe grapes, berries, and other food at hand. During this time, den site several times as they search the countryside for food.

They help rid the farmer's fields of rabbits, rats, mice, and often gorge themselves on injurious grasshoppers, crickets, and other insects — thus partially compensating the farmer for the occasional loss of an unattended chicken, baby pig, kid, or lamb. The fox also feeds on some of the thousands of birds and mammals killed by automobiles, highlines, mowing machines, and wire fences, helping to utilize some of the wild creatures killed by modern civilization. A small percentage of live bobwhites, doves, and ducks are also consumed; however, reliable biological data indicate that red foxes have no appreciable effect on game bird populations. Like all predators, they help remove the weak, sick, and otherwise surplus animals that would not likely find their way into the hunter's bag anyway. Biologists have definitely determined that due to weather conditions drastically affecting food and cover, game bird populations fluctuate from year to year regardless of the number of predators.

By early fall the family separates and the surviving young foxes move out from their parents' home range to establish their own hunting grounds. Competition for living space is an immediate problem, since neighboring adult red foxes generally tolerate only one pair to the square mile. Consequently, these young transients are under continual stress until they finally discover an uncontested area. At this stage, many young are killed on highways, are caught in the open by larger predators, or become easy targets for hunters. Thus, when a young red fox settles on a new

home range, he has shown his resourcefulness by staying alive.

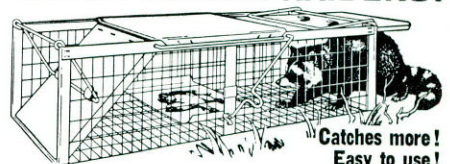
During fall and early winter, he hunts chiefly at dusk. When food is abundant, he makes caches of uneaten material buried under earth or in leaves and grass. This is a survival technique to help insure a food supply when hunts are unsuccessful. In February and March, the growing scarcity of food increases his need for diligence, and he may be seen abroad at all times.

In general, he hunts into the wind, but turns aside to inspect every promising thicket or grassy meadow. He trots along trails, fence rows, and over ridges and sneaks by dwellings. Stopping at the slightest sound or motion, he will freeze to a statue in an instant, upholding one foot in a most graceful pose. At times he stands on his hind legs to overlook the surrounding vegetation and may even bound into the air for an observation hop. He searches the wind with his nose, hunts by the hour, missing nothing, zigzagging the landscape along a general upwind course. He outruns short-winded house dogs and trails down feeding rabbits, pouncing on one whenever possible.

When satisfied or tired, he lies down for a nap in the woods by a dead log or in open country in a patch of weeds or soft grass. He curls into a ball, bushy tail covering his nose and face with only the tip of his black ears breaking the symmetrical outline.

A young red fox is subject to predation by great horned owls,

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eagles, hawks, coyotes, or bobcats; but after reaching adulthood his intelligence and superior running ability allow him to escape from all but the most cunning eagle, bobcat, or pack of coyotes.

Man with his modern machines, calling devices, guns, traps, dogs, and vicious poisons emerges as the red fox's most threatening predator. The fact that the fox survives in the present civilization in large numbers over a large portion of the continent is a tribute to his adaptability and intelligence.

His life is not an easy one. He is continually plagued by both internal and external parasites. Fleas, ticks, and stomach worms sap his vitality, but seldom bring death unless food becomes scarce and malnutrition develops. However, when infested with the obnoxious and bothersome mange mite, he gets little rest and even his hunting activities are impaired. This microscopic insect pierces his skin, causing severe irritations and inviting infections that often result in death.

Even worse are contagious diseases such as canine distemper, infectious hepatitis, encephalitis, and rabies. Individuals are in continual danger, and serious outbreaks are sure to hit high populations if diseases are not regularly controlled. With these hardships, it is easy to understand why only a few foxes live out their normal life span of 7 to 10 years.

Truly, the sly red fox is one of Texas' real assets. He has found

his niche in the ecological community of both wild creatures and modern civilization and is likely to be with us for a long time. He is very efficient in helping to control small mammals and insects which can be exceedingly destructive. At the same time, he provides sport during many months of the year when regular game seasons are closed. He is a true symbol of the wild, with his magnificent display of color, amazing intelligence, and courage. As he roams the countryside with grace and freedom, let us learn to live with him and enjoy his presence to the utmost. **

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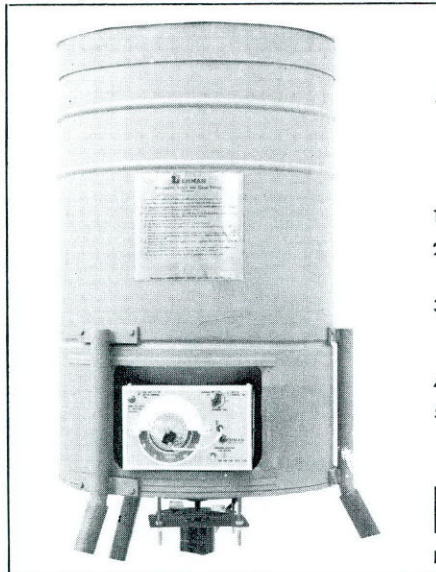
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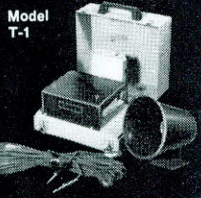
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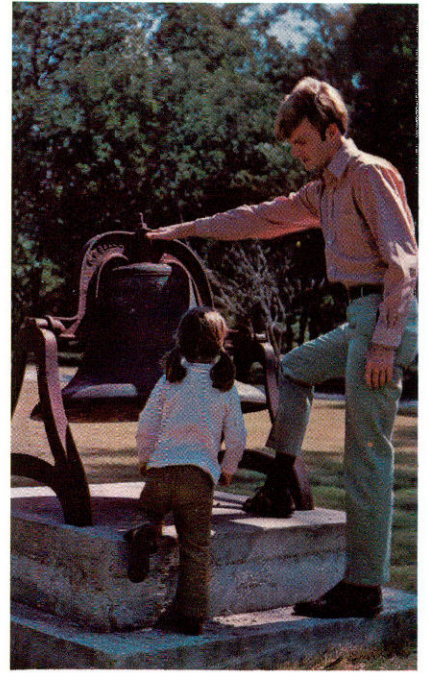
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While Mother Neff State Park is a little more remote than some of the other parks, it is an excellent place for a family outing any time of the year. Winter visits to the State Parks can be a refreshing relief from city jobs.



MOTHER NEFF



STATE RECREATION PARK

by
Neal Cook

Photography by
Reagan Bradshaw

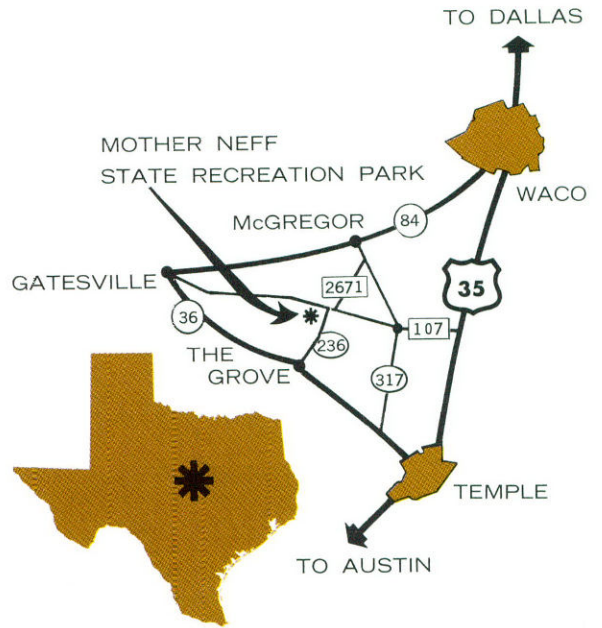
A VIRGINIA woman who ventured into what was then a wild and rugged part of Texas showed her love for her adopted state by leaving in her will a six-acre piece of property that was later to become an official State park in Texas.

Mrs. I. E. Neff and her husband Noah moved to a beautiful pecan grove on the Leon River in 1856, and there they reared nine children, one of whom became Governor of Texas — Pat M. Neff. He was Governor for two terms from 1921 until 1925, and during his second term he formed the first State Parks Board. However, his mother had already seen the need for public parks property, and in

1916 had made a will leaving six acres for “religious, educational, fraternal, and political purposes.”

After her death in 1924, it was another ten years before the State officially accepted the land; at this time, Pat M. Neff gave an additional 250 acres to the park. Three additional acres were donated by Frank and Erma Smith.

Located about 30 miles southwest of Waco, the park contains three types of terrain and vegetation. About 50 acres are located along the Leon River in rich bottomlands with huge pecan, willow, cottonwood, and oak trees shading peaceful camping and



picnic sites. Among these trees are a bur oak that was declared the largest one of its kind in the State and a white ash that missed being a State champion by inches.

Another 100 acres are in the rugged hills overlooking the river where large cedar and mountain oaks grow and shallow, rocky gullies make ideal places for youngsters to play. The remaining acreage is in gently rolling prairie land that is covered with wildflowers in the spring.

In the rugged hilly part of the park is a rock overhang that offered shelter for Indians that once roamed through the area. Civilian Conservation Corps members working on facilities for the park in 1935, excavated the floor of this shelter and found an Indian burial site. The C.C.C. workers carved a limestone marker over this burial site, but time and vandals have destroyed almost all of the marker.

Most of the structures in the park were built by the Civilian Conservation Corps during the thirties, including a home for the park manager, an office-concession building, and a stone water tower. An open tabernacle was also built which has been used for political rallies and religious services.

Recreational facilities include 28 picnic sites, an open group shelter, and a children's play area. Trailer camping is permitted, but no sewage, water, or electrical connections are available.

Since it is not on any main highways, Mother Neff State Recreational Park is not visited by a great number of people, but those that do spend the day or their entire vacation in the park know why the Neff family chose to build their home there. Visitors should know about and be thankful for the Virginia woman who showed her love for Texas by donating this land — thus demonstrating the need for State-owned parks. **

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Recreation Parks																				
Abilene	Buffalo Gap	•	•														Texas	Longhorn	Herd	
Atlanta	Queen City				•	•							○	○	○					
Balmorhea	Toyahvale	•			•	•			•											
Big Spring	Big Spring			P									○	○				D		
Blanco	Blanco	•	•		•	•														
Bonham	Bonham	•		C										•						
Buescher	Smithville	•	•	H														D		
Cleburne	Cleburne	•		C		•							○	•				B		
Copano Bay	Rockport																			
Daingerfield	Daingerfield	•			•	•														
Eisenhower	Denison		•		•	•							○	○	○			B		
Falcon	Falcon				•	•							○	○	○			B · T	Airstrip	
Ft. Parker	Mexia	•		C														B		
Garner	Concan	•	•	S					•											
Goose Island	Rockport	•	X																	
Huntsville	Huntsville	•	•	P	•	•												B · T	Airstrip	
Inks Lake	Burnet	•			•	•												B		
Kerrville	Kerrville	•		S	•	•								○				G · B		
Lake Brownwood	Brownwood	•		S																
Lake Corpus Christi	Mathis	•	•		•	•														
Lake Whitney	Whitney	•	•	S	•	•													Airstrip	
Lockhart	Lockhart	•		H	•	•														
*Mackenzie	Lubbock	•			•	•						•								
Martin Dies, Jr.	Woodville	•	•		•	•								○						
Meridian	Meridian	•	•		•	•							○	•	Nature Trail			B		
Mother Neff	Moody	○																		
Port Lavaca Causeway	Port Lavaca																			
Possum Kingdom	Caddo	•			•	•			•									Texas	Longhorn	Herd
Tyler	Tyler	•	•	S	•	•												Texas	Longhorn	Herd
Scenic Parks																				
Bastrop	Bastrop	•		C	•	•			•				○	•					G · D	
Bentsen-Rio Grande Valley	Mission				•	•							○							
Brazos Island	Brownsville	○			Undeveloped Gulf Beach					○			○							
Caddo Lake	Karnack	•				•			•				○	○	○					
Davis Mountains	Ft. Davis	•			•	•			•									D		
Longhorn Cavern	Burnet			Daily Cavern Tours												Texas	Longhorn	Herd		
Monahans Sandhills	Monahans	○																		
Palmetto	Luling	○											○							
Palo Duro Canyon	Canyon	•			Summer Drama "TEXAS"											Texas	Longhorn	Herd	R · D	
Historic Parks																				
Ft. Griffin	Albany	○		P									○					Texas	Longhorn	Herd
Goliad	Goliad	•	•		•	•														
Gov. Hogg Shrine	Quitman																			
Indianola	Port Lavaca	○			Open Bay Beach								○	○						
Jim Hogg	Rusk																			
Lyndon B. Johnson	Stonewall				Texas Wildlife Exhibit								○							
Mission Tejas	Weches	•			•	•							○							
San Jacinto Battleground	Deer Park				*Battleship Texas								○							
Stephen F. Austin	San Felipe	•	•	S	•	•			•				○	•				G · T		
Vарner-Hogg Plantation	West Columbia																			
Washington-On-The-Brazos	Washington																			
Historic Sites																				
Acton	Granbury				Burial site of Davy Crockett's wife															
*Alamo	San Antonio																			
Eisenhower Birthplace	Denison																			
Fannin Battleground	Fannin																			
Ft. Lancaster	Ozona																			
Ft. Leaton	Presidio																			
Ft. McKavett	Ft. McKavett																			
Ft. Richardson	Jacksboro																			
Gen. Zaragoza Birthplace	Goliad				Monument Only															
Monument Hill	La Grange																			
Old Ft. Parker	Groesbeck																			
Port Isabel Lighthouse	Port Isabel																			
San Jose Mission	San Antonio																			

* Facilities Not Operated by Texas Parks and Wildlife Department
 ○ Permitted But No Facilities Provided
 ● Facilities or Services Provided for Activity

X - Open Shelters
 S - Screened Group Hall
 H - Group Hall
 C - Group Camp
 G - Golf

P - Group Picnic Shelter
 D - Scenic Drive
 T - Trailer Rentals
 R - Rental Horses
 B - Boats for Rent

Junior Sportsmen

by Suzanne Winckler



Leroy Williamson

ALLIGATORS are architects of the swamplands. While building and maintaining their dens and nests, alligators constantly re-work their surroundings. Like prehistoric bulldozers, they open trails and channels, dredge new ponds or keep existing ones fresh, and build banks which prevent erosion. They create islands of debris, humus, and rubble that provide nesting areas for many of the alligator's swamp companions — birds, turtles, and raccoons to name a few.

But many of his swamp neighbors who benefit from his meanderings are also a potential meal for the alligator. He eats almost anything from snails, frogs, fish, and turtles, to muskrats, small deer, and snakes — poisonous and nonpoisonous. These creatures must always be on guard. It is a way of life in the swamp to be on guard against the alligator,

even though he is helpful to them in other ways.

Don't confuse alligators with crocodiles or caimans. Can you tell the difference? All are members of the age-old crocodile family which dates back about 200 million years. The true American alligator, *Alligator mississippiensis*, is native across the southern United States from South Carolina to Texas. The American crocodile, *Crocodylus acutus*, is found only in extreme southern Florida and the Keys, the Greater Antilles, and from southern Mexico to Colombia and Ecuador. The spectacled caiman, *Caiman sclerops*, is native in southern Mexico to northern Brazil, but they are often sold as pets in this country.

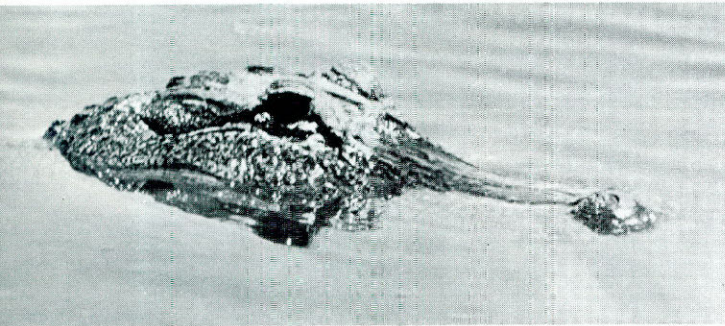
How does the alligator affect his environment? Size alone is an important factor. Anything that is eight feet long, weighs 150 pounds, and is built like a batter-

ing ram is bound to make changes in his terrain! In his everyday movements, the alligator cuts trails and channels in swamp vegetation. This serves to stop — or at least slow down — a pond from becoming a stagnant marsh.

Alligators vary in size and weight of course. At birth they are about eight inches long. They grow an average of a foot per year, and at maturity — the fifth or sixth year — they average about six feet long. Growth continues throughout life although this foot a-year rate slows down considerably. After maturity, males grow somewhat faster than females. As a result, alligator bulls (males) are generally larger than females.

The alligator cannot regulate his body temperature as humans can. He must rely on the sun, earth, and water for warmth. His reptile armor — as sturdy as it looks — requires dampness; there-

Photos by Reagan Bradshaw



Alligators change a swamp to create deep holes which hold water even during droughts, islands for birds and other animals to live on, and channels that allow the transfer of fresh water into areas that would become stagnant.



fore, the steamy, damp swamp is the perfect home for him. In summer he is active in his territory but with the arrival of winter, he slows his pace, tunnels into his den, and hibernates. Occasionally, on a mild sunny winter's day he will surface to sun himself. But he does not eat during the entire hibernation period from early October to late March.

Building and upkeep of the den have important effects on the swamp environment. The den is a tunnel dug into the bank of a swamp pool. The alligator moves earth with sharp-clawed feet, shovels material with his blunt snout, cuts through roots with his teeth, and sweeps aside dirt with powerful swipes of the tail. New mounds and embankments of earth are fertile grounds for vegetation. New nesting areas are created and soil erosion is lessened.

As he tunnels in, water from the pool seeps in behind his diggings. When completed, a good portion of his cranny is filled with water. To guarantee an air supply, he tunnels up a bit higher at the end so tidewater won't engulf his home and he may widen a small room. Also, he may dig small air holes to the surface. Alligators generally return year after year to their dens, each year making additions and rearrangements.

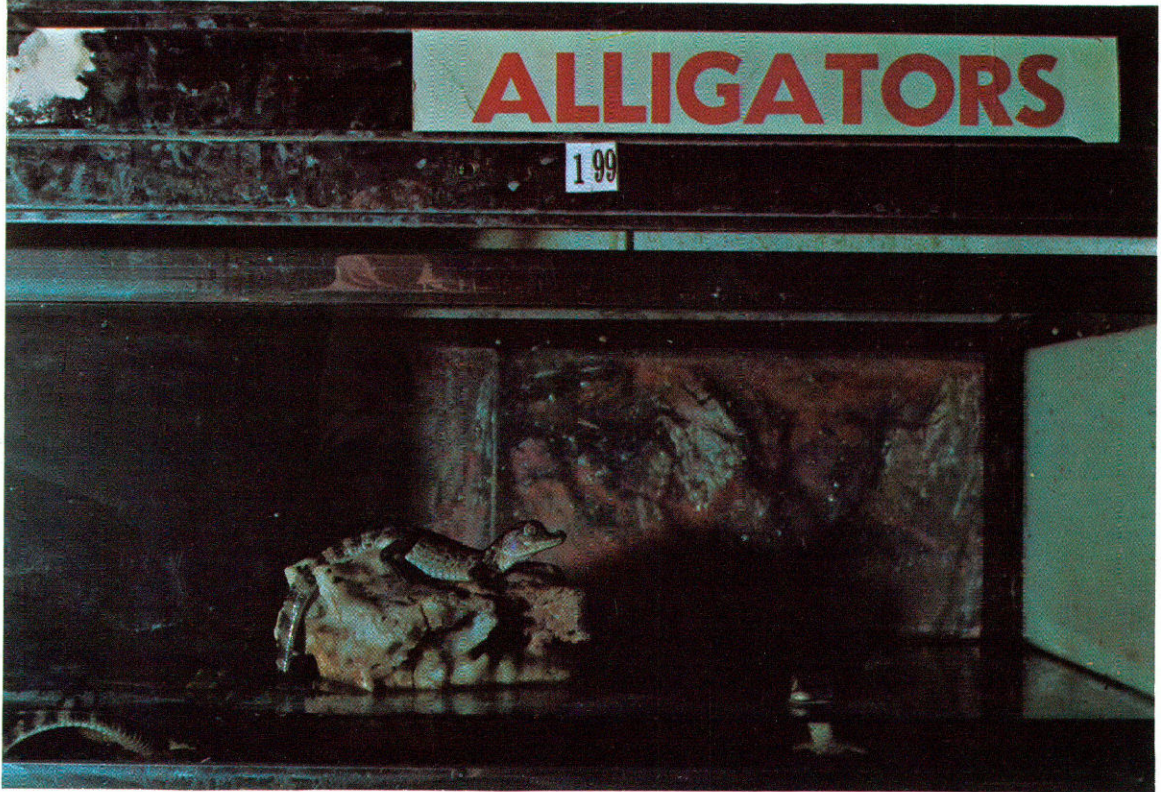
The den is useful to the community because it can harbor many water-oriented organisms — swamp plants, reptiles, amphibians, fish — during the warm summer months when pools and streams often shrink in size. If a drought ever hits or if the swamp is drained, the alligator's den is about the last refuge for these plants and creatures.

Another major construction by

the alligator is the nest mound which provides an island for other nesting species as well. When spring comes the alligator — who is generally a lone creature — begins seeking a mate. Males are noisy in their ramblings, bellowing and roaring to attract a female and to challenge other bulls in the territory.

About June, nest building begins. The female constructs a nest mound of grass, leaves, and reeds. She compresses it by crawling over it. In this mound — which is about four to seven feet in diameter and two to three feet high — she will bury her 30 to 80 eggs. Then she seals over the nest cavity with more vegetation and mud. The mound is like an incubator. The sun's heat and the swamp's moisture cause the vegetation in the mound to decay and become very warm.

Nine weeks pass before the



Sale of alligators is unlawful. Baby caimans such as these are often sold as alligators.

eggs hatch and during this time the mother guards her nest against swamp animals who are fond of alligator eggs—wild pigs, opossums, bears, and raccoons, for example. She can make a frightful hissing noise as she charges at egg-thieves.

The tiny alligators break out of their shells with the aid of a pick-like *carbuncle*, a hard knob on the end of the nose. Each baby hammers his way out all the while making a “umph, umph” noise. Mother alligator shoves aside the nest covering when she hears her babies. Almost immediately, they go with her into the water, swimming with ease. Until next mating season they stay near her for protection.

Baby alligators are a favorite prey of owls, raccoons, garfish, snapping turtles, and even larger bull alligators. As the reptile grows, many of these animals in turn become the alligator’s favorite food.

If an alligator grows to a length

of three or four feet, he has just about outgrown all his enemies — except man of course. Man has threatened the alligator in two ways. First, he has used alligator hide to make shoes, belts, and purses. But in Texas it is now illegal to catch, kill, buy, or sell an alligator for its hide. Second, man often alters the swamp — draining it for example — so he may use it. But when he does this, it will no longer provide the alligator with the proper food and privacy. As land is converted for human use, the alligator is left high and dry — and homeless.

Few Texans have seen alligators in the wild mainly because their swampy home is too messy and muddy for humans to visit. But perhaps you have seen an alligator in the zoo. Did you notice his built-in smile? Of course, it is very unscientific to say the alligator is happy because animals don’t have emotions or express feelings as we do. But one thing for sure — it’s hard to look

at the grinning reptile and not smile back!

Of course, alligators are well worth protecting for more than their smile. These rugged creatures are important to a healthy swamp environment, and in their activities of feeding, den building, and nest making, they are vital in the give and take among members of the community. **

Books and articles to tell you more about alligators:

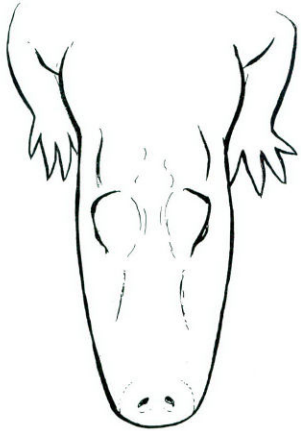
“Alligators, Dragons In Distress” by Archie Carr; *National Geographic Magazine*, Jan. 1967, page 133.

“The Alligator” by Patricia Caulfield; *Natural History*, Nov. 1966, page 52.

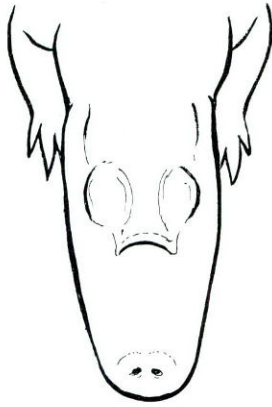
Animals in Danger by Frances and Dorothy Wood; Dodd, Mead, & Co., 1968.

Bayou Backwaters by Allan W. Eckert; Doubleday & Co., Inc., 1968.

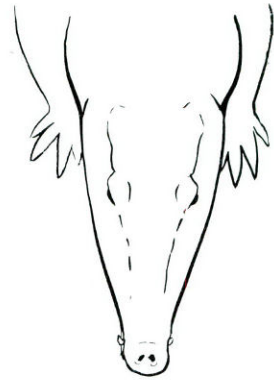
Black Jack by Robert M. McClung; William Morrow & Co., 1967.



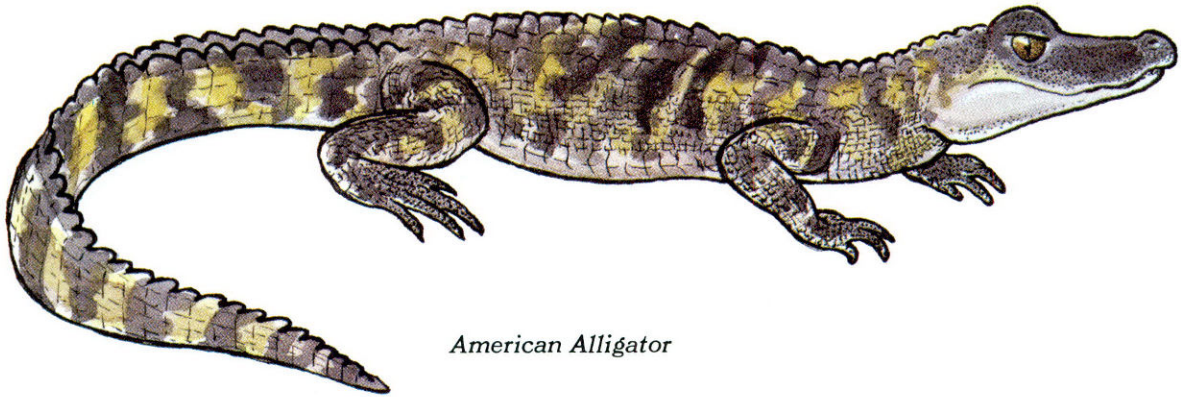
American Alligator



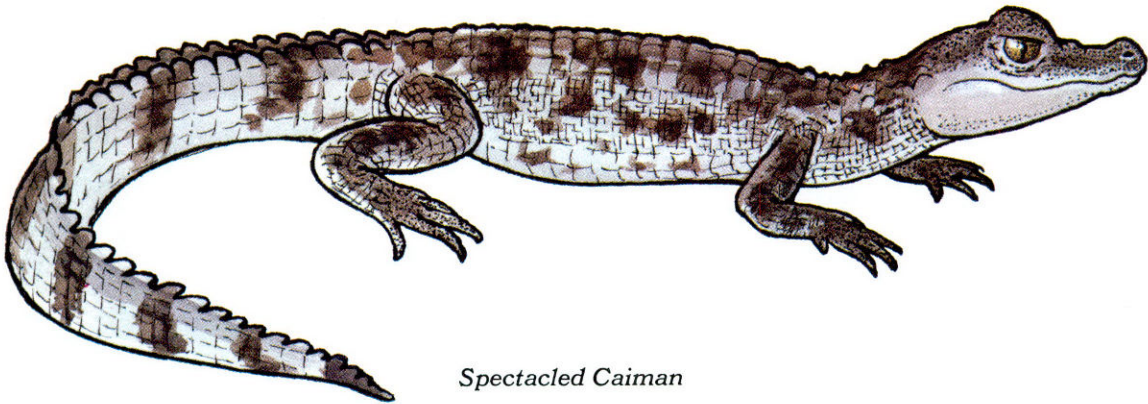
Spectacled Caiman



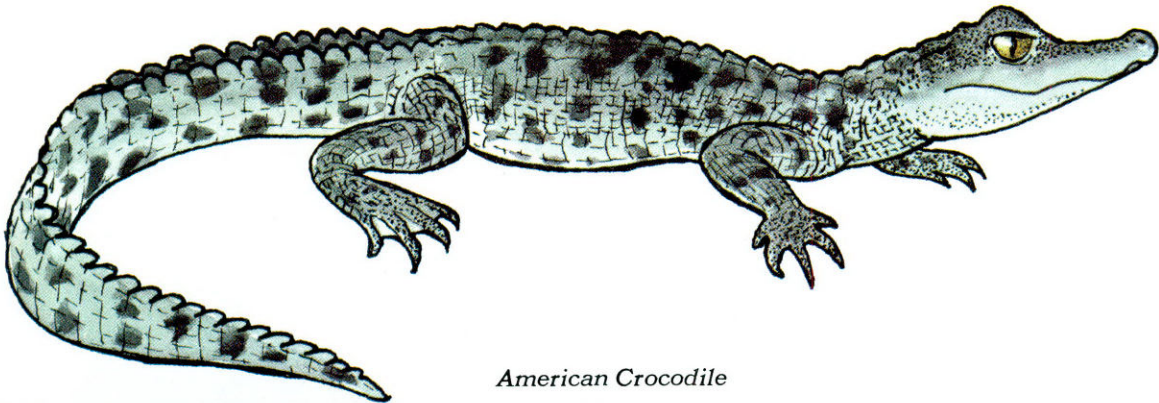
American Crocodile



American Alligator



Spectacled Caiman



American Crocodile

Letters to the Editor



Poison Ivy

Record Rattlers

One of my shipmates claims that rattlesnakes have been known to attain a length of over 10 feet. I disagree and believe it is more like seven feet. Our ship's library does not contain information to support either belief. Could you please help us as a small wager is resting on the outcome.

Jack Bush
San Francisco

The most recent information available indicates the largest rattlesnake on record was a 96-inch eastern diamondback, *Crotalus adamanteus*. The largest western diamondback, *Crotalus atrox*, usually believed to be the largest rattlesnake, was an 80-inch individual. Other species and the maximum lengths recorded are: canebrake, 74½; timber, 74; red diamondback, 65; western, 62; and black-tailed, 49½.

Okinawa Shrimp

Okinawa has a bait shrimp capable of living out of water for extended periods. Local fishermen keep shrimp in wicker baskets and dip the basket in water about once an hour to keep the shrimp alive all day. Bait stands sell live shrimp packaged in plastic bags without water. I have kept shrimp in

the bags for an hour and had none die.

I was never able to keep Texas bait shrimp alive, except in well aerated cool water. Have I just had bad luck with Texas shrimp, or is the Okinawa strain more hardy? If the Okinawa strain is more hardy, transplanting them to the Gulf Coast would be a boon to the bait stand operator and fisherman.

W W. Bradley
Okinawa

We are not familiar with "Okinawa" shrimp and can only speculate on the species of shrimp to which you are referring. There are many species of shrimp found throughout the world, each with somewhat different environmental requirements. The naturally occurring species found in a given area are normally more suitable for that locale. Japanese scientists working with shrimp in Florida have attempted to culture our native shrimp, *Penaeus* spp., and not the successfully cultured "Kuruma" prawn, *Penaeus japonicus*, of Japan. Incidentally, "Kuruma" shrimp are sold alive and normally are shipped in dry sawdust cooled with ice packed in plastic bags. These shrimp can be held in the sawdust for several hours, providing the temperature is low (54°F).

While it is true that the sensitizing oleoresin contained in the poison ivy plant may get under fingernails and be spread by scratching, the mere breaking of a skin blister and release of blister fluid in no way spreads the skin inflammation as suggested in your August 1969 issue. Aspiraton of this blister fluid into a needle and application to other parts of the body with no harmful effects has disproved this widely held misbelief that the blister fluid contains some of the plant poison.

Mike Sabom
Senior Medical Student
Galveston

Along with most people, we too have believed that the fluid contained in skin blisters due to poison ivy contained some of the plant "poison." Thanks to you, we can pass on to our readers that the "mere breaking of a skin blister and release of blister fluid in no way spreads the skin inflammation."

Ad Error

In some copies of the October issue of this magazine, the two advertisements appearing on page 22 placed by E. N. Dean Supply Co., 1515 Rogers St., San Antonio, were incorrect in that the photographs were switched. The gasoline-powered winch with the bar over the top should have appeared in the small ad on the left. Our apologies to all persons affected by this error.

— Editor

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BACK COVERS

Inside: Sea shells are one of nature's beauties that can be appreciated year-round. For more information on these coastal treasures see page six. Photo by John Suhrstedt.

Outside: Winter comes to some parts of Texas in the traditional form of ice and snow. One storm coated trees near Palo Duro Canyon State Scenic Park. Photo by Leroy Williamson.





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BRADWA
PAN AMEK
EDINBURG TE