

Nature's Tank, the Turtle

This Leisurely Armored Reptile Takes Everything
in Its Slow Stride but the Automobile

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ON a warm day in late spring, you are strolling along a narrow stream. Near the bank is a half-submerged log on which are scattered half a dozen dark, rounded knobs.

As you approach, these knobs detach themselves, slide into the water, and swim away. You have just disturbed a group of freshwater turtles basking in the sun.

Or you are weeding the tomato bed after a summer rain—and suddenly a lump of dirt at your feet rises and waddles off.

The muddy coating all but hides the yellow-and-black shell of a box turtle. You see his bright eye cocked at you before he disappears under the deeper foliage of your lettuce patch.

Again, you are cutting early roses when you notice a slight commotion in the loose soil near the roots. As you watch, a tiny clawed hand appears, and then another, waging a life-and-death struggle against the small pebbles and loam.

Finally a baby turtle lifts himself free of the encumbering earth, pauses a moment to blink at his first bright look at the day, then instinctively seeks cover under the nearest leaf or bit of bark.

In the Turtle's Grass-roots World

Except for such casual contacts as these, the one who wears his house on his back is not too well known to many of us. Let us, therefore, enter in imagination the world of the grass roots and observe a box turtle (page 676) for an entire day.

The morning has been cool, for it is early June, but as the sun rises higher the heat increases. Under a loose covering of oak leaves where she burrowed the night before, a female box turtle feels in her muscles the growing warmth of the climbing sun. Soon she is able to shoulder through the leaves to a sunlit spot.

Cold acts as a paralyzing agent on turtles and all other reptiles. Body heat of these "cold-blooded" creatures varies with that of their surroundings, instead of being regulated to stay at a fixed high temperature, as in mammals and birds. If you find a turtle early in the morning when the air is cool, you will notice that its skin is cold to the touch, its movements slow and lethargic.

After warming up a while in the sun,

Madame Turtle begins to think about lunch. She spies a few mushrooms and takes several nips.

A turtle has no teeth, so cannot chew. But the edges of the jaws are sharp and covered with heavy, horny tissue. The lower jaw fits closely inside the upper one. Their closing shears off a bite of food, which is then swallowed whole.

As our turtle pushes on through the leaves, she uncovers some earthworms and devours them greedily.

At a spring she takes a drink, for turtles are thirsty creatures. She wades right in, and, when partly submerged, stretches out her neck and slightly opens her mouth, letting the water pour in. The throat may be seen to expand and contract as the muscles carry the liquid into her stomach.

After drinking a few spoonfuls, the turtle heaves herself out of the water; she suddenly has something else on her mind. In some hazy cell of her slow-moving reptilian brain there may lurk a blurred memory of her somewhat less than tempestuous love affair of the past summer.

A handsome yellow male turtle with bright red eyes had met her feeding on a grassy hillside when the mating instinct was at its peak. At first he had merely followed her as she moved through the grass; then he had begun to make little bites at her neck and legs to stop her, putting his forefeet on her back.

After mating, the two had wandered apart. From the scene of her brief romance, she had resumed her hunt for food.

Spring Ends a Deathlike Sleep

All winter she had hibernated in the ground under a tree, having buried herself several inches deep in the soft leaf mold, well below the frost line. Respiration had almost ceased during her long sleep; her metabolism slowed nearly to a standstill, and for six months, while snow and ice covered the earth above her, she neither ate nor moved, and seemed as if dead.

The warm rains of April penetrated to her sleeping place, and one day when the sun had lain with particular warmth on her coverlet of leaves, she hoisted herself out of her trench.

During the winter hibernation, the eggs which she carried had barely continued to grow, but as she fed ravenously in these first



"On Your Mark, Get Set, Crawl!" Box Turtles Prepare to Race Off—in Any Direction

Owners from the Boys' Club of Washington, D. C., aware that pushing their entrants might make them retract, urge them onward by blowing. While hardly sprinters, shellbacks make gentle, interesting pets. They can be trained to run mazes, discriminate between black and white, and show up on time for dinner.

warm days of spring, they reached their full growth within her body. Now she suddenly feels the urge to rid herself of this burden.

After anxious searching, she finally selects an area between the long roots of an ash tree where she can easily dig and where the sun falls during part of each day.

Crouching and using only her hind feet, the turtle begins to push the soil away. She digs first with one foot and then with the other, turning the cup-shaped sole of the foot outward to push dirt from the hole.

It is a long task, demanding great patience, and dusk is falling before the hole is as deep as the turtle's hind legs can reach—about two inches.

Fertile Turtle Lays Her Eggs

Finally the expulsion of the eggs begins. One by one they are dropped into the cavity, at intervals of several minutes. After each egg falls, one of the hind feet feels for it and pushes it forward in the hole to leave room for those to follow.

When all have been laid—seven, because this is a large, well-grown female who produces nearly the maximum number—she reverses the action of the hind legs and fills the

hole, packing the dirt securely over the eggs.

All this has been done by touch alone, for the turtle has not looked at her eggs or nest. Now, however, she rises as if to inspect her work. She tramples over the nest several times to obliterate its outlines. Then she walks away, her maternal duties ended.

The eggs are at the mercy of any marauder. Skunks, dogs, bears, and raccoons are especially adept at digging up and eating them.

If the mother lays her eggs late in the summer and does not dig deep enough, the ice of winter may kill the developing embryos. But since this particular clutch of eggs was laid in the spring, the young turtles are due to hatch before the cold weather arrives.

The period of incubation for turtle eggs depends upon the temperature. Usually eggs laid in early June hatch by mid-September if the weather remains warm. But a late spring or an early fall may not give the eggs sufficiently prolonged heat for complete development; then they may remain in the ground all winter, the young emerging in the warm days of the following spring.

A box turtle's egg is elliptical, white, about one and a quarter inches long by three-quarters of an inch in diameter, with a tough, leath-

ery shell which can be dented but not torn easily when recently laid. As incubation proceeds, the egg rapidly absorbs water. The shell is distended and finally ruptured by this rapid water absorption, aided by the young turtle's kicking legs.

Growing stronger with its birth struggles, the turtle uses the sharp claws on its forefeet to widen the hole in its prison wall.

A Beady-eyed Baby Meets the World

Now comes the greatest struggle of all. The tiny, newly hatched creature, weighing only a fraction of an ounce, must force its way upward through several inches of close-packed soil and drifting leaves.

Let us assume that the struggle is successful. A fine beady-eyed baby turtle as large around as a 25-cent piece emerges.

The youngster pushes his way manfully over straws and sticks to a quiet hiding place under a piece of bark, where he can accustom himself to this big new world of his. There he stays for several days, until the egg yolk stored as food in his little body is exhausted and the soft suture on his lower shell, through which the yolk once nourished him, is hardened (page 670).

The first food of this young box turtle and his brothers and sisters probably will be small earthworms. As the youngsters grow, they may sample a fallen blackberry, a slug, a piece of green clover, a toadstool, or even a dead field mouse, for box turtles are practically omnivorous.

Instinct tells the young turtles that in turn they would make a good meal for almost any carnivorous animal. Accordingly, they hide all during their early life; seldom can they be found without very careful searching in the underbrush.

By the end of five years, the turtle has a shell length of about five inches and is mature. By this time he has become relatively fearless because of the strong fortress provided by his shell.

The box turtle's lower shell is hinged across the center and has powerful closing muscles fore and aft. When its owner is attacked by some hungry animal, he can draw his head, arms, and legs completely inside, close the lower part tightly against the upper shell, and withstand siege until the attacker tires.

During strawberry time, the turtle gorges on fresh fruit and often becomes so fat that he cannot completely close his shell, no matter how much you may tickle him. If a wolf had him, instead of a friendly human, he might pay for his greediness with his life.

The shell of the box turtle and certain other Temperate Zone species serves also as a record of growth, at least in early years.

When box turtles are hatched, each has 13 squarish plates arranged in three rows on the upper shell, or carapace, bordered by 25 smaller marginal ones. Growth takes place around the edges of these plates.

The cessation of growth caused by winter's hibernation is marked around every plate by an encircling depression. Counting the deepest "rings," or channels of growth, from the center to the margin of any scale, gives the turtle's age.

Occasionally in summers of severe drought, turtles are forced to estivate—bury themselves in the mud at the bottom of a pond or ditch until the welcome rains come again. If the drought lasts long, the turtle fasts, growth stops, and a ring is formed on the scales of the shell.

The summer ring is seldom as deep as the winter one, however, since the drought-forced resting period is usually much shorter than the all-winter hibernation.

Growth takes place also on the margins of the lower shell, or plastron, but since these markings become worn by the turtle's travels, the rings seldom are complete there.

Turtles continue to grow after reaching maturity, although at a slower rate.

As a result of crawling under things, a very old turtle is often worn as smooth above as below; so its age can only be guessed. Eighty years is believed to be a ripe old age for a box turtle, although some authorities think they may exceed the century mark!

Lunch at the Cafeteria

Box turtles have a well-established itinerary over the few acres they select for their home. This has been ingeniously demonstrated by attaching a spool of thread to the turtle's back with a little harness, fastening the free end of the thread, and following the trail as it unwinds.

Captive box turtles soon learn a feeding routine. I once kept pet turtles in an enclosed court in the United States National Museum at Washington, D. C., feeding them fruit, tomatoes, and bread every noon. Although the natural plant growth of the grassy enclosure provided adequate food, it was not long before they were waiting for me at lunchtime near the flat stone where I spread their tidbits.

If I happened to be a few minutes early, I could see my turtles coming to the picnic through the grass from all directions. One can imagine their philosophic resignation on Sundays when the office was closed and no lunch appeared!

Box turtles are accustomed to climbing over rocky or uneven ground, and so have learned to avoid tumbles. If you place one on a table top, it will walk to the edge but will not go



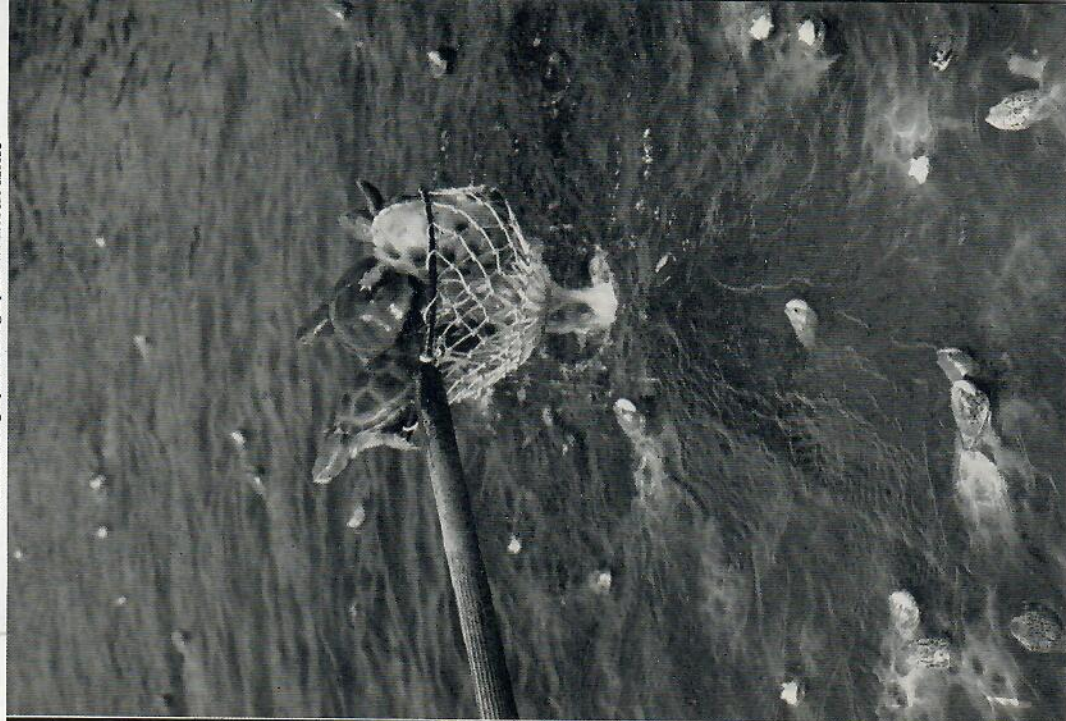
Diamondback Terrapins Fatten in Pens for Nine Years. Stew Made from Their Meat May Sell at \$3.50 an Eight-ounce Bowl

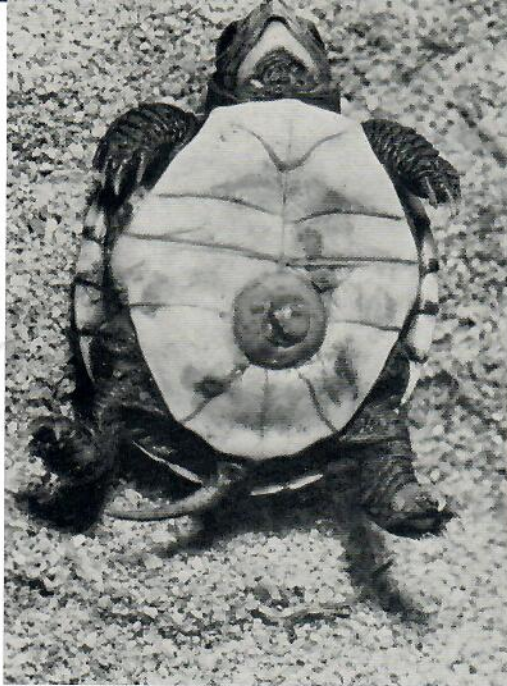
Once a common food, terrapin now is reserved for well-heeled owners of cultured palates. At Crisfield, Maryland, expecting lunch, hundreds of turtles swim toward the net, only to be dipped up and sold at \$2 to \$4 apiece. Lower left: Diamondbacks at Beaufort, North Carolina, waddle ashore for a handout (page 672).

National Geographic Photographer J. Baylor Roberts

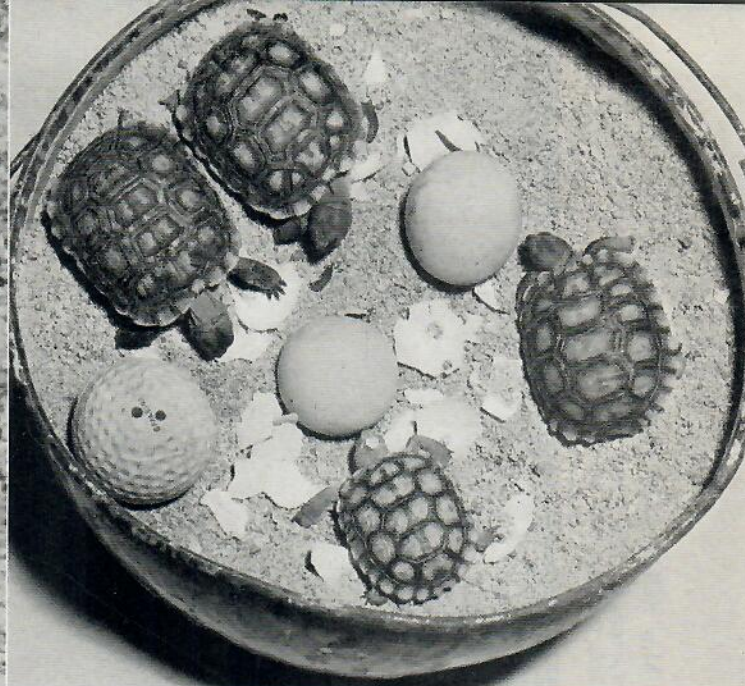
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National Geographic Photographer W. Robert Moore





Three Lions



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Littlefield Photo

Baby Turtles Face the World Complete with Rations for Several Days

The ventral sac on the lower shell (left) nourished the box turtle in the egg, but will harden as the youngster forages (page 667). Mother turtles lose interest in offspring after laying eggs. Galápagos tortoises in the pan hatched in 86 to 157 days from eggs slightly smaller than a golf ball (page 683).

over. A water turtle, on the other hand, will launch itself from the edge without hesitation, being used to sliding off a mud bank into the soft buoyancy of water.

Although turtles have no external ears, they "hear" by feeling even the slightest vibrations through ground or water. Their sight is so good that it is hard to approach one without being seen. They have some sense of smell and taste, but further experiment is needed to gauge the precise extent.

A question frequently asked is whether "turtle," "tortoise," and "terrapin" mean the same thing. The answer is that it depends upon where you are.

In the United States it is correct to call any turtle a turtle, but we often refer to the edible fresh-water kinds sold in markets as "terrapin," while the land turtle with stump-shaped hind legs may be called a "tortoise." British usage differs somewhat.

Scientists have given each one of the more than 300 living kinds of turtles its own scientific name. The common box turtle, for example, is *Terrapene carolina*.

Pet stores stock the young of many of our commoner pond turtles and sell them for aquariums. A healthy turtle will soon accept food from its owner's fingers. A varied diet, including small pieces of raw meat and fish, earthworms, insects, water plants, vegetables, and fruits, should be provided.

Holding a morsel in its jaws, the turtle uses the claws of its front feet to tear off a piece small enough to swallow. Most aquatic turtles prefer to feed under water.

The turtle's home may be a deep pan, a tub, or a glass-sided aquarium. The main requirement is two or three inches of water with a sandy island or a smooth sloping rock onto which the turtle may climb.

Turtles Need Their Cod-liver Oil

A daily drop of cod-liver oil in the food, or dropped directly into the mouth, helps to prevent the vitamin deficiency which often afflicts a captive turtle in winter. Its symptoms are swelling eyelids, softening of the shell, and lack of interest in food. Bathing the eyes daily with boric acid reduces swelling.

In combating this deficiency disease, it is helpful to keep the turtle on dry soil most of the time, with a few short swims during the day, and to provide sunbaths, being careful to offer shelter in case he gets too much sun.

Some pet dealers smear the shell of the baby turtle with bright enamel and often paint it with flowers! This means deformity or death to the turtle unless the paint is removed, since the shell cannot grow. The paint should be chipped off or softened and rubbed away with nail-polish remover.

Of the box turtles, the Florida type (*Terrapene bauri*) has a higher and narrower shell than the common variety (pages 676 and 677). Its black shell has a handsome starlike pattern of yellow lines radiating from the center of each scale. It is found wild in peninsular Florida and seems to prefer being near the water.

Blanding's turtle (*Emys blandingii*) is grouped with the box turtles because of its



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Carl M. Mydans

A Sheep Dog Would Think Twice Before Barking at This Box Turtle's Ancestors

Archelon, a three-ton marine turtle of the Cretaceous period, swam seas that covered Kansas. More recently (about a million years ago), *Colossochelys atlas*, a turtle three feet tall, roamed the Siwalik Range of northern India. Box turtles are common throughout the eastern and central United States.

similarly hinged lower shell. Its upper jaw is deeply notched and its shell is flattened, whereas the box turtles have hooked beaks and highly arched, domelike shells.

The Blanding's lives in ponds and marshes in the north-central States, east to Ontario, Ohio, and northwestern Pennsylvania. Although timid when first taken, it readily adjusts to captivity. It is one of the least aggressive of turtles and seldom bites, even when teased.

One of our handsomest species is Troost's turtle (*Pseudemys troostii*) from the upper Cumberland and Tennessee Rivers. The side of the head and neck bears a bright-red streak flanked by black and yellow lines (page 675).

The young Troost's shell is greenish; the adult's is much darker—deep brown, almost without shell pattern in the male, light brownish-gray with a yellowish bar in the center of each scale in the female. The red mark on the neck remains throughout life.

Nose-tickling Courtship

When they are about seven inches long, Troost's turtles are mature enough to breed. Their courtship is most interesting. The male swims in front of the female and vibrates the long nails on his forelimbs against her nose or chin for a second or two. He repeats this stroking action at short intervals.

Although the female appears disdainful of these antics, they eventually break down her resistance and mating takes place.

Since water turtles shed the outer layer of the shell as they grow, there is no definite

way of telling the age of wild-caught adults.

The best clue to telling the sexes apart is the fact that male water turtles have a longer tail and, in most species, proportionately longer fingernails than the female.

The Florida turtle (*Pseudemys floridana*) is a larger and less colorful edition of the Troost's. It reaches a total length of 11 inches and has black and yellow lines on the neck. It abounds in lakes, rivers, large swamps, and streams from North Carolina and Florida to Mississippi.

Bears, raccoons, and many other animals, including man himself, dig in the sandy banks where these turtles lay their eggs. King snakes, too, devour them.

The red-bellied turtle (*Pseudemys rubriventris*) is still larger than the Florida species; a shell length of 18 inches has been reported. Instead of being yellow, as in Troost's and Florida turtles, the lower shell of this species has a reddish hue; hence its common name (page 675).

Today the red-bellied ranges along the Atlantic Coastal Plain from northern North Carolina to central New Jersey. A century ago it was found also in southeastern New York and along the Delaware River to Trenton, but its use for food caused its extermination in that part of its original range. Remains found in shell heaps near many pre-Columbian village sites show that this and other large turtles long were used as food by Indians.

Another pet-store favorite is the yellow-bellied turtle (*Pseudemys scripta*), native from

Virginia to northern Florida and southeastern Alabama (page 675).

Although somewhat like the young Troost's turtle, this handsome fellow has a wide yellow patch behind the eye and lacks the red color on the neck, which is striped with yellow and black. The adult has a shell nearly eleven inches long and may weigh eight and a half pounds.

The omnivorous appetite of the yellow-bellied makes it easy to keep as a pet. It seems to be a scavenger, for it is one of the few turtles which have increased in number in spite of pollution of rivers by sewage.

The most widely distributed turtles in the United States are the painted turtles of the genus *Chrysemys*; one or another of the four recognized varieties is known in practically every State east of the Rocky Mountains.

The western painted turtle (*Chrysemys bellii bellii*) is the largest member of its group; on record is one with a carapace nearly ten inches long. The margins of its lustrous blue-black shell are handsomely marked with red and yellow concentric rings.

The western painted is known to have lived more than ten years in captivity. Usually it will accept food from one's hands, but prefers to swallow it under water.

For the eastern painted turtle (*Chrysemys picta picta*) seven inches seems to be the maximum shell length (opposite page). It inhabits the Atlantic Coastal Plain from Long Island, New York, to Jacksonville, Florida, and can endure the brackish tidal water in marshes near the ocean.

The central painted turtle (*Chrysemys bellii marginata*) also makes a long-lived pet (page 675). It readily accepts meal worms, earthworms, raw fish, and meat, as well as tender vegetables, if placed in the water beside it.

Smallest of the four is the southern painted turtle (*Chrysemys picta dorsalis*).

The Diamondback a Delicacy

Diamondback turtles (genus *Malaclemys*) dwell along our coasts from Massachusetts to Texas and are economically important, as well as being among our handsomest species. The upper shell is deeply etched by growth rings and has a central keel running down the back. The shell resembles fine carving.

Because the adult's flesh is a highly esteemed delicacy, turtle hatcheries were established early in this century near Chesapeake Bay, and later at Beaufort, North Carolina (pages 668 and 669). Turtles of breeding size are kept in pens until eggs are laid—seven to 23 in a clutch, averaging around twelve per female. Eggs are then transferred to hatching boxes until the young emerge.

Newly hatched young are just over an inch long and light olive to dark brown in color, with black concentric lines within the scales. Often their wide upper "lip"—the margin of the upper jaw—is paler than the rest of the head, giving them a clownish look.

Winter-fed young in captivity grow during the time when they would normally hibernate and accordingly are bigger and more vigorous than those that sleep the winter away.

Females are ready to breed when they reach a length of five and a half inches, usually at the age of five, but often much later.

The maximum size of the Carolina variety is slightly over seven inches. Since the males seldom exceed five inches, they are of little commercial importance.

The northern diamondback (*Malaclemys centrata concentrica*) inhabits the Atlantic coast from Cape Cod to Cape Hatteras (opposite page). There it intergrades with the closely related southern form.

Lazy Turtles Sun in Layers

The common map turtle (*Graptemys geographica*) is known all the way from the St. Lawrence River and the southern shores of the Great Lakes down the Mississippi Valley to Missouri, Kentucky, and Arkansas (opposite page). Shell markings like map contour lines account for its name. It is exceedingly wary, and takes quickly to the deepest part of the stream if alarmed.

On sunny days hordes of these turtles may be seen sunning themselves on rock ledges, mud banks, or logs. Sometimes they pile up two or three deep, the lowest layer apparently not objecting to being crawled over.

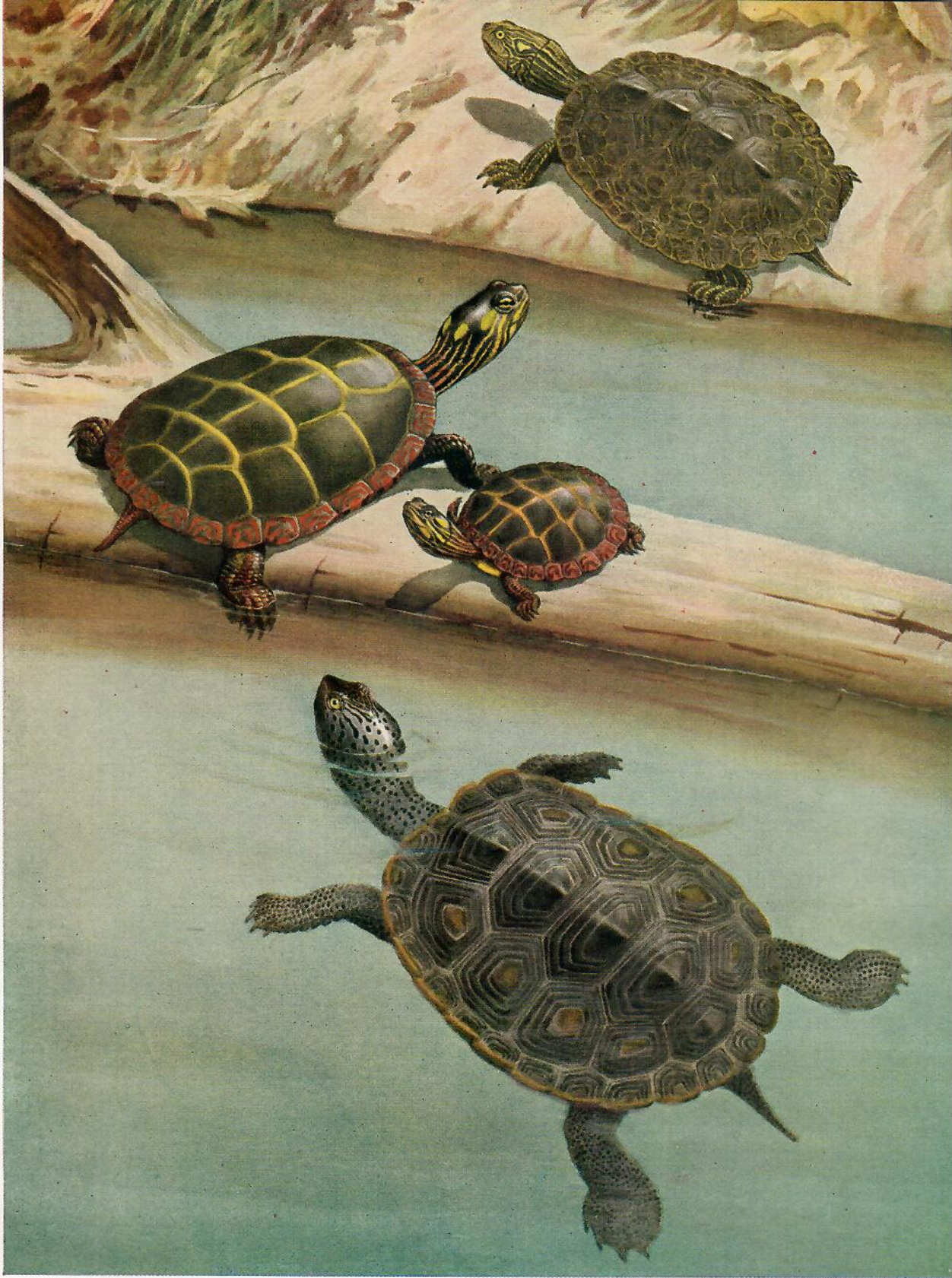
A map turtle at rest is one of the laziest sights imaginable. Its hind feet stick out straight backward, and the forefeet are equally relaxed in front, one of them sometimes pilloving the heavy head.

In addition to a sharp cutting edge, the jaws of map turtles are provided with wide crushing surfaces, so that adults can get at the soft parts of large mollusks such as clams. Crayfish and aquatic insects are also devoured.

The Mississippi map turtle (*Graptemys pseudogeographica*) is another of the clown-faced turtles. Here, however, the decoration is a sinuous yellow half-circle on the side of the head behind the eye, plus numerous wavy light markings on jaw and neck (page 675).

The central scales of the upper shell are curiously keeled and pointed posteriorly, while the marginal shields suggest the fluted carvings of some oriental master. Ten inches seems to be the maximum length attained by adult females. Weight runs up to four pounds.

In northern Illinois this turtle's favorite places for hibernation are muskrat houses.



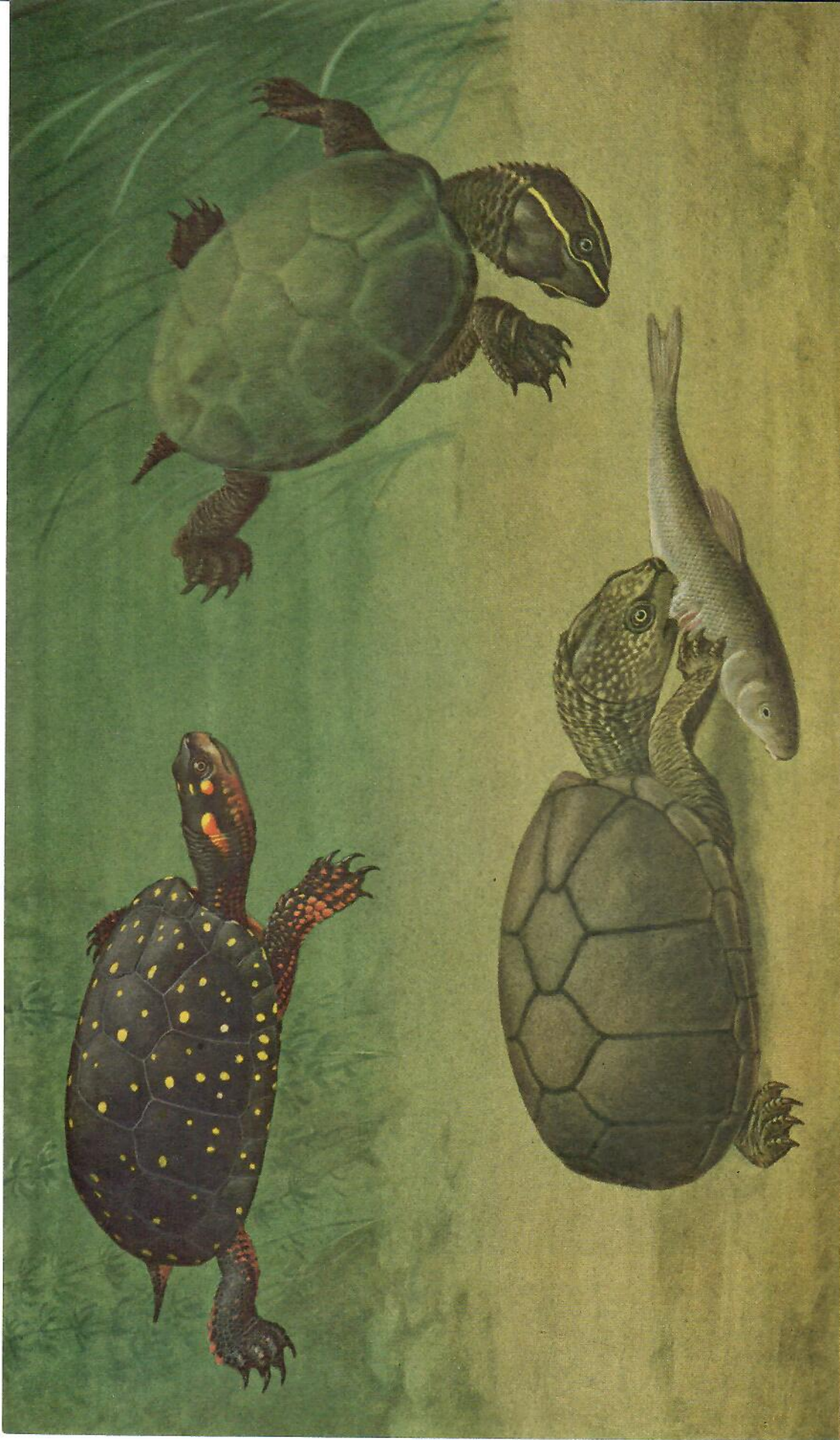
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Painting by Walter A. Weber

Eastern Painted Turtles, Ready to Dive Out of Danger, Use a Log as Their Solarium

Map Turtle climbs the bank and **Northern Diamondback** peers from the river. Turtles never scuffle over a place in the sun, but often pile up three or four deep. Northern Diamondback ranges from Cape Cod to Cape Hatteras, **Eastern Painted** from Long Island to Florida, the Map from Great Lakes to Missouri.



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Because Their Blood Absorbs Oxygen Very Slowly, Turtles Can Stay Submerged for Hours on a Lungful of Air

Spotted and Musk Turtles drop down to grab a morsel from the chub snatched by the **Mud Turtle**. Frequenting sluggish streams and ditches of the eastern United States, these turtles prey also on worms, insects, mollusks, crayfish, and tadpoles. Hard, sharp-edged jaws shear off food, which is swallowed whole.

Turtles Listen Without External Ears; Sensitive Skins Catch Vibrations from Water or Ground. All Five Are Common in Pet Shops
Young Yellow-bellied (left) and Central Painted Turtles share lily pads. Baby Red-bellied, Troost's, and Mississippi Map Turtles perch on rocks.

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A Wood Turtle (Center) and a Blanding's Arrive Uninvited to Share a Box Turtle's Strawberry Dinner

When hibernating, these eastern and midwestern reptiles spend the winter without food. If ground is moist enough to keep skins comfortable, they can fast a year or more.

Deserts Hold Water for Those Who Know Where to Look. Florida Box Turtles (Left) Get Theirs from Prickly Pears
Gopher Tortoise (right) hunts for fruit and succulent plants by day and retreats at night into a sandy burrow fifteen to twenty feet long.

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Alligator Snapper's Pale Tongue, Moving Like an Earthworm on a Hook, Presumably Lures Fish Within Snatching Distance
Ferocious Spiny Soft-shell (left) and Common Snapper can slice off a man's finger or seize a duck by the feet and drag it to the bottom. Never straying far from fresh-water ponds, they make sharp inroads on fish population. Snappers will lunge at almost anything that moves, including turtles of other species.

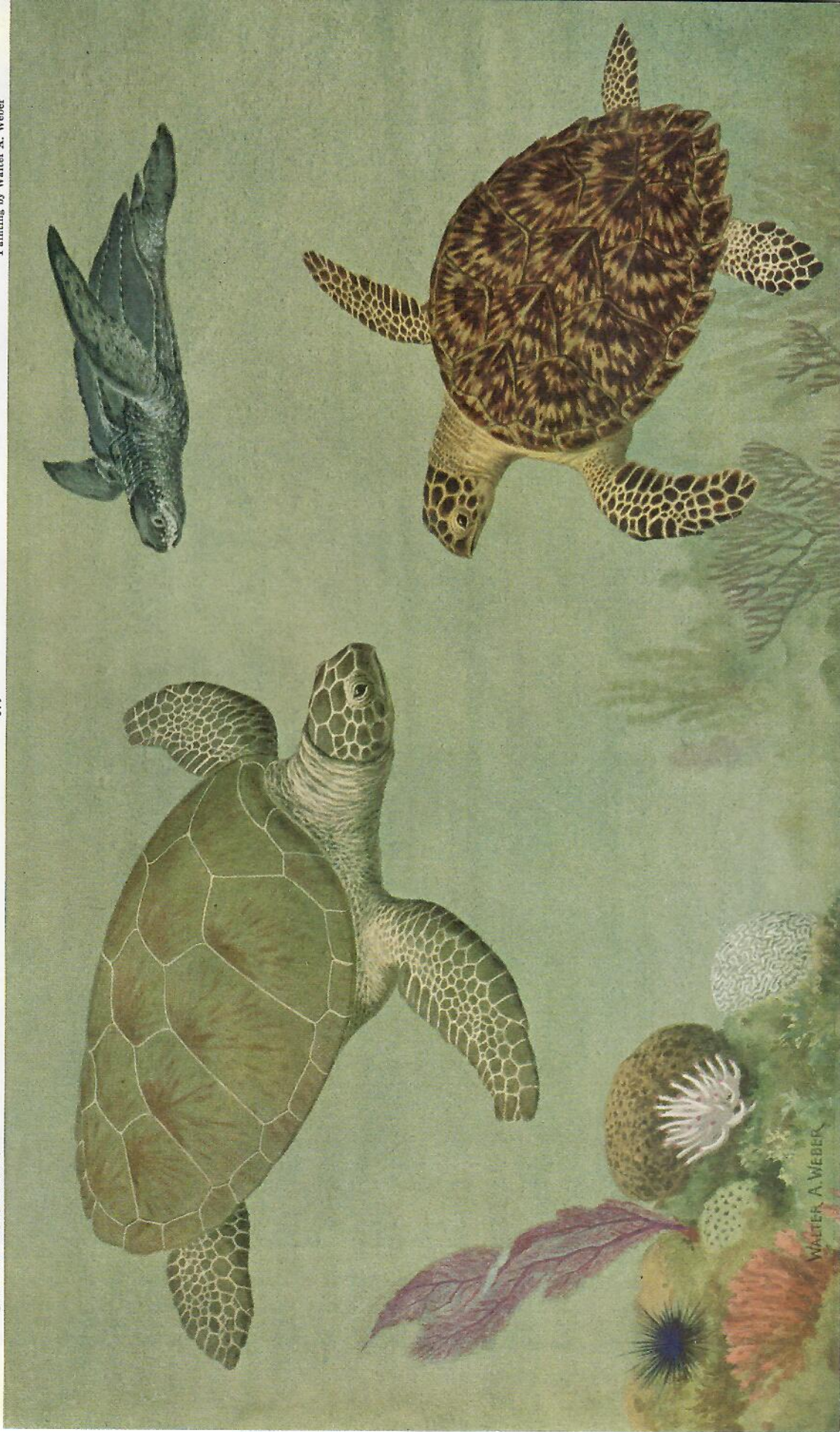
Marine Turtles Keep a Wary Eye for Sharks. They Need Size to Survive in Their Predatory World

Largest of these tropical reptiles is the 1,500-pound **Leatherback** (upper right). Prized for its flesh is the **Green** (left); for its shell, the **Hawksbill**.

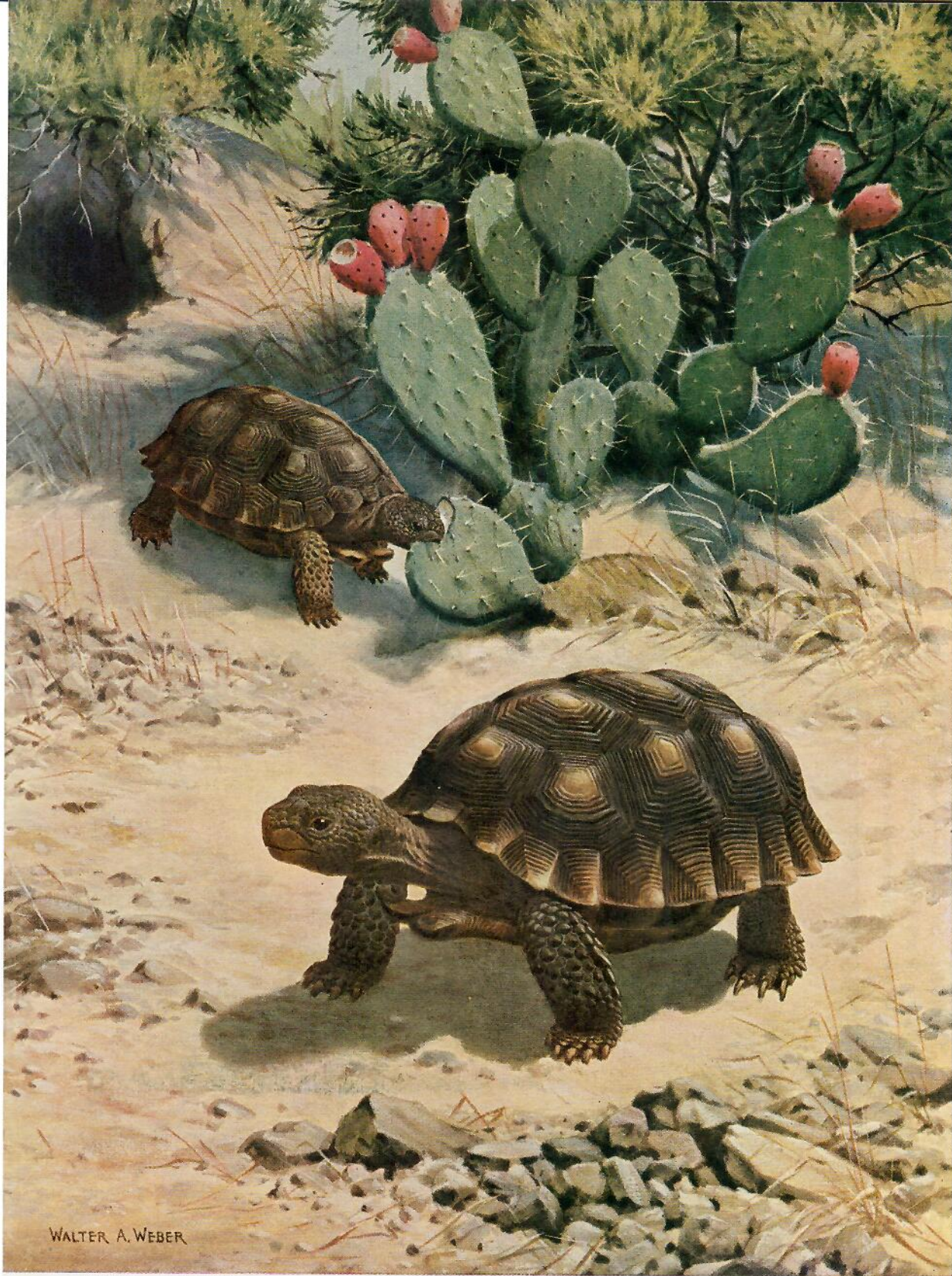
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Sensible Desert Tortoises Venture Out in Midday Sun Only on Mild Days

Reptiles, unable to regulate their blood heat, cannot endure high temperatures tolerated by mammals. These fellows usually forage in early mornings, late afternoons, and after showers. With head retracted and heavy scales overlapping its partially withdrawn arms and legs, **Desert Tortoise** is virtually invulnerable to all animals but man.

Its food habits undergo a great change during growth. Newly hatched young are mostly carnivorous, feeding on small snails, insect larvae, and worms. The adult is chiefly herbivorous, dining on the roots, stems, and leaves of aquatic plants, with an occasional crayfish or other nonvegetarian delicacy.

Among the commonest of turtles found east of the Mississippi is the musk turtle (*Sternotherus odoratus*), which ranges as far north as southeastern Canada (page 674). Dwelling in muddy ditches, streams, and lakes, the musk turtle crawls over the mud, hunting worms, insects, mollusks, crayfish, minnows, and tadpoles. It is scarcely over five inches long and weighs barely half a pound.

The lower shell is small compared with that of most water turtles, leaving much more of the bases of arms and legs exposed. Perhaps this turtle's bad temper and readiness to bite compensate for its lack of bony protection. Its life expectancy as a pet is good, one having lived 23 years in captivity.

Nesting habits of the musk are more irregular than those of most other turtles. Sometimes the eggs are laid on the bare ground and left uncovered; often they are deposited under a log or on top of a stump. A single female lays two to seven eggs, but many more are often found close together, for these turtles tend to be gregarious at nesting time.

The baby musk turtle looks like a mechanical toy as it kicks with its tiny feet, trying to escape from your fingers. Its shell, high and ridged, is minutely and delicately formed, though never brightly colored. As growth progresses, the shell flattens and widens, losing its miniature beauty.

His Name Is Mud

The common mud turtle (*Kinosternon subrubrum*) is related to the musk, but is usually less aggressive. Where their ranges overlap, they are frequently found together in the same pond (page 674).

The mud turtle is found from Connecticut along the coastal plain to Florida and inland; close relatives live in Alabama, all the Gulf States, and north to Missouri.

Mud turtle hatchlings are brown, attractively spotted with yellow on the neck and along the sides of the shell. As pets they readily accept earthworms and finely chopped meat. Very alert, they swim about the aquarium as if propelled by a wound-up spring. They live a long time in captivity—38 years in one instance.

A full-grown mud turtle measures only a trifle over four inches in length. The lower shell, or plastron, is much wider than that of the musk turtle and protects the soft parts of the body much better.

Both mud and musk turtles have hinged plastrons, which enable them to close the shell partially, somewhat in the manner of the box turtle (page 667).

Food preferences of the mud turtle in the wild state have scarcely been investigated, while its reproductive habits are known from only a few scattered observations. Its musky odor prevents its use as food by human beings.

The spotted turtle (*Clemmys guttata*), very common in the eastern United States and readily found in sluggish streams, bogs, and ditches, likewise needs study, especially as to its hibernating habits in different regions (page 674). Thus far the earliest record for its appearance is March 2, in southeastern New York State, and it apparently remains active until November.

It is surprising to note how many descriptions of some of our commonest reptiles conclude with the words, "Nothing is known about its habits." Turtle study could well become a project for amateur biology students of all ages.

Voice of the Turtle

The wood turtle (*Clemmys insculpta*) roams woods, fields, and swamps from Maine to West Virginia (page 676). Though it eats almost anything, it prefers berries, fallen fruit, tender plants, and mushrooms. It makes an intelligent pet and is surprisingly agile; it can climb out of a shallow box with ease.

Although the voices of most turtles are at most a slight squeak or sigh, the wood turtle makes a whistling call audible thirty or forty feet away.

The part of our country lying west of the Rocky Mountains is much less rich in turtle species than the central and eastern parts. The Pacific pond turtle (*Clemmys marmorata*), found from southern California to Oregon, is the only fresh-water turtle native to our west coast. In spite of extensive trapping for its delicious meat, this species remains fairly abundant.

The desert tortoise (*Gopherus agassizii*) lives in the desert regions of southeastern California and in parts of Nevada, Utah, Arizona, and northern Mexico. Its thick shell and the heavy overlapping scales on the outer side of its arms and legs make it almost impervious to attack (opposite page).

The upper shell of a large male is about thirteen inches long, nearly hemispherical in shape, and sculptured attractively with growth channels paralleling the outlines of each scale.

Like the box turtle, the desert tortoise displays a great deal of "sense" in captivity. He soon learns to get his food in a certain



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National Geographic Photographer Howell Walker

Green Turtle, Caught off Australia, Promises a Feast

Its Arnhem Land captor grins at the prospect of steaks. Aiming from a dugout, the hunter hurls himself and roped harpoon at the target. As the reptile dives with barb in neck or shell, the harpooner clammers back into his boat. The turtle tows the canoe until exhausted, then is hauled aboard.

place, if it is put there each day. One I kept in my office had a definite itinerary, followed nearly every day during warm weather.

A Busy Day at the Office

In the early morning he was usually found in a corner between the file case and the wall. About 10 o'clock he took a stroll and ended up under a kneehole desk.

Lunchtime found my office tortoise waiting at a piece of oilcloth on which I served his cantaloupe and lettuce. About 3 o'clock he again patrolled my two office rooms from end to end a few times, and by closing time he had gone early to bed in his corner next to the filing case.

He enjoyed having his neck scratched, and when I filled a large bowl of water and put him in it to drink, he guzzled happily for half an hour at a time.

As winter approached, he became more sluggish and appeared to want to hibernate. He was put into a wooden tub partly filled with sandy soil and soon burrowed into it.

I kept this tub in the coolest corner of my office, and there the desert tortoise slept until spring. Then he emerged from his sandy

blanket, a little dusty, but as lively as ever, and quite ready to eat his breakfast.

A close relative of the desert tortoise is the gopher tortoise (*Gopherus polyphemus*), found from southwestern South Carolina to central Florida and westward to Texas (page 677).

A shell length of 12 inches and a weight of 10 pounds are considered the maximum for this turtle. It burrows into sandy soil, often for fifteen or twenty feet, returning each night to its own tunnel after having spent the day foraging for fruit and succulent plants.

Razor-jawed Soft-shells and Snappers

Of all North American fresh-water turtles, the soft-shelled and the snapping turtles are the only truly ferocious ones.

The soft-shells (genus *Amyda*) have flattened, scaleless shells, the margins of which are leathery and soft, hence the popular name. They seldom go far from water voluntarily, except when the female pulls herself out on a sandbank, perhaps in mid-stream, to deposit her eggs.

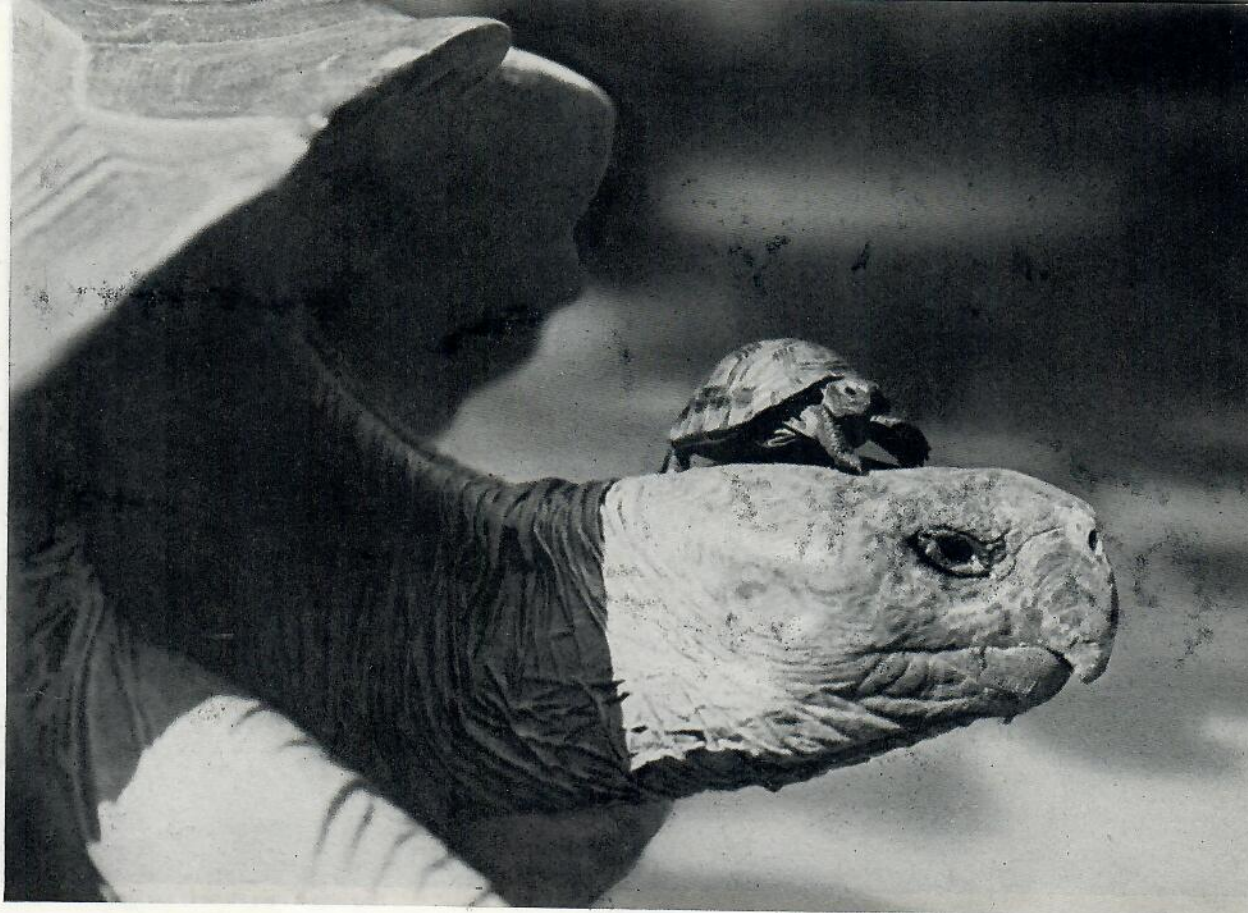
The soft-shell's snout ends in a piglike nose with valvular nostrils which close when it submerges. It can stay under water for several hours, being specially adapted to obtain oxygen from water through the lining of the pharynx.

With its razor-sharp jaws, the soft-shell wreaks havoc among fish. It also catches frogs, crayfish, snails, and mussels, and bites courageously at human beings who may attempt to capture it.

The large northern soft-shell (*Amyda ferox*) may have a shell more than 18 inches long and weigh over 34 pounds.

The spiny soft-shell (*Amyda spinifera*) is smaller, with a shell length not exceeding 14 inches (page 678). It is very agile both in swimming and in climbing steep banks to its nesting site above the water line; there it lays from 12 to 25 eggs, usually in June or July.

The common snapping turtle (*Chelydra serpentina*) and its big relative, the alligator snapper (*Macrochelys temminckii*), are even more destructive (page 678). Adept at catch-



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Herbert Photos, Inc.

Like Oaks from Acorns, Galápagos Giants from Little Tortoises Grow

The year-old tortoise, weighing $3\frac{3}{4}$ ounces, may in time rival his mount's 350 pounds. On the arid Galápagos Islands these turtles store scant rainfall in neck sacs. Tapping the four-legged canteens and then eating their flesh has saved shipwrecked or marooned mariners from death.

ing anything that swims, they have been known to bite off part of a fish struggling on a fisherman's hook.

In captivity, even young snappers strike savagely at proffered food, and woe to the person who fails to withdraw his fingers quickly! Young snappers cannot be kept in the same quarters with young turtles of other species, for they will attack and kill even those larger than themselves. For the same reason, they should be kept out of ponds containing goldfish and other aquatic pets.

The common snapper often grows to a length of 13 inches measured along the upper shell, with a weight of 16 to 30 pounds. A large captive specimen being fattened for the soup pot reached a weight of 86 pounds.

A Walking Meat Cleaver

Except for purely marine species which sometimes visit our coasts, the alligator snapper is the largest turtle found in the United States. It occurs in the Gulf States and along the Mississippi watershed and, in spite of its large size, is quite secretive in its habits.

An average alligator snapper has a shell measuring 24 inches long and weighs about 100 pounds, but weights up to 219 pounds

have been reported. Its skull measures more than nine inches in length.

One look at the meat-cleaver jaws will convince even the most fearless person that this is a creature best left alone.

Though larger, the sea turtles are much less ferocious than the alligator snapper. The leathery turtle, or leatherback (*Dermochelys coriacea*), attains the largest size of any turtle now living, with a shell length of eight feet and a weight of nearly 1,500 pounds (page 679).

Sea turtles live and breed in tropical waters, although occasionally one will stray far to the north until numbed by the colder temperatures.

Since the hazards of existence are much greater for sea babies than for land babies, the female sea turtle lays 90 to 150 eggs in a clutch, as often as four times a year, instead of the half dozen to a score or so, once a year, of the land and fresh-water mothers.

Because turtle eggs contain a high-grade oil, used in watches and other precision instruments, and also are relished as food, natives living near tropical shores hunt sea-turtle eggs by probing in the sand with a sharpened stick.



Siamese Sue Proves that Two Heads Are Not Always Better than One

This twin-headed river turtle in the Fish and Wildlife Service Aquarium, Washington, D. C., shows why such freaks, though not uncommon, rarely escape their natural enemies for long: each head controls the two legs on its side. Often the right head sounds "Retreat!" while the left orders an advance. Result: the turtle gets nowhere. Although Siamese Sue has a single blood stream, shell, and lower intestine, most other parts are dual. The heads often fight over food and seldom agree on a common objective.

The green turtle (*Chelonia mydas*) is hunted for its savory flesh (pages 679 and 682). One method is to dive into beds of sea grass in shallow water where the turtle feeds, seize it around the neck, and swim with it to the surface. There it is hauled on board a boat and turned on its back to complete its journey to market and the soup bowl.*

The hawksbill (*Eretmochelys imbricata*) furnishes the valuable tortoise shell, prized for fine combs, boxes, and inlays for furniture ever since the Middle Ages (page 679). This shell is easily carved, yet durable, and is delightfully colored with streaks of golden yellow and rich brown.

Modern Pace Too Fast for Turtles

Turtles are reptiles of ancient and honorable lineage. Their fossil ancestors are found in rocks at least 175,000,000 years old.

One of the largest fossil land turtles on record was dug out of rocks in northern India. It measured seven feet in length and three feet in height.

Fossils show that, during the Age of Reptiles, turtles flourished over the whole world except on the circumpolar icecaps; cold was

apparently their only enemy. Their descendants are found today on every continent and in almost every region not subjected to perpetual winter.

The turtle has a considerable niche in mythology and folklore. Many Asian people believed that the earth itself rested on the back of a turtle.

Ceremonial rattles made of dried turtle shells filled with pebbles figure in the rain dances of the Indians of our arid Southwest.

Inoffensive and valuable for food, shells, and oil, turtles deserve their popularity.

Turtles on the whole are nice people, but, like many other nice people, they cannot quite keep pace with our swift modern life, especially on the highways. The broad, clear space in the center of a good road exerts an irresistible attraction for turtles who wish to bask in the unobstructed rays of the sun.

The next time you see one of these harmless but old-fashioned fellows attempting to cross the road in front of your car, slow up, if you please, and spare his life.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Capturing Giant Turtles in the Caribbean," by David D. Duncan, August, 1943; and "Certain Citizens of the Warm Sea," by Louis L. Mowbray, January, 1922.

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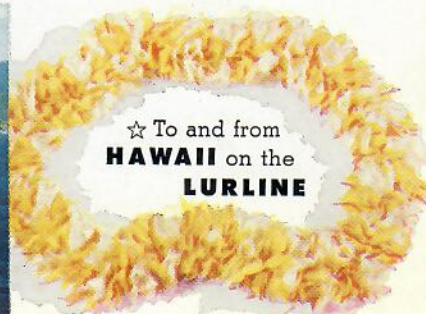
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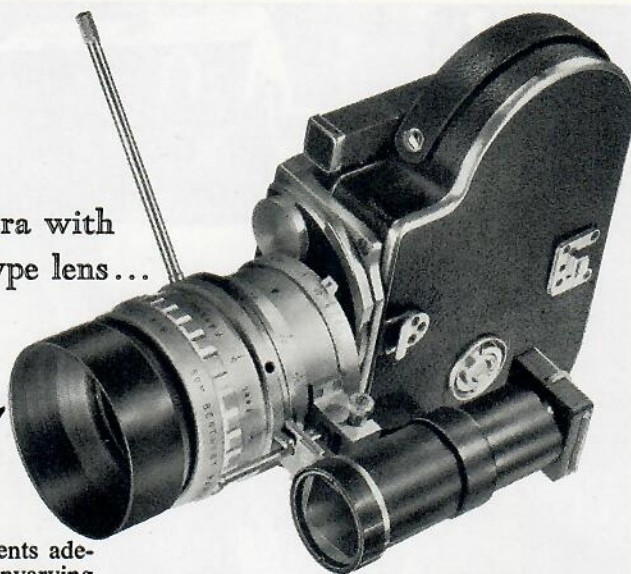
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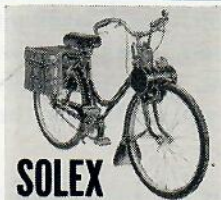
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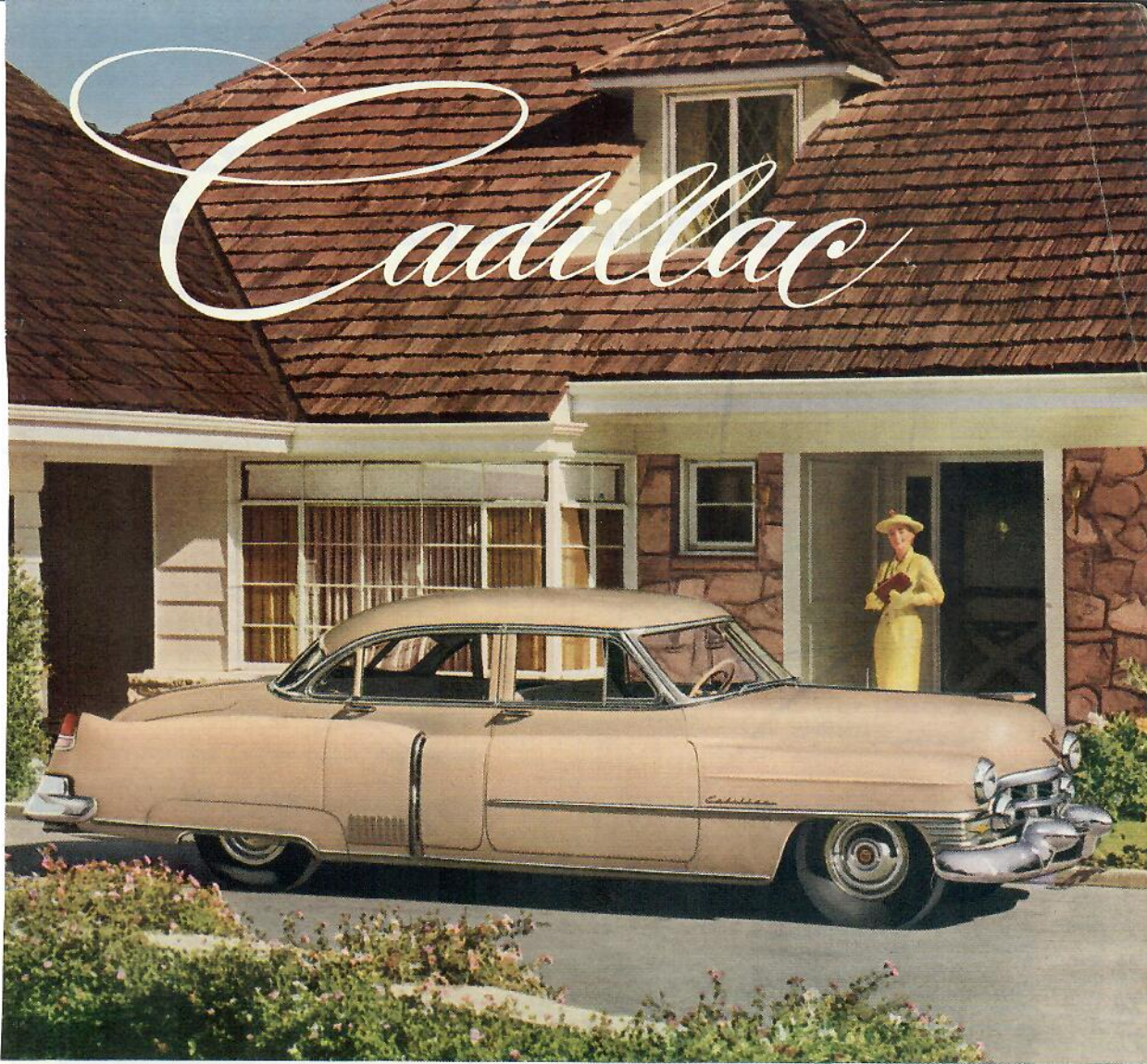


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Dear Georgie, Linny, & Meli,

Just received the nice package of assorted cheese and meat from Figi's that you sent us. It came in really beautiful condition and is nice and fresh....and not a bit of mold on any of it. Thank you very much we will both enjoy it a lot!!

All is well here and we are both feeling fine. The weather has turned cold and windy the last two days. Yesterday it was so windy that we thought sure we wouldn't be able to take our walk but then about three o'clock the wind calmed down so we put on our heavy jackets and walked our three miles. Today is really

cold and right now (2 o'clock) the wind is blowing harder than yesterday so I doubt whether we will be able to walk.

Also received the two National Geographics in the mail this morning and just got done wrapping them. Will put them in the mail today when we mail this letter. They are both in good condition in fact I think one of them is even better than those we sent you. This place is less expensive than the address I sent you and also pays the postage so if you want to inquire about any books or magazines here is the address: BOB FINCH BOOKS, P.O. BOX 1362, TORRANCE, CALIFORNIA 90505.

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