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THE NATIONAL GEOGRAPHIC MAGAZINE

America Goes to the Fair

Farmers and City Dwellers Meet at Booming Harvest Festivals That Entertain and Educate 85,000,000 Visitors a Year

BY SAMUEL W. MATTHEWS

National Geographic Magazine Staff

RANKED the length of the floodlighted field in the Dallas fairgrounds stood 2,000 Texas boys and girls, high-school bands in rainbow-hued uniforms forming six huge words against the green turf:

HI HO COME
TO THE FAIR

Behind them, from a thousand-throated chorus massed high in the concrete colosseum, swelled a familiar, swinging song:

"The sun is a-shining to welcome the day,
Heigh——ho! come to the fair!"

Neon-blazing pylons flashed in the sky beyond the stadium's rim. Carefree crowds surged past a red-shirted cowboy five stories tall (page 297). Loudspeakers blared across plazas lined with flags.

Dallas, with true Texas flourish, was staging an annual phenomenon as American as Indian summer and spun-sugar candy. It was State Fair time!

Fair-hopping Across a Continent

As the bands spelled out their huge welcome, I stood in the stadium's topmost tier and thought back across an unforgettable year. Off and on for ten months, with NATIONAL GEOGRAPHIC photographers Jack Fletcher, Joe Roberts, and Don McBain, I had been following the advice outlined below me.

We had gone to fairs.

In January we prowled the roofed, resounding halls of the Pennsylvania Farm Show in Harrisburg; in February we watched as the Florida State Fair and Gasparilla Celebration turned Tampa into a carnival city.

At August's end we crossed a continent to see the Nation at harvest festival: Iowa as its State Fair opened at Des Moines; California spilling its bounty into Sacramento; New England's homey mixture of colonial and modern times at the Eastern States Exposition; and finally, in October, the State Fair of Texas, largest in the land.

We saw banner-decked tents go up beside cavernous grandstands, empty stock barns come alive with blue-blooded farm animals, bright-painted carnival trains drawn up on railroad sidings.

A year at the fair: I remembered small boys bouncing in the seats of giant harvesting combines while their fathers listened longingly to the salesmen's talk . . . a dozen Iowa farmers soberly chasing a dozen young pigs helter-skelter around a judging ring . . . riggers hoisting a Ferris wheel on a 100° summer's day . . . an awestruck youth in West Springfield, Massachusetts, hearing the President of the United States compliment his grand champion baby beef (page 308).

Agricultural fairs, as they are known today, have been part of American life for nearly 150 years. Harvest celebrations and market fairs in both New and Old Worlds are far older, of course. Their ancestry traces back to Old Testament times, when the Prophet Ezekiel wrote of fairs filled with livestock and metal-

Texans Stream Along Million Dollar Midway at the Nation's Largest Fair

Agricultural fairs draw six times major-league baseball's annual gate. The Texas State Fair, with 2,380,000 visitors in 16 days, offers football in Dallas's Cotton Bowl (upper left), grandstand auto stunt shows, and an amusement park.

Photograph by Squire Haskins

A Thousand Yellow School Buses Bring Boys and Girls on Rural Youth Day

The author visited six big U. S. fairs, from New England's Eastern States Exposition to the California State Fair. In Texas he joined a gigantic parking-lot picnic (top center) for farm youngsters. Some had come 600 miles.

wares, embroidery and spices. There were fairs in ancient Sumer and Babylon, in Cretan Cnossus, in Thebes on the Nile, and in Tyre of the Phoenician seagoers.

To an older generation of Americans, summer's fair posters recall the taste of foaming root beer on dusty county fairgrounds and brass bands oompahing away within fretted pavilions. But the older generation had better take a second look. For fairs now wear a modern face. In a few short decades they have changed as much as rural life itself. And they have grown to amazing dimensions.

Modern Farmer Often Flies to Fair

Where surreys once clustered under the trees behind the stands, rank upon rank of shiny cars, buses, and trucks now shimmer in the sun, and on near-by airstrips upstate farmers and their families whir down from the bright summer skies in small grasshopper planes. Along the fair's streets they wander between exhibitions of machinery of a size, a complexity—and a color—that would have made their fathers' eyes pop.

Each year more than 2,000 county, State, and regional fairs occur across the United States, in addition to hundreds of smaller fairs held by townships, schools, granges, and rural youth organizations.* Some States, in fact, present more county and district fairs than they have counties.

California, with 58 counties, stages more than 70 fairs; the Los Angeles County Fair at Pomona is the second largest fair in the United States in attendance, surpassed only by the State Fair of Texas. In the East, industrial Pennsylvania and Ohio both hold close to 100 rural fairs.

But today's most impressive farm events are the long-established State fairs. New York's fair began at Syracuse in 1841. Minnesota's is four years older than the State itself. Both Iowa and California will celebrate the hundredth birthdays of their State fairs this year.

Huge, nonprofit enterprises, solid and highly respectable, State fairs represent investments of millions of dollars in buildings and grounds. The Texas State fairground alone is valued at $35,000,000.

"Total fair attendance in the United States topped 85,000,000 visitors in 1953," Frank H. Kingman, secretary of the International Association of Fairs and Expositions, told me.

"But that's half the U. S. population!"

"Well, there weren't that many *different* people at fairs, of course; day-by-day gate figures count repeaters, and many people go to more than one fair. Even so," he punned happily, "the over-all total is a fair figure."

All across Iowa, last August, we saw farmers getting ready for the State Fair at Des Moines.

Not far from Marshalltown, Harold Wheater had his 10-year-old boy, Danny, out behind the swine barn, showing him how to handle hogs in the show ring.

"You'll see more purebred hogs at Des Moines than at any fair anywhere," he told me (page 318).

Near Indianola, dairy farmer Wallace McKee wiped his brow and talked about his prize Milking Shorthorn herd.

"Getting our entries ready for the fair actually began 10 years ago when we chose our herd sire—or you might even go back 150 years, when Thomas Bates was developing the Milking Shorthorn breed in Yorkshire, England," he explained.

Shorthorns Get Careful Manicure

To the McKees—father, three daughters, grown son, and hired hand—State fair at the moment meant smoothing rough spots on coats, ears, and tails with electric clippers; trimming hoofs with 2-foot-long pincers; rasping, sandpapering, and polishing horns with a manicurist's care.

"We've entered 28 animals," McKee said with a sigh for the work still ahead. Every year Bob, the son, takes his 2-week vacation from the Jefferson State Bank during fair time to help show the family's herd.

They were to win dozens of ribbons.

* See "4-H Boys and Girls Grow More Food," by Frederick Simpich, National Geographic Magazine, November, 1948.

Tallest Talker at the Dallas Fair Booms Out, "Howdy Folks, I'm Tex!" →

Loudspeakers inside Tex's papier-mâché head broadcast State Fair announcements, his lower jaw wagging with the sound. Complex jaw machinery is counterweighted to keep him from standing around with mouth open on windy days. Vacuum tubes of the amplifying system in his talk-box generate considerable heat; as a safety precaution the head is asbestos lined.

Wide-eyed orphans from a Baptist home look up at the 52-foot figure. His wire frame dressed by a derrick, Tex wears shirt and jeans of more than 100 yards of material and a 75-gallon hat.

His outflung arm points to the Cotton Bowl. Beyond the Lone Star flag rises the Texas Hall of State.

Kodachrome by National Geographic Photographer John E. Fletcher

In late August, Iowa bakes beneath a blue oven of sky that seems to grow hotter day by day. Photographer Jack Fletcher and I drove through a constant shimmer of heat over wide concrete highways that followed right-angled section lines due east and west or north and south.

"Hotter it gets, the better the State Fair seems to be in Iowa," a county farm agent told us. "Don't ask me why."

Where plows had turned gently rolling fields, the rich, deep soil was as dark as bitter chocolate. Sleek herds of cattle grazed pastures of purplish clover between fields of oats, alfalfa, and soybeans. But the sight that filled the eye was corn.

A field of Iowa corn in August is a thick, dark-green carpet topped by a close-striped design of dusty gold. Tassels flop over under their own weight, and silk-capped ears hang

Plowing matches have largely succeeded Iowa's once-famed cornhusking contests. At Cherokee, and later at the State Level Land Plowing Match near Boone, we stood with thousands of spectators to watch chugging tractors turn furrows straight as a ruler across green fields. Many a canny farmer makes up his mind which tractor or plow to buy only after watching a plowing match (page 322).

Plowing is science and art combined—and serious business in Iowa. Cherokee's 16-time champion, Lyle Mason, won the State match in 1953 and lost the national plowing contest in Wisconsin by only a fraction of one point.

In a long, low cattle barn on Cherokee's

← Barker Promises Thrills and Chills as Cyclists Warm Up to Ride the Wall

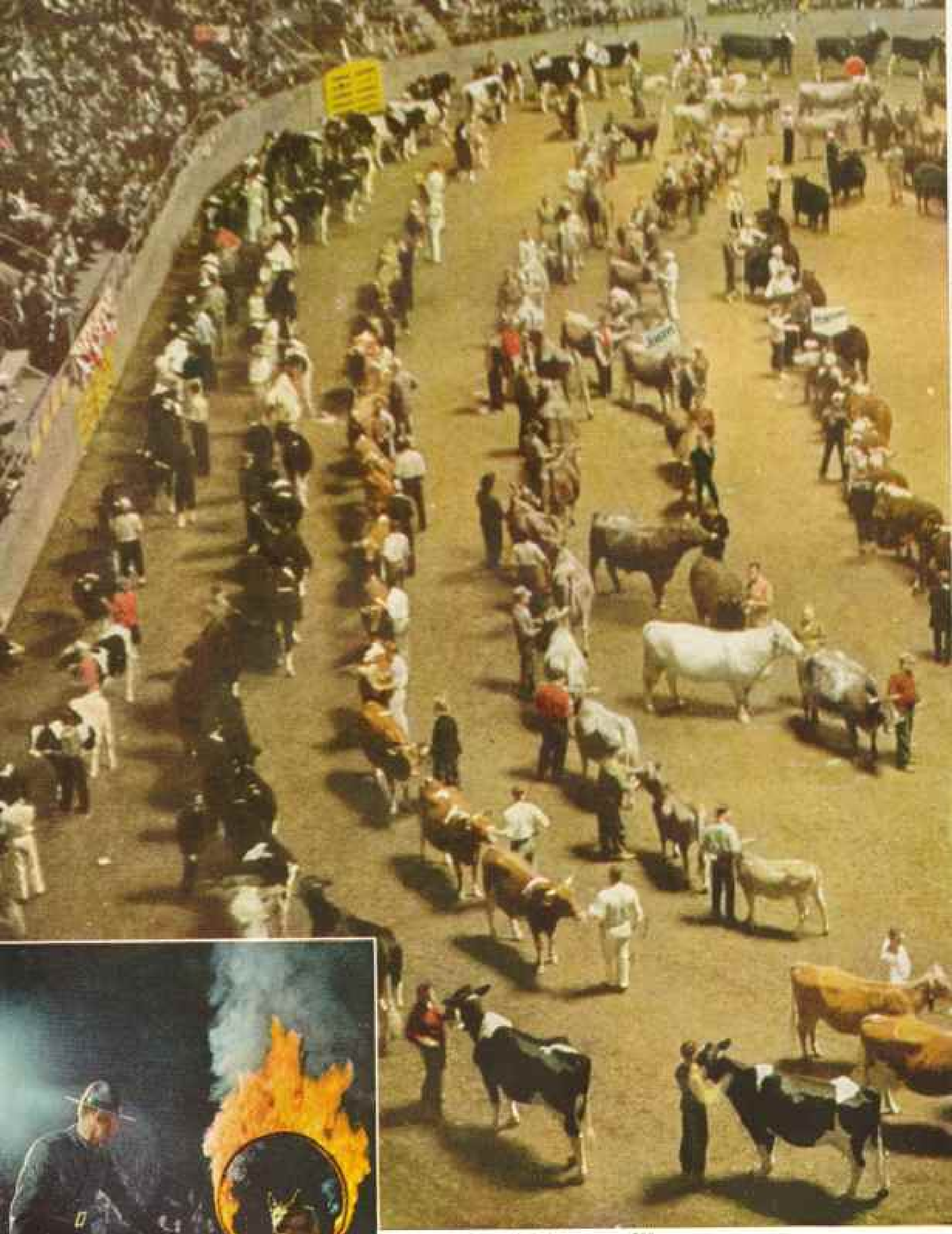
"Motorcycle maniacs," the ballyhoo man calls these midway performers at the Florida State Fair in Tampa. Standing on bike, a stunt man guns his motor with a booted toe. Wheels spin on rollers.

↓ Arms folded, Betty O'Day of the Royal American Shows whips at a mile a minute around motordrome's wall. Centrifugal force exerts on the rider three times the pull of gravity, sometimes blacking her out momentarily as blood is forced from her head.

National Geographic Photographers
J. Baylor Roberts and John E. Fletcher

full and heavy. Iowa is mile after mile of corn, 11,000,000 acres, a billion dollars' worth in a good year.

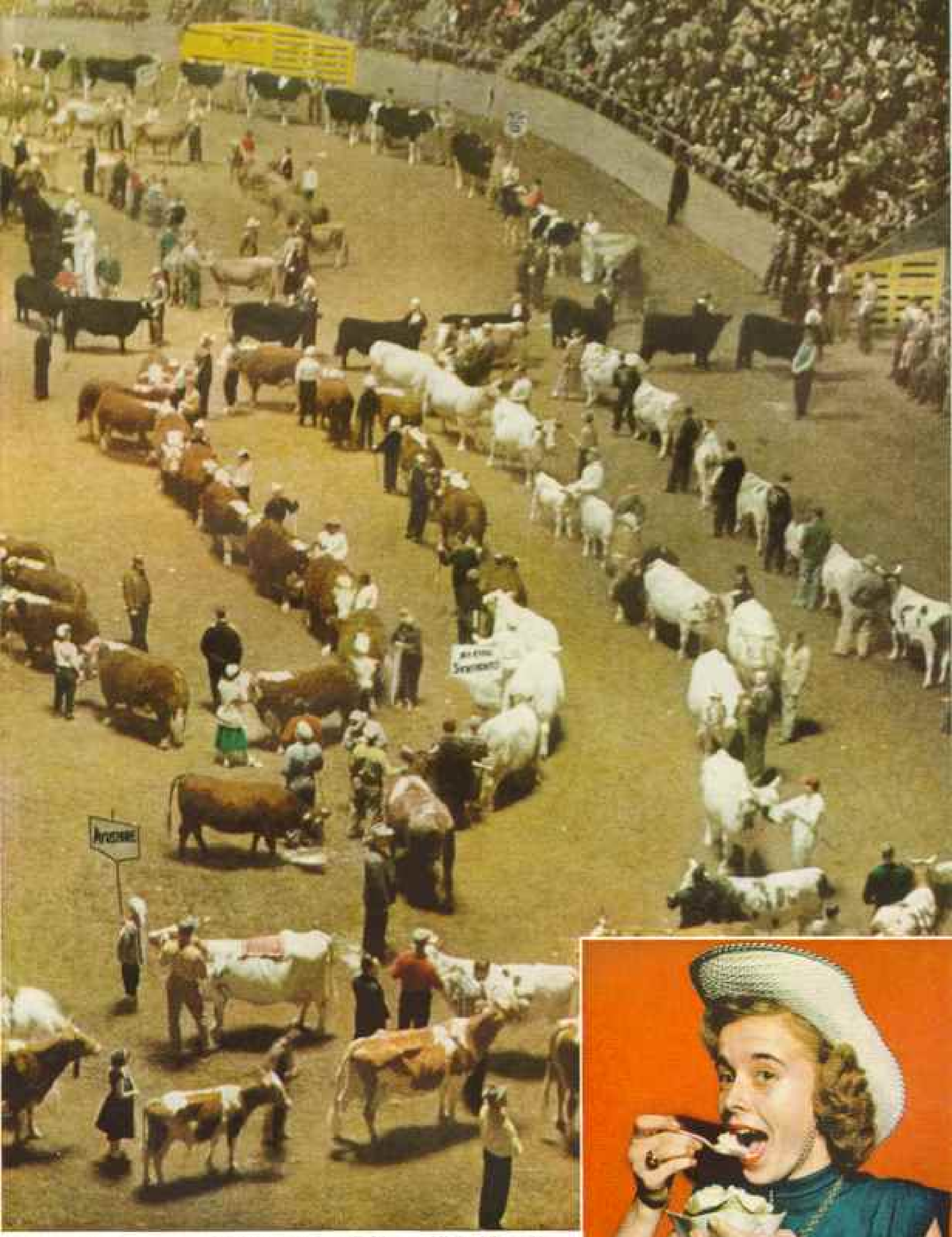
Just beyond Cherokee in northwest Iowa we came upon the huge hilltop boulder that once guided Indians and pioneers across the limitless wind-swept prairie. Near here the Pilot Rock Plowing Match has been held for 47 years. It's also Cherokee County's annual 4-H fair.



↑ Pennsylvania Parades Its Prize Cattle . . .

Cold weather in mid-January drives the Farm Show at Harrisburg indoors, unlike any other State fair in America. Main arena, nearly as long as a football field, resounds to hundreds of lowing animals.

←At a corporal's command, Prince demonstrates training of troopers' dogs in a State Police show.



. . . In a Bovine Game of Follow-the-Leader

Pennsylvania, fifth among the States in dairy herds, takes pride in its purebred animals in the Farm Show's annual livestock parade. Black Angus steers at exit represent a new trend toward beef raising.

➔ Like ice cream or hot dogs elsewhere, oven-hot baked potatoes are favorites at the Farm Show for staying hunger.

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The New York Times

Iowa's Finest Loaf of Bread Wins Beaming Approval from a Circle of Cooks

Judging of such culinary masterpieces takes place behind glass windows. White-garbed experts test bread for texture, color, and crust as well as taste. Champion baker, holding her loaf, won a new stove.

plowing grounds we found Faye Eileen Mugge. She was brushing the gleaming black coat of an Aberdeen-Angus calf.

"Going to the State Fair? I hope so," she said. "But first I have to show here in Cherokee."

At 16, this farmer's daughter was famous all over Iowa. The year before, her entry had won the baby beef grand championship at the State Fair. Then it had gone on to take a championship banner at the American Royal Live Stock & Horse Show in Kansas City. Finally, to Faye's grinning delight, it had been named champion of all Aberdeen-Angus at the International Live Stock Exposition in Chicago, highest honor court of American beef cattle.

Farm folk crowded wooden bleachers to see Faye again win the grand championship of the local fair. In Des Moines the *Sunday Register* captioned her picture: "Faye'll Be Back This Year."

A day later we visited the weathered Mugge farmhouse 11 miles northwest of Cherokee. On the parlor mantel stood a gold cup, trophy of her triumph at Chicago.

"I'm getting Shorty's hide as a rug, too," she said. "The Bismarck Hotel bought him and shipped it back to me; it's being tanned. Real nice of them, wasn't it?"

Faye's new pride was Rubicon Mignonne M, a coal-black Aberdeen-Angus with a stiff-legged strut. As she splashed creek water against the heifer's soapy flanks, she explained that Ruby would be rinsed with weak vinegar before the State Fair to condition her coat.

Ruby herself looked mildly astonished at all the fuss (page 310).

Later, in Des Moines, we arrived at the great 378-acre fairground at the end of Grand Avenue just as it was beginning to come alive. Hammers rang in the Varied Industries Hall. In the streets, ice-cream stands, lemonade "factories," and pitchmen's booths were getting bright new coats of paint. Engines roared in "Machinery City," an area as big as many eastern farms, while scarlet, green, and yellow corn pickers, tractors, and hay balers backed and filled into position.

No Gate Crashing Even by Helicopter

Long lines formed before the concessions hiring window in the Administration Building. Here, on the veranda, is where everyone meets during the fair. Here, too, an important contest is decided: the State checkers championship.

Fair police, 230 strong, drew their canes and white tropical helmets. The treasurer's office coached armored-car drivers who would carry tens of thousands of dollars a day. Fair officials unpacked reams of ribbons with their heart-stopping gold letters: "First Place" . . . "Premier Breeder" . . . "Grand Champion."

On the 100-acre campgrounds hill, families that had been coming to every Iowa State Fair for three generations unloaded cookstoves and cots and moved into tents and cabins (page 317).

As quiet settled that night among the tall trees, a familiar call went out: "Oh, Joe, where are my mules?" Forty-odd years ago, a man hunting his runaway team stumbled through the darkened tent city with that cry, and it has been the traditional "good night" ever since.

At Iowa, as at few other State fairs, everybody pays to get in. There are no passes, even for members of the fair board itself. Several years ago a governor of Iowa landed by helicopter in front of the grandstand. As he stepped down, a ticket taker collected his admission!

Livestock barns, airy block-square pavilions, fill one side of the fairgrounds. More than 8,000 animals were bedded down there. Fair officials wouldn't even guess at their aggregate value.

"One might be worth only $100," State Fair secretary Lloyd B. Cunningham explained, "while the next will be a potential champion worth $40,000."

I asked if the fair premiums were what attracted such valuable animals.

"Cash awards often don't even pay expenses," he said. "But a farmer's showing at fairs establishes his reputation as a breeder. It's important to him, and it's important to the country. America owes a lot to fairs for the quality of today's livestock." *

Top breeders of cattle and hogs sometimes spend all summer on the fair circuit, trucking their animals from State to State. Two years ago, one Connecticut farm shipped 30 dairy cows all the way across the country to show them at the California State Fair.

Eugene Dugan of Storm Lake, Iowa, was worriedly sprinkling a massive Poland China boar, Captain Video by name, with a big watering can. The hog lay on the pen's concrete floor, panting hoarsely.

"This heat is terrible," Mr. Dugan groaned. "It'll melt these hogs down and kill them in the show ring."

I asked him if he was serious.

"Sure I'm serious," he said. "You let them get too hot, and likely as not they'll drop dead right here."

Porterhouse and Pots of Gold

For 4-H youngsters, the baby beef championships comprise the pot of gold at the end of the State Fair rainbow. The winning steers suddenly become kings among princes of porterhouse. Television cameramen and newspaper and radio reporters swarm around their young owners.

Fourteen-year-old Arnold Sheriff of Orient, Iowa, had paid $100 for the Hereford calf that was judged Grand Champion last year (page 320). He had fed it corn, rolled oats, and barley, groomed and trained it for the show ring, keeping careful records as meat layered deep and smooth on its flanks. At the fair's annual baby beef auction it was sold to the Rath Packing Company of Waterloo, Iowa, for $1,317, or $1.30 a pound.

For dairy-cattle judging, a farmer has an advantage if he can bring his prize cow to the fair just as she is about to freshen. Then she is at her peak of beauty and form.

Sometimes, however, there are slips in timing. At one farm show, for example, a principal contender for a grand championship began to calve before hundreds of spectators

* See "America's 'Meat on the Hoof,'" by William H. Nicholas, National Geographic Magazine, January, 1932.

All's Well Here! Boys Sleep Soundly Beside Their Cows

Grooming and exhibiting their cattle at the Farm Show and seeing the sights leave these Pennsylvania youths "plain bone-tuckered." As farm boys do at fairs across the Nation, they bed down in the stock barn's soft straw.

State troopers patrol the Farm Show at Harrisburg around the clock. A National Geographic photographer, wandering the quiet barns after midnight, took these unposed pictures without disturbing the sleeping boys.

A Jersey cow (above) sniffs the trooper's flashlight. A placid Holstein (left) makes a warm pillow for her young owner. Animals' snug blankets keep their coats clean and prevent chilling.

Kodachromes by National Geographic Photographer John E. Fletcher

while still in the judging circle. Veterinarians hastily led her back to her stall, where spindly-legged twins were born within minutes.

At Iowa, as at fairs all over the country, sheepshearing championships are still held. Speed with the whirring electric clippers is not the only criterion; condition of the shorn fleece and final appearance of the lambs are also judged (page 310).

Sheepshearings have roots far back in fair history. George Washington Parke Custis, Martha Washington's grandson and adopted son of the first President, held sheepshearings at Arlington, his Virginia estate. Widely copied in the early 1800's, these events were forerunners of today's agricultural fairs.

Horse shows, too, are an important part of many fairs today. From Massachusetts to California we watched high-stepping Shetland ponies and burly wagon horses prance through their paces. At Sacramento, where the oldest annual horse show on the Pacific coast continues every night of the State Fair, the ringmasters wear tuxedos and an organist plays amid banks of flowers.

The most popular event in this horse show, however, dispenses with formal dignity. The "It" Class, open only to children, is a free-for-all; contestants ride, drive, push, or pull a pony, horse, mule, calf, or goat, and the audience judges by its applause. Winners have included a little boy riding backwards on a mule, a baby held on the neck of a huge draft horse, and a youngster wearing the costume of a headless horseman.

Cake and Pie Judges Skip Breakfast

High suspense and hot competition fill another section of Iowa's fair: a spotless glass-walled sanctuary where frosted spice cakes, flavorsome mincemeat, and plum preserves pass before white-frocked judges. Their eyes and palates must separate the divine from the merely heavenly.

Judging is no picnic. These experts must skip their breakfasts and spend all day dipping their fingers into ice water to make them more sensitive to texture and consistency. To perk up jaded taste buds, they sip water or lemon juice.

A subtle difference is all that marks a winner. A few years ago, something about one of the cakes eluded a puzzled judge. Again and again she turned back to try that one cake again, while farmers' wives watching beyond the glass nudged each other excitedly. Then the answer suddenly came to her.

"Oh, I know!" she exclaimed. "It's made with homemade butter!" The cake took a ribbon.

Mrs. Coldren Glenn of Mitchellville, Iowa, brought out her plate of divinity candy when the judging was done. "Try a piece," she offered. "It won a red ribbon! Matter of fact, I've had something entered in the fair for an awful lot of years—including my two daughters! This one was a grand champion in the baby health contests they used to hold."

A pretty teen-age girl stood beside her.

"Martha here hasn't missed a State Fair since the year she was born, and she didn't miss it by much even then—only by the time it took the police to drive me to the hospital."

Martha now wore the neat blue uniform of an Iowa 4-H girl. On a warm, peaceful Sunday evening I saw hundreds of these alert and energetic teen-agers gather for candlelight vesper services.

4-H Youths Exhibit Projects

They bring food, fashions, and refinished furniture to overflow their exhibit hall at the fair. Each entry is an award winner from one of Iowa's 99 counties.

Betty Goodhue of Carlisle, Iowa, proudly showed me an entire farmhouse bedroom that fair carpenters had copied, even to the wallpaper, just as she had decorated and furnished it at home for her 4-H project.

"The bed belonged to my great-grandmother," she said. "That slipper chair I made from an old butter tub."

Seeing all the varied exhibits at a State fair like Iowa's means eating every hour or so just to keep up strength. There are hot dogs a foot long, brimming tanks of orange drink, candied apples galore. You can get cotton candy in green and yellow shades; ice cream sticks are dipped in chocolate and crushed peanuts.

But at midday and suppertime, Iowans settle down to eat in earnest. Along "church row," canvas-roofed cafeterias offer heaping platefuls of tender ham or succulent roast beef, golden Iowa corn on the cob, piping-hot potatoes, juicy tomatoes—and a clincher of strawberry shortcake.

The same churches man these home-style eating places year after year. Likely as not, the exuberant cane-waving barker outside will prove to be the minister.


3
5
6

← "No. 3, Move Up . . ." Barks the Starter

As California's State Fair starter talks sulky drivers into place, pacers take up their "side-wheeler" stride, both legs on a side moving together. Here horses move at about 25 miles an hour. Moments later, the gate will fold forward and the race begin.

↓ "What Am I Bid for This Fine Animal?"

Four-H baby beef raisers usually sell their steers after the judging. Restaurant and packing house buyers offer top prices.

The auctioneer's assistants down front catch signals and prompt bids for this Hereford.

Opposite, below: Black-and-white kid at the California State Fair bears the markings and lean lines of an Alpine.

Kodachromes by National Geographic Photographers J. Baylor Roberts and (below) John E. Fletcher

National Geographic Photographers John E. Fletcher and Donald McBain

"Congratulations!" President Eisenhower Greets an Awed 4-H Champion

At the farm show in West Springfield, Massachusetts, Fred Scornick, 18, shows the Chief Executive his rare red Angus steer, Ferncliff Laddie No. 4. Initials on 4-H clover stand for head, heart, hands, and health.

As you walk back toward the grandstand, the fair's familiar sounds swirl about your ears—the whistle of peanut roasters, a band playing in the old-fashioned pavilion to families sprawled on the grass in the shade, a crowd calling questions to a fortuneteller.

Spieling pitchmen line the sidewalks, their luring voices lower and less flamboyant today, but no less hypnotic for the lip microphones many of them now wear.

They sell anything and everything: "For advertising purposes, this beautiful pen and pencil set you see here . . . a knife that never gets dull . . . now, if friends suddenly drop in for supper, try this little gadget on an ordinary potato . . . as a final gift, and one only, a genuine 17-jewel Swiss watch; you've heard its name, but you won't believe it . . ."

From morning until midnight crowds flock in front of these booths. They have money to spend, and they'll listen to pitches that sometimes go on for hours.

In the great roofed grandstand still pulses the thundering excitement of the days of Dan Patch, the immortal pacer, as gaily-bloused sulky drivers stream by in the dust of high-stepping horses.

Harness racing has filled grandstands for a hundred years. Josh Billings wrote wryly of a fair back in 1868: ". . . Thare was two yoke ov oxens on the ground, beside sevral yokes ov sheep and a pile ov carrots, and some worsted work, but they didn't seem to attrakt enny simpathy. The people hanker fur pure agrikultural boss-trots."

Four years ago the Iowa State Fair Board canceled harness racing from its program. The indignant roar that went up all over the State quickly persuaded the officials of their error. Sulky horses were back the next year.

Today most fairs add automobile races—stock cars, bulletlike midgets, and the big snarling Offenhausers from the Indianapolis Speedway. You can see human cannon-ball

Samuel W. Matthews, National Geographic Staff

Curly and "Gardenia" Make a Hesitant Young Friend at California's State Fair

Three tame skunks and a dozen costumes vary Henry Daily's clown act. He roams the fairgrounds with beribboned pets, paid only in the fun he gives children. Pinned to his tie is deputy sheriff's badge.

stunts, stage and aerial acts, rodeos, and running horses.

California's State Fair has an oval canal inside its mile race track for water skiing and speedboat races. Last year the Eastern States Exposition presented Army infantry attacks and an old-time firemen's muster with century-old man-powered pumpers.

Auto-crashing "thrill shows" rank as one of the major drawing cards of most State fairs. Joie Chitwood's Tournament of Thrills, for example, has been so successful that different units perform simultaneously in various parts of the country.

But grandstands still grow quietest as drums roll and the high aerialists risk their lives.

Standing in the sun, a girl in spangled tights balances at the very top of a slim 130-foot steel mast. Nothing is above her but blue sky, nothing below but the thin white pole and green sod. No intervening net spreads its reassuring web.

She begins swaying slowly, only one foot braced in a steel stirrup. Farther and farther, first to one side, then to the other, the supple mast bends. Faster and faster. Finally, crossing the sky like a giant metronome, the girl swings through an arc as wide as a house.

The sway pole ranks among the most dangerous of all high acts. Rietta Grotefent, who won't go up in an airplane, is regarded by other aerialists as one of the most daring in her business. Hanging by one ankle from a guy wire, she comes back to earth, bathed in perspiration, by sliding 400 feet down across the race track.

I stood watching her one day with Arthur F. Briese of Thearle-Duffield, a firm that produces some of the biggest fireworks displays in the United States.

"You know how you can tell you're in Iowa?" he asked suddenly. "Look up at the grandstand. What color do you see?"

← Clippers and Soapsuds Give Startled Farm Animals a New Look

Above: A market lamb takes a high-speed fleecing in Iowa's sheepshearing finals. Champion shearers, holding squirming subjects between their knees, may finish the job in two minutes. The 5-pound fleece yields almost enough wool for a man's suit.

Below: Rubicon Mignonne M, prize Aberdeen-Angus heifer, gets a pre-fair scrubdown in an Iowa creek.

↑ A Golden Pyramid of Iowa Corn Spills from the Fair's Horn of Plenty

One young fairgoer exclaimed, "Look at the corn-utopia!" Iowa is just that. Proudly dubbing itself "the largest cornfield on earth," the State grows better than half a billion bushels in an average year, one-sixth of the entire U. S. crop. This annual display holds 100 hand-picked bushels banked on a wire frame. Red-kerneled ears spell out the State's name.

"Blue," I hazarded.

He pounced, triumphant. "Overalls and blue shirts! There's no mistaking that crowd. You know you're at a real farmers' fair!"

I asked him about his fireworks.

"Iowans expect a slam-bang show. The bigger and more elaborate the better. Lots of color. Plenty of noise."

Briese brings a crew from Chicago. They string five miles of wire to detonate a daily ton of pyrotechnics. It takes them nine hours to set up for 20 minutes of dazzling bedlam each evening.

But first comes the big and slick State Fair Revue. You settle expectantly in your seat, floodlights hit the stage, and the master of ceremonies steps to the microphone.

"Good evening, ladies and gentlemen. Welcome to the greatest Iowa State Fair you've ever seen!

"Before we start, let's all get acquainted. I'd like every one of you to turn to the person in the next seat and shake hands . . . Now look your neighbor straight in the eye and say sincerely, 'Gee, but you're good-looking!'"

With a roar of laughter, the show is on.

Today's fairs bring top-ranking names in show business to their stages. Spike Jones and Phil Harris filled the grandstand at Sacramento; Ethel Merman jammed the State Fair Auditorium at Dallas.

There's a special knack to appearing at fairs, a hundred yards out in front of a grandstand a sixth of a mile long. Every motion has to be overdone. A comedian has to wait for his joke to reach the audience and for the laugh to come back before he can go on to his next quip.

From Burl Ives to Pansy the Horse

An entirely different type of fair show is being tried in a small open-air theater on the California State fairground. Shaded from the sun by overhead latticework, its seats come down almost to the stage on three sides.

Burl Ives, the American folksong troubadour; the Golden Gate Quartet; and Pansy the Horse, famed comedy act of the Mayo family, appeared here in a free Magic Hour of Entertainment in the afternoon. They played to overflow audiences.

At Sacramento, when Mother says she is going to the flower show, the whole family accompanies her with enthusiasm.

California's modernistic metal-and-glass Hall of Flowers, a building that came to the Sacramento fairgrounds in sections from the 1939-40 San Francisco world's fair on Treasure Island, is an eye opener.

Exhibitors bring in trailerloads of flowers each day, replacing banks of orchids, chrysanthemums, and roses. When three waterfalls are turned on each morning, the Hall of Flowers becomes a tropical paradise.

Finding Art in Everyday Objects

Fair visitors linger just as long in the air-conditioned Arts Building across the street. Instead of a formal hanging of amateur paintings, twisted-wire mobiles float in air above well-designed typewriters and carpenter's tools. A monkey's skeleton demonstrates the perfection of natural design; a bullet-riddled gasoline can found in the desert is alive with accidental beauty.

At each entrance hangs this placard:

> Art has broken the fetters which bound it to the easel and kept it hidden within museum walls. Art is everywhere, in everything we see and touch—our home, car, clothes, tools, toys. Artists point the way to new horizons and beautifully designed forms result. They are ours, if we are receptive to the magic of our times. Choose an object of function and beauty with conscious, selective effort and you become one of the artists in your life!

In the great mission-style building marked "Agriculture," fronted by a golden bear riding a magic carpet, 41 California counties in 1953 built carefully planned displays of their farm produce, mining and forest wealth, scenic and vacation retreats (page 314).*

Yolo County's theme could well have characterized all California: "Anything That Grows Anywhere Grows Everywhere in Yolo County."

With an amazing diversity of crops—cotton, fruits, vegetables, dairy products, cattle, rice—California now ranks as the leading U. S. farm State in value of marketed produce. Los Angeles County outranks all other counties in the Nation in agricultural income.

One fruit stands out above others at the Golden State fair. Grapes grown in California account for 85 to 90 percent of all American-made wines. The State boasts some of the largest vineyards in the world. The annual output of its grape industry is valued at $200,000,000.

The wine competition at the California State Fair is ranked by vintners as the most impor-

* See "New Rush to Golden California," by George W. Long, National Geographic Magazine, June, 1954.

"Spin Your Partners,
Give 'em the Gun . . .
Come to the Middle,
Don't We Have Fun!"

At fairs across the United States in 1953, International Harvester Company drew capacity crowds to its farm-machinery exhibits by staging tractor square dances. Here a team of drivers put on their show at the Iowa State Fair, complete with fiddler, chorus, and country-style caller.

Above: Four tractors wheel through their paces to the tune of "Turkey in the Straw." Each carries a different implement "partner": clockwise from camera, a 2-bottom plow, disk harrow, cargo platform, and corn planter.

Left: Drivers drop the attachments and nose their tractors to the center in true square dance fashion. A new hydraulic hitch enables farmers to pick up equipment by merely backing up to it. Chrome muffler pipe, jutting from hood, vents exhaust above the driver's head.

Kodachromes by National Geographic Photographer John E. Fletcher

tant in the country. A committee of experts judges hundreds of the choicest American wines produced during the year. Its gold, silver, and bronze medals are coveted awards.

Most Californians, like Iowa's farmers, go to the fair by car. But last year two adventurous 13-year-olds, reliving gold rush days, traveled by miniature covered wagon bearing the slogan "State Fair or Bust!" They walked most of the 80 miles from their ranch homes near Oakland, bringing with them a burro of uncertain temperament and a Belgian sheep dog. It took them seven days. A police car escorted them the last leg of the way, and the fair threw open its gates to them.

Fairs are still a magic place for wide-eyed youngsters. Clowns wander through the fairgrounds at Sacramento, trailing excited clusters of children wherever they go. Zimbo sets up his foot pump by the bandstand and hands out balloons. Goo-Goo has cavernous pockets crammed with all-day lollipops. Curly carries one of three pet skunks—Gardenia, Rose Blossom, or Evening of Paris (page 309).

Daily, terrible moments of crisis arise, however, when amid the jostling crowds wander

Mother Sobs as the Barber's Shears Crop Baby's Curls in a Fair Tableau

California's Ventura County won a State Fair trophy for this old-time barbershop drama set on a floor of lemons and oranges. Mannequins all, the boy squirms mechanically in the chair while a derbied father consoles the weeping mother. Some 200 county products encircle the exhibit.

National Geographic Photographer J. Baylor Roberts

forlorn fairgoers with quivering underlips.

"My parents got losted!"

Kind-spoken policemen escort the strays to the "calf pen." Dark clouds clear away as soon as the newcomers hear the happy squeals of other "prisoners" playing while loud-speakers call their parents.

It was Children's Day at the Eastern States Exposition when President Eisenhower rode through the gates at West Springfield with his famous hands-up salute and a grin that grew wider as the day progressed.

The New England Governors who accompanied him, the President said, would certainly agree that the one really important person there that day was the boy or girl who was participating, either directly or indirectly, in the exposition.

"Each of you, if you are lucky, owns about 70 years of the United States still to come . . . It is yours to keep, and you must start now.

"I believe your presence at such expositions as this, competing in all the agricultural products of this great Northeast, is very fine—an essential step in becoming the good citizen you must be if America is to remain as our fathers handed it to us."

Old New England Town Built at Fair

At West Springfield five States—Maine, Vermont, New Hampshire, Massachusetts, and Connecticut—own land and big exhibit buildings. Since 1916 the Eastern States Exposition has served as the joint showplace of New England's agriculture and industry. Today it is one of the biggest fairs east of Illinois.

Beside the Avenue of States stands Storrowton Village, unique in the Nation's fairgrounds—a typical New England town of a century and a half ago (page 332). Visitors sing hymns each evening in a high-steepled meetinghouse built in 1834 in Salisbury, New Hampshire, birthplace of Daniel Webster. They wander through an old tavern, a one-room red schoolhouse, a village lawyer's office, and a blacksmith shop of time long past.

Serene and lovely, these buildings poignantly recall the villages that sent their dwellings to live again at Storrowton. Every stone, hand-hewn rafter, and rafter pin was numbered as it was taken apart, so that each might be placed in the same order when the buildings were set up again on the exposition grounds.

The village, which has grown year by year since its founding in 1927, escaped near disaster during the exposition of 1936, when the Connecticut River swirled from its banks and covered the fairgrounds with 14 feet of water.

Although the fair's wooden grandstand was washed away, Storrowton's careful workman-

Songs at Curfew Delay Bedtime in a 4-H Dormitory

Four-H Club girls, 23,000 strong, outnumber boys in Iowa's farm youth program. Girls join not only home project clubs, where they sew, can foods, and refinish furniture, but also agricultural clubs, to raise calves or crops.

More than 800 girls bring their prize projects to the State Fair, which houses contestants in a half-million-dollar dormitory and feeds them at cost in a huge dining hall.

Each girl is responsible for manning exhibits and giving 4-H Club demonstrations. Plenty of time remains to see the fair.

All girls must check in by 10:30. If someone breaks out an accordion, a songfest may stretch the bedtime hour. One bed inverted on another makes an adequate double-decker.

↑ **Campers End an Iowa Fair Day; Tomorrow Is the 4-H Show**

As in horse and buggy days, farm families still make Iowa's State Fair their annual vacation, camping on a tree-shaded hill above the fairgrounds. Some pitch tents or bring house trailers. Noble Christianson (left) and Orlin Lein (right) built a canvas-roofed cabin for their 2-family use. Before bed, they talk over the next day's events. Bonnie Lein, 17-year-old State Flowmen's Queen, fixes her hair; the boys reach for the popcorn.

↓ Next day, Bonnie and Larry Lein grin in anticipation as they line up their Herefords for the baby beef judging. Canes help them pose their animals.

Suspense Grips an Iowa Swine Show as the Judge Scrutinizes a Portly Poland China Sow

Corn-rich Iowa raises a fifth of all U. S. hogs. Farmers dub them "mortgage lifters," so efficiently do they turn feed into valuable meat and fat. Miss Maud 2nd, an aged queen, wears the breed's black coat, white snout and feet, and drooping ears. Poland Chinas, name notwithstanding, were developed in Ohio.

ship saved the village. Even its 1824 organ could be restored to its original condition.

Past and future meet at New England's fair. In the Industrial Arts Building the Chrysler Corporation took 16,000 square feet of exhibit space for its "New Worlds in Motion" show, a million-dollar display of modern automotive design and engineering.

Meanwhile, outside in a bleacher-lined pulling pit, pairs of wide-horned Devon and brawny Durham (Shorthorn) oxen strained against a wooden sled piled high with concrete blocks.

Draft oxen, almost extinct elsewhere in the United States, still are used in parts of New England where stony fields and steep hillsides tax tractor and horse beyond capacity.

"Horses? Pfaff!" said one grizzled back-country Vermonter to me. "Who wants horses?"

That seemed to cover the question. He turned away to watch a competitor's rust-red oxen successfully pull a load of 6,600 pounds, almost twice their own weight. They easily dragged the stoneboat the required six feet.

From those oxen history's line ran straight and true back to an autumn day in 1810 on the elm-shaded public green at Pittsfield, Massachusetts. There the first "Berkshire Cattle Show," organized by an energetic gentleman named Elkanah Watson, was to set a pattern that American agricultural societies and farmers' fairs still follow today.

Agricultural societies on the English model, devoting themselves largely to offering gold medals for scholarly essays, had been founded shortly after the Revolution. The most famous began in Philadelphia, Pennsylvania, and Charleston, South Carolina, in 1785. George Washington and Benjamin Franklin were members of the Philadelphia society.

As early as 1804, a series of agricultural fairs opened in Washington, D. C. These were something more than the market fairs familiar in early colonial days. Premiums were offered for the best livestock sold. President Madison attended a similar event in Georgetown a few years later dressed in his homespun inaugura-

National Geographic Photographer John E. Fletcher

"Boy, What Service!" Young Acrobat Inveigles Backstage Help for His Make-up

Five-year-old Ervin Hall, riding a high-seated unicycle, brought down the house in the Eastern States Exposition's "big show," the Hippodrome of 1954. Elaborate music and staging of such shows bring Broadway to the fair. These roller-skating chorus girls changed costume seven times during the evening.

tion suit to help encourage American woolen manufacture.

But it was Watson who conceived the idea of annual fairs run by agricultural societies of farmers themselves. Their exhibits would not primarily be for sale, but would compete for prizes. Better farming and a fertile exchange of knowledge would result.

Many of Watson's early ideas would seem familiar on country fairgrounds even today. A master showman, he made eloquent welcoming speeches to the farmers, staged a grand agricultural ball, and persuaded the farmers' wives to bring their homespun cloth to put on display.

At that first show Watson headed a gala parade. For the 1811 fair, each farmer proudly wore a cockade of wheat in his hat. A huge plow guided by the two oldest men in the county was pulled by 60 yoke of oxen.

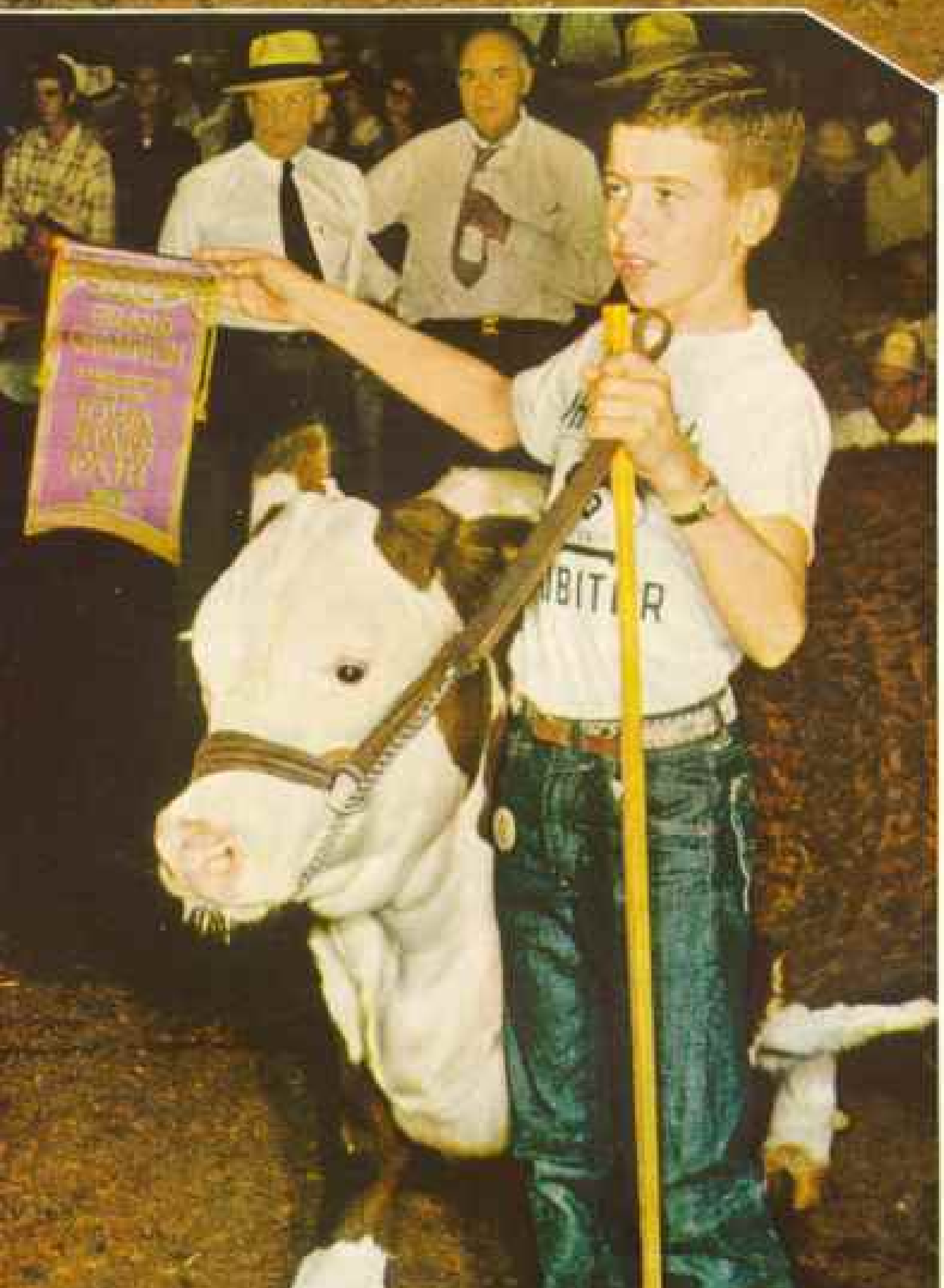
Berkshire plan societies, spurred by Watson's enthusiasm, soon spread, and survive today. Massachusetts still boasts the two oldest continuous fairs in the United States, at Topsfield and Northampton. Both began in 1818.

Of all modern U. S. agricultural events, perhaps Pennsylvania's Farm Show at Harrisburg follows Watson's original concept most closely. In a magnificent free festival, Pennsylvania each year dramatizes the products of its farms and life of its rural people. This show, strangely enough, opens in midwinter.

No other farm exhibit in the country is quite like it. Amid 13 acres of machinery displays, livestock-filled barns, and great arenas, visitors find no carnival attractions, no vaudeville acts, no race tracks. Yet in five days the Farm Show draws an estimated two-thirds of a million people.

They come through wide doors into a red-brick world of bright bunting and painted placards, of sound and color. There's a spirit among them remindful of well-painted barns and rolling fields, an accent in their voices unmistakably Pennsylvanian.

On the day of the big evening Rural Talent Festival, you must find a seat by midafternoon



↑ **Calf Scramble Turns into a Tug of War**

Dignity goes by the board in a wild melee of boys versus beef at the Iowa State Fair. Nine calves are turned into the stock pavilion with 18 boys lined up at the other end. Contestants try to put a halter on a calf and lead it to the judging stand, but they cannot interfere with a competitor so long as he has a grip on an animal. Later Armour & Company awards the nine winners registered purebred calves.

← **Baby Beef Champion Wins a Purple Banner**

A year of hard work and high hopes of 400 young cattlemen climaxes in the State Fair's 4-H Baby Beef Show. This half-ton whiteface Hereford, raised by 14-year-old Arnold Sheriff of Orient, Iowa, was chosen Grand Champion. Arnold's father won a banner two decades before.

On the fair's last day Arnold watched his steer go under the auctioneer's hammer. Iowa's Rath Packing Company paid $1,317.

Kodachromes by National Geographic Photographer John E. Fletcher

or not get in at all. For hundreds of farm youth this is the moment for which they've been practicing all year, learning songs and dances, memorizing cues.

"We don't have time for a dress rehearsal," director William R. Gordon of Pennsylvania State University said. "These youngsters come in from all 67 counties, sometimes take their positions in pitch darkness, and put on their festival for the first time together before 10,000 people. It's a night they'll remember the rest of their lives."

Teams Strain To Pull 20 Tons

Modern farm machines long ago began taking over work on the land, yet horse pulling contests are still held at fairs all across the country (page 323).

Pennsylvania's is spectacular. In the big arena at Harrisburg 10,000 spectators held their breath while lather-flecked draft teams of Belgian and Percheron blood snorted restlessly below, jingling heavy harness chains.

Then a steel hook clanged into place. From a farmer seated atop a specially designed pulling truck burst the shrill command: "Eeeaaah! . . . Dig! . . . Dig!"

A beautifully matched pair of horses lunged against their collars. Their task was to exert enough pressure through a system of pulleys to raise weights from the truck bed. Then, applying still greater sustained force, they were to pull forward the heavy truck itself against the retarding effect of hydraulic brakes.

Their muscles strained, and the wheels revolved, first by feet, then inches—slower—slower—Wham! The team stopped short in a final pawing surge; the weights dropped back to their seat.

"The winner . . . for a distance of 24 feet 5½ inches . . . pulling a weight equivalent to 20.1 tons . . ." The announcer battled a growing roar of applause. "State champion lightweight team . . . a new record for the Pennsylvania Farm Show!"

Between farm-style meals in the big cafeteria upstairs you wander amid displays of apples, honey, corn, tobacco, potatoes, and nuts, or watch State log-sawing and horseshoe-pitching championships.

Following a long-time tradition of the Farm Show, you buy a big baked potato, served piping hot on a paper plate with thick slices of golden butter (page 301). Washed down with tangy apple juice, it offers palatable proof that Pennsylvania is a place of more than coal and steel and roaring factories.

In striking contrast to this northern winter festival is the subtropical harvest that spills into pastel-stucco pavilions at the Florida State Fair in Tampa early in February: coconuts beside fresh-picked vegetables, orchids banked around oranges and grapefruit, blue herons in the poultry house.

Florida's State Fair often gives winter vacationers their first inkling of the size and diversity of the State's subtropical farm output (page 330). A half-billion-dollar industry, it is surpassed only by tourist trade.

From Florida comes more citrus—oranges, grapefruit, and tangerines—than the combined crops of California, Texas, and Arizona. Vast new acreage has been planted to citrus groves in the past 10 years to supply new frozen-concentrate plants.

Beef raising too is booming in the Sunshine State. Ranging on grass that grows winter and summer, Florida's herds are increasing steadily. In total number of beef cattle Florida now stands third in the South after Texas and Oklahoma.

Tampa's Señoritas Grace State Fair

Distributing center for southern Florida and port for much of the U. S.-Caribbean trade, Tampa has a strong Latin personality. In Ybor City, Tampa's Cuban cigar manufacturing quarter, State Fair time transforms the streets with night dancing and illuminated parades. Señoritas drift through palm-shaded patios in Spanish gowns and lacy mantillas held high by ornate *peinetas* (decorative combs) in their hair.

Parades tie up Tampa traffic during fair time. Biggest and most famous is the Gasparilla Invasion (page 328). It draws half a million visitors each year.

Decked out in swashbuckling pantaloons, blazing pirate shirts, and knotted bandannas, 350 roistering members of Ye Mystic Krewe of Gasparilla man a full-rigged ship that sails up the Hillsborough River into Tampa.

Blank cartridges crackle like a Chinese New Year. Dummies swing by hangman's neckties from bowsprit and boom. Both river banks are lined by cheering onlookers. Brandishing blunt cutlasses, the buccaneers storm ashore to join the 2-hour-long Gasparilla parade to the fairgrounds.

Historians may question the legend of a bloodthirsty renegade named José Gaspar roaming Florida's west coast a century and a

↑ **Soil the Color of Bitter Chocolate Curls from Moldboards; an Iowa Plowing Match Finalist Finishes a Double Furrow**

↓ A farmer's draft team, plow-power of a fast-vanishing sort, surges against its harness in the Iowa State Fair horse pulling contest. Hoofs churn up the ground as the team pulls against iron weights and a hydraulic drag equaling a load of roughly 20 tons.

half ago. Tampa, however, has taken him to its heart, celebrating in 1954 its 50th annual Gasparilla revel.

The State fairgrounds lie just beyond the fantastic silvered Moorish minarets of Henry B. Plant's old Tampa Bay Hotel, now the University of Tampa.

Four Ferris wheels loll over and over against the midway's skyline. Tin-panny tunes rise from the whirling merry-go-round, and an old-fashioned calliope toots its piercing pipes.

Siren Song of the Carnival "Talker"

Midways cast the tinseled but unfading lure of fairs. They take away the years and reawaken memories of childhood excitement. But think twice before venturing to follow an actual youngster through an afternoon of fun there. I know: I tried it!

One afternoon photographer Roberts and I staggered off a mechanical squirrel cage called a "Looper," in which we had been alternately rocked back and forth and stood on our heads. Carl J. Sedlmayr, wise in the way of carnivals, laughed at us.

"Royal American assumes no responsibility for you birds," he said.

Billed as the largest traveling midway in the world, Sedlmayr's Royal American Shows winters on the Florida State fairgrounds. In busy shops it manufactures and repairs its equipment, rides, costumes, and lighting. When Sedlmayr puts his show on the road later in the year, it takes 70 double-length railroad cars to carry the complete setup.

Royal American's "carnies" spend eight months on a fair circuit from Tampa to Edmonton, Alberta, and back. They have a lingo all their own. A side-show spieler is not a "barker," as in a circus, but a "talker." He "ballys" skeptical crowds, enticing them into the "girlie-girlie" show or into trying their luck at a "hanky pank" game such as the "hoop-la" ring-toss booth or the baseball-throw "cat racks" with their stuffed animals.

About 300 U. S. carnival companies, large and small, compete for fair bookings. Some are railroad shows like Royal American and the Amusement Company of America. Others travel by huge trailer trucks; Frank W. Babcock covers the entire Pacific coast that way with his United Shows.

They represent a major entertainment industry. Royal American alone estimated it had 16,000,000 visitors in a recent season —five times the population of Florida.

Other businessmen are realizing that today's fairs offer hordes of people in a receptive mood for seeing—and buying. Fair exhibits represent advertising of high impact value—the "touch, try, and compare" sort. At every fair I visited, display space had been sold out months ahead.

Electrical appliances, from attic exhaust fans to cellar dehumidifiers, building materials and entire prefabricated houses, sewing machines, pianos and electric organs, even stocks and bonds are shown, explained, and sold at the fair.

At Tampa a complete kitchen of home appliances was displayed in a glass-fronted tank of water. Performers breathing from air hoses acted an underwater domestic skit.

The Borden Company's "Elsie the Cow" and "Beauregard," her calf, have traveled the United States making personal appearances at fairs. Among other honors, Elsie is the only cow ever to have received an honorary degree from the University of Tampa.

When we reached Texas in October, there was Elsie! Thousands of manufacturers' displays filled great buildings fronted by modernistic sculpture two stories high. Texas has gone further than any other State in making its fair a giant exposition of both farming and industry. In one of its half-dozen exhibit buildings it boasted $3,500,000 in automobile displays alone.

Water, Key to Texas Plenty

But first things are not forgotten at the Texas fair—the soil, what grows from it, what grazes upon it. An "Agriculturama" dramatized the State's need for water and its proper use in raising better crops and livestock.

Animated dioramas showed the State's widely differing farm regions, where grow cotton and cattle, sugar cane and rice, watermelons and turkeys—and miles of grass.

In the livestock pavilions I watched judging of silver-gray Brahmans and sleek black Aberdeen-Angus; marcelled Herefords and handsome roan Shorthorns; and mahogany-red Santa Gertrudis, product of scientific crossbreeding at the huge King Ranch.*

Quarter horses compete in roping and cutting out contrary calves whose stiff-legged

(Continued on page 333)

*See "King Ranch, Cattle Empire in Texas," 26 natural-color photographs by Howell Walker and Justin Locke, National Geographic Magazine, January, 1952.

↑ Draft Geldings and Mares Compete for Ribbons on a Hot Iowa Day

In today's tractor age farmers keep horses like these chiefly for show. This Belgian-bred gelding, with coveted white mane and sorrel coat, won the championship in his draft horse class at the Iowa State Fair. His handler nudges a foreleg into better position.

↓ "This Is the Way We Milk a Cow, So Early in the Morning . . ."

Champions or not, cows have to be milked during fairs. Here an agricultural student demonstrates technique on a Holstein at the Pennsylvania Farm Show. Farmers breed their show cows to freshen just after fair time; the animals look best when about to calve.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Midway Lures Fairgoers with Rides, Side Shows, and Cotton Candy

A fair's amusement area—midway, fun zone, or gayway—usually is a separately owned concession. Traveling carnivals bring in rides and games, paying fees that provide a large part of the fair's revenue. One exception is the State Fair of Texas, which operates its own amusement park all summer in Dallas (page 294).

Above: Two hilarious riders try a midget roller coaster at Florida's State Fair. Monkeys driving miniature race cars in the banner-fronted side show usually end up in a riotous snarl.

Right: Cowpunchers take time out for a sticky, frothy swirl of air-spun sugar.

←A cluster of gas-filled balloons tugs at its strings at the California State Fair. Vendors do a brisk business in chameleons and crazy hats. With Iowa, California this year celebrates the State Fair Centennial.

Some midway rides such as the merry-go-round date from the Middle Ages. Today's Ferris wheels bear the name of an American engineer, George Washington Gale Ferris. His giant revolving wheel, built for Chicago's Columbian Exposition of 1893, stood over 250 feet high and held 1,440 passengers.

Kodachromes by National Geographic Photographers J. Baylor Roberts and (right) Kathleen Revis

Pirate Ships Sail Straight into the Heart of Tampa on Gasparilla Day

Like Mardi Gras in New Orleans, the Gasparilla carnival highlights Tampa's social year. King Gasparilla and his Mystic Krewe, a band of otherwise serious civic leaders, stage a tumultuous "invasion" each February during Florida's State Fair. Flags fly and cannon roar from the flotilla on the Hillsborough River. Landing beneath the city's skyline, the corsairs march in a float-festooned parade through the business district to the fairgrounds.

329 Kodachrome by National Geographic Photographer J. Baylor Roberts

Thousands Line the River as Buccaneers Swarm Ashore to Collect a City's Tribute

José Gaspar, legend-surrounded Florida freebooter, reputedly led a mutiny aboard a Spanish warship in 1783. Calling himself Gasparilla, he turned to piracy and became the terror of the Caribbean and Gulf of Mexico. Tradition relates that he jumped to his death, wrapped in chain, during a disastrous fight with a disguised man-of-war in 1821. Tampa's carnival Krewe built a $100,000 copy of Gasparilla's ship for its golden jubilee in 1954.

Grapefruit Arrow Points to a Tangerine County on a Citrus Map of Florida

↑ Flopsy's Ears Give a Sure Grip for the Judge

Hundreds of rabbits go on show at fairs across the country. They are especially popular in California and Florida.

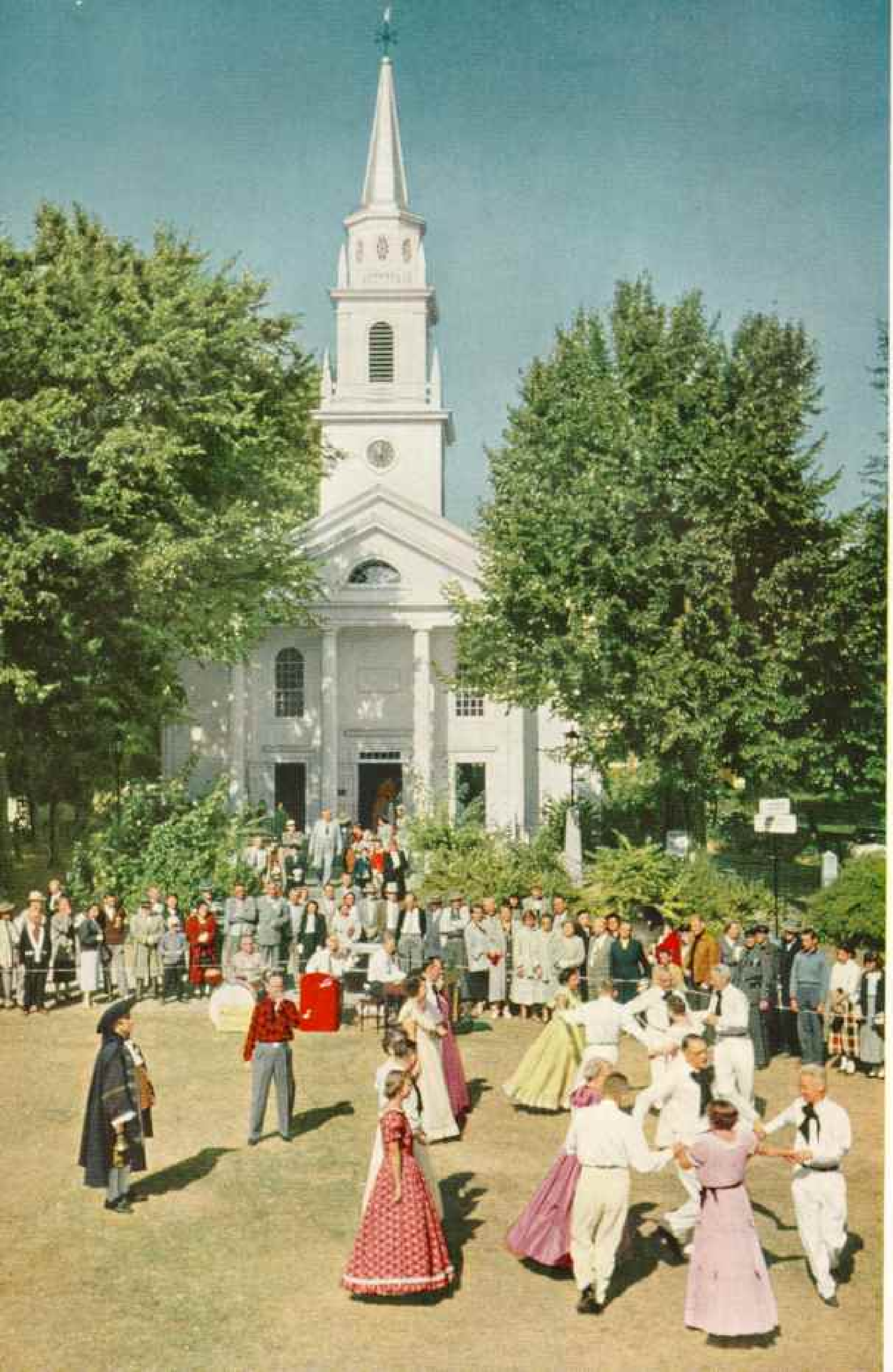
Here Oscar F. Schultze, president of the American Rabbit & Cavy Breeders Association, judges a New Zealand Red at the Florida State Fair. If the rabbit struggles, he blows on its nose to quiet it.

In most cases these fancy rabbits are raised just for show purposes. Some belong to youthful hobbyists; others are entered by commercial rabbitries, most of whose animals eventually provide meat, fur for hatters' felt, or ornamental pelts for furriers.

Contrary to popular assumption, rabbits seldom increase their numbers during a fair. Does about to kindle are not entered; handling might harm them.

4-H Club Girls Dress with Equal Flair in Jeans or Gowns →

At fairs everywhere, farm girls exhibit clothes they have made themselves. Here Sally Curtis of Bakersfield, California, prepares to model a party dress in a 4-H fashion parade.



maneuvers at escape would do credit to a broken-field runner in football.

Texas fairgoers can see the gridiron sport too. Rising in the center of the fairgrounds, the giant Cotton Bowl takes the place of the jumbo grandstands at other State fairs. Eleven football games were part of the 1953 fair program—Texas versus Oklahoma annually sells out all 75,504 seats.

Texas Chickens Can Hit Home Runs

Yet football crowds account for less than a tenth of total attendance at the State Fair of Texas. The first impression upon a stranger suddenly set down in the Dallas fairgrounds is people, endless masses of them!

Consider a few statistics from the 1953 fair. Attendance: 2,382,712, or slightly more than the total population of Philadelphia. Cold drinks sold: 3,200,000, enough to fill even a Texas-size swimming pool. Potatoes: three freight-car loads just for French fries.

Half a million people saw themselves on a television screen. Farm-machinery demonstrators sold 3,000 streamlined toy implements. A scientific weather exhibit produced 3,800 miniature tornadoes. Eight baseball-playing chickens hit 6,400 home runs (trained hens release feed by pecking a spring-operated bat). Enough trash and debris was swept from the fair's streets and buildings to make a pile as high as a 40-story office building!

"How can anyone see everything here at the fair?" runs a familiar lament in Texas. The answer is: "You can't. But we hope everyone will find something to his liking."

A seemingly endless schedule of events ranges from crochet contests to antique automobile shows, from Angora goat judging to a planetarium offering visitors a simulated trip to the moon.

Biggest of the "big days" at the State Fair of Texas comes when it entertains 100,000 4-H Club boys and girls, Future Farmers and Future Homemakers of America, some traveling from El Paso more than 600 miles away.

They begin arriving at dawn. By midmorning the main parking lot is a sea of bright-yellow school buses (page 294).

At noon the fair stages a mammoth picnic for this army of rural youth. Dallas businessmen, firemen, police, and Boy Scouts help in serving 20 hungry lines. To keep things straight, a director stands on a platform with a public-address microphone.

Last year's picnickers swallowed enough grape punch to keep four fire hoses flowing for three hours, enough hot dogs in oversize buns to reach 10 miles end to end.

At many a fair today over half of all the livestock and domestic arts entries are made by boys and girls of the various rural youth organizations, such as 4-H and FFA.

Their participation is unlimited in enthusiasm and effort. Fairs in return offer them great reward, from the first matchless ribbon at the age of 10 to the last baby beef prize before turning 21.

Where else can a beginner in the business of living bring a calf or a cake or a homemade bedspread and walk away with applause, ribbons, premiums, or enough money for a year of college? It happens, at fairs!

Oscar the Sturgeon 28 Years at Fair

Fairs are as many different things as there are people who go to them. To the farmer they offer new knowledge, stimulus, and a chance to see how the other fellow is doing. To the city dweller they convey the memory of youthful summers spent on a farm, or an eye-filling vision of a bountiful land.

A fair is Old Oscar, Iowa's famous sturgeon, that died in his tank on the last day at Des Moines, after 28 years at the State Fair. It's a boy in Texas who put his hand too far into a chimpanzee's cage, whereupon the ape bit off the end of a finger. It's a nearsighted acrobat in Massachusetts who had to judge his leap by the spotlight's glint on his chrome-plated rig, and the person who lost a set of false teeth at the horse show and was too embarrassed to answer the announcer's call to come get them.

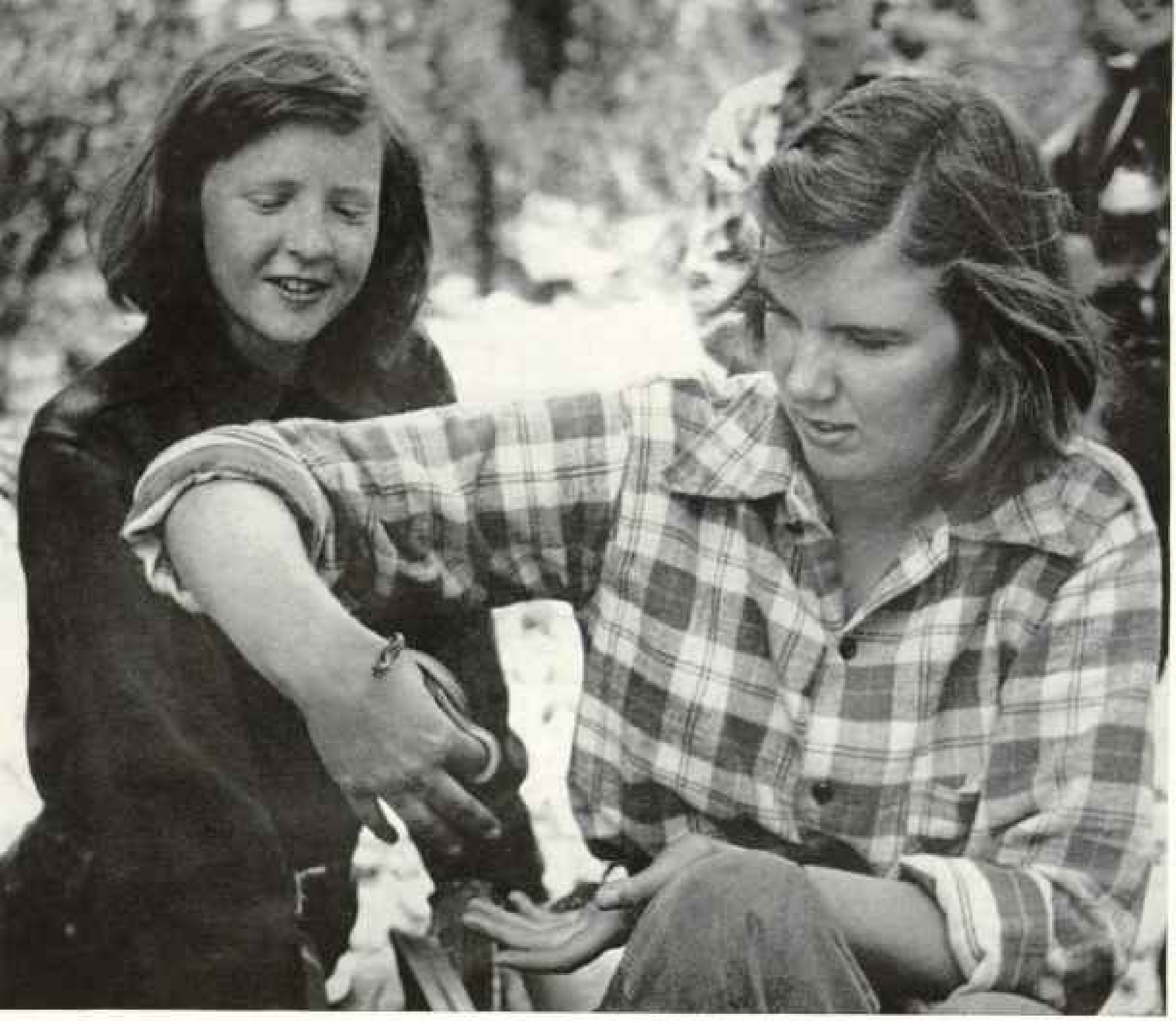
It's the siren song of the midway and the roar of the crowd as the sulkies come around the final turn, colors flashing in the sun. It's the best that grows from America's soil, the newest products of its factories, the skills of its country homes.

And it happens every year!

← Square Dancers on Storrowton Green Whirl to Call of "Change the Ladies"

Authentic creation of an old-time New England town, Storrowton was begun in 1927 at the Eastern States Exposition in Massachusetts. The 1834 village meetinghouse came timber by timber from Salisbury, New Hampshire. Town crier with bell, buckled shoes, and tricorne hat stands watch.

Kodachrome by National Geographic Photographer John E. Fletcher



Our Snake Friends and Foes

By Doris M. Cochran, Ph.D.

Associate Curator, Division of Reptiles and Amphibians, U. S. National Museum

With Paintings by National Geographic Artist Walter A. Weber

ARDENT summer sunshine warms the old stone wall bordering the field. The time of Nature's abundance is at hand; heads of wheat hang over from their own weight. A big black-and-yellow king snake, who has been sunning himself on the wall, slithers off into the ocean of wheat. He has eaten nothing for three days, since his meal of young rats taken from beneath a farmer's corncrib.

At first he prowls at random among the wheat stalks, rubbing his nose lightly over the ground, almost like a dog picking up the trail of game. Soon he catches a scent and moves ahead. The trail twists and turns, but the king snake is a born tracker and follows straight to the quarry. His prey today is a large field mouse, gorged on the grain she has been devouring and heavy with unborn young.

The little animal sees the snake before he sees her and dashes into one of the many doors of her underground burrow near by. But this subterranean home with its numerous entrances is of no service to her now. The snake goes into the tunnel, seizes the trembling mouse with his sharp teeth, and in a moment all is over.

The king snake, however, is not the only hunter afield this morning. A young timber

← Fear Gives Way to Curiosity: "Why, It's Not Slimy at All!"

California schoolgirls, handling a tame Garter Snake for the first time, register mixed emotions as they discover that the reptile's skin is as dry as their own. Many harmless snakes can be tamed to become gentle, unusual household pets.

Dent Larry

rattlesnake, foraging since early dawn and now a little sluggish from a heavy breakfast of shrews and field mice, is returning to a convenient crevice under the stone wall where he can digest his meal.

As he is about to enter, the king snake appears right in his path. Although the rattler is not accustomed to giving ground to any living thing, he tries this time to avoid the big king snake; gorged with food, he is not inclined to battle.

But the king snake has no intention of letting him go in peace. With a swift movement he seizes the rattler by the neck and weighs him down with the muscular folds of his powerful body.

A furious struggle begins; the grass writhes under the impact of the lashing combatants. Desperately the rattlesnake contorts his body in an effort to free himself from the pointed teeth and choking coils. Once he almost succeeds in anchoring himself around a small stump and pulling free. Several times he manages to bite the king snake, but the venom has little effect. Soon the wearied rattler relaxes; he can no longer resist the king snake's grip.

Jaws Expand to Swallow Large Prey

Now begins the swallowing process. The rattler, though shorter than the king snake, has a much wider body. How can the narrow jaws of the king snake possibly encompass so large a mouthful?

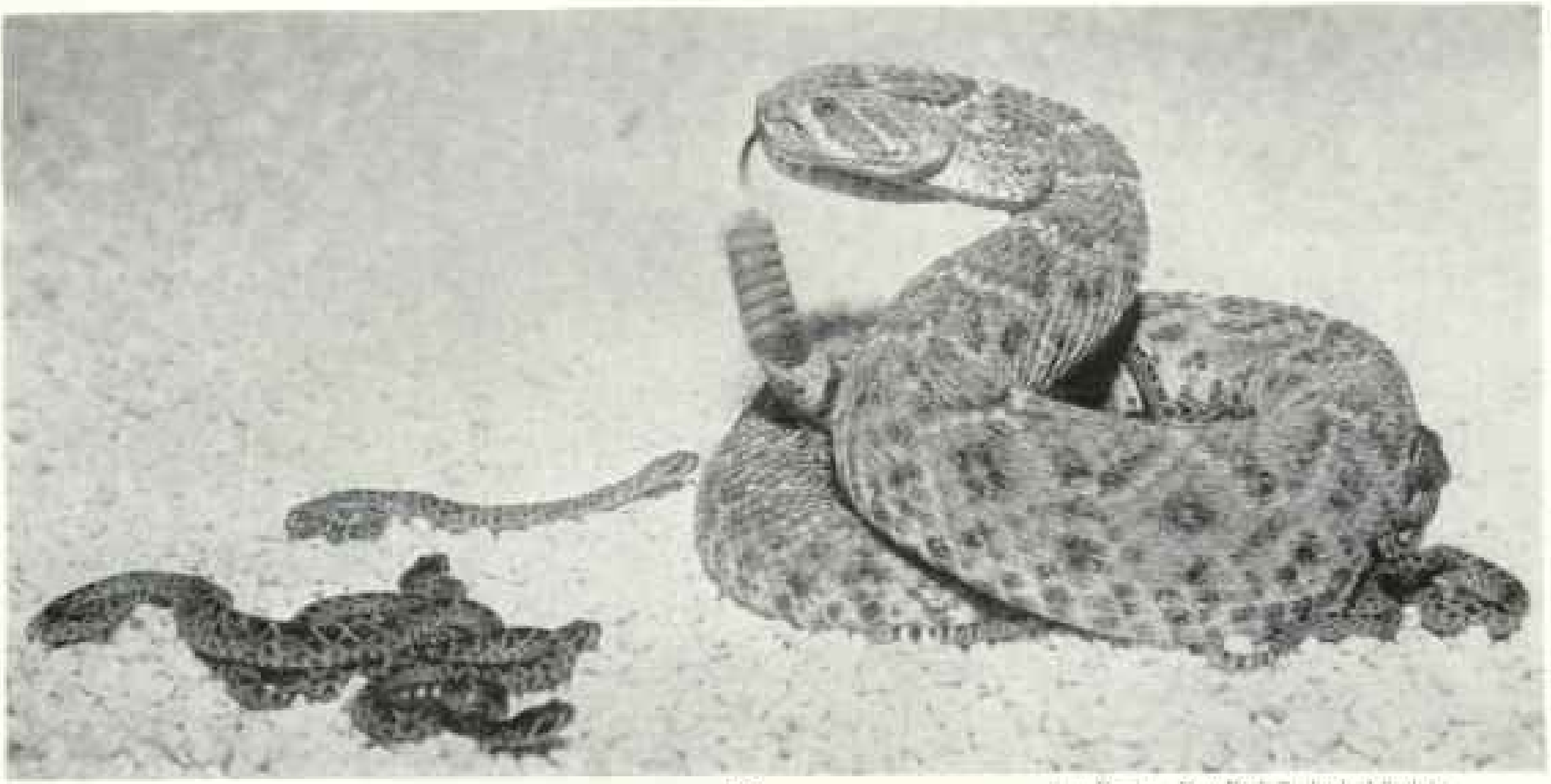
Nature has taken care of that. The jaws of all snakes are put together with ligaments that stretch during feeding, so that the mouth easily distends to several times its normal diameter. Since the snake has no hands with which to hold food, the needlelike teeth are recurved: their tips point backward down the throat. It is virtually impossible for a snake's prey to pull away without severe lacerations.

The two halves of a snake's lower jaw can move independently of each other. As the left half of the mandible holds, aided by the teeth of the slightly movable upper jaw, the right half may be advanced along the body of the animal being swallowed. Then the left is similarly advanced, while the right part holds. Slowly the prey is engorged (page 350).

National Geographic Photographers Robert F. Sisson and Donald McBain

Friendly Man Meets Friendly Snake

Cold-blooded reptiles enjoy the warmth of human hands. A zoo keeper plays with this King Snake.



Ivan Dmitri, New York Zoological Society

In half an hour only the tip of the rattler's tail remains in view. Then with a final swallow even that disappears. Full to repletion, the king snake does not attempt to travel far, but curls up along the base of the stone wall to "sleep off" his orgy of eating.

Snakes do not sleep quite as we do. Their eyes never shut, for a transparent windowlike protective disc is fixed permanently in front of the eye. In sleep the pupils contract; sometimes the muscles governing the eyeballs are relaxed, so that the eyes remain at different angles to the head.

After feeding heavily, snakes become very sluggish and may remain almost motionless for several days while digesting food. In hot climates snakes, like people, take a siesta

↑ Pound for Pound, Mother Rattler and Offspring Are Deadly Equals

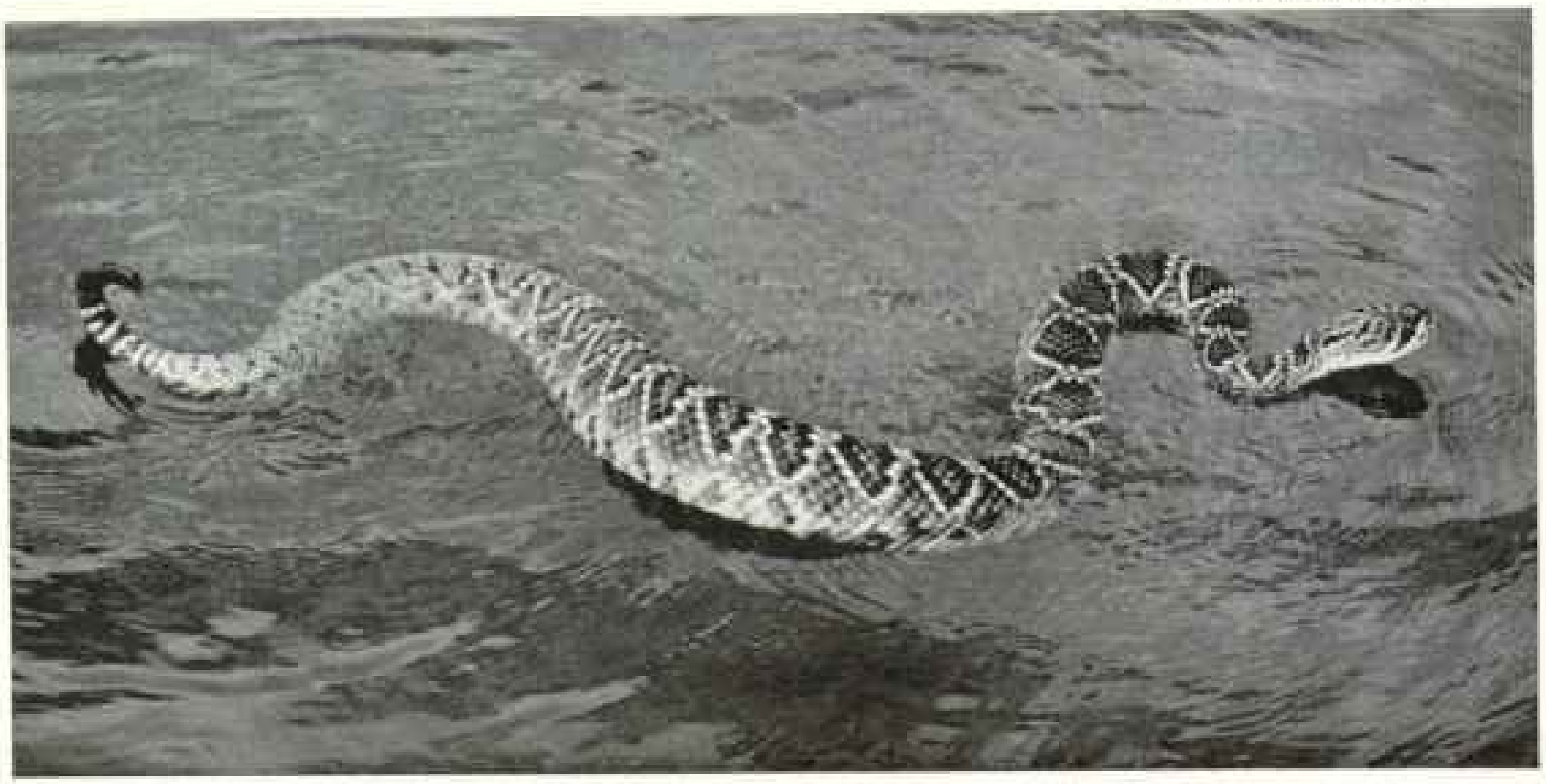
Almost 40,000 persons die of snakebite each year, according to a recent United Nations World Health Organization report. The Western Diamondback Rattler (above) probably causes more fatalities than any other United States species. Burma has the world's highest death rate from snakebite: 15.4 persons annually per 100,000 population.

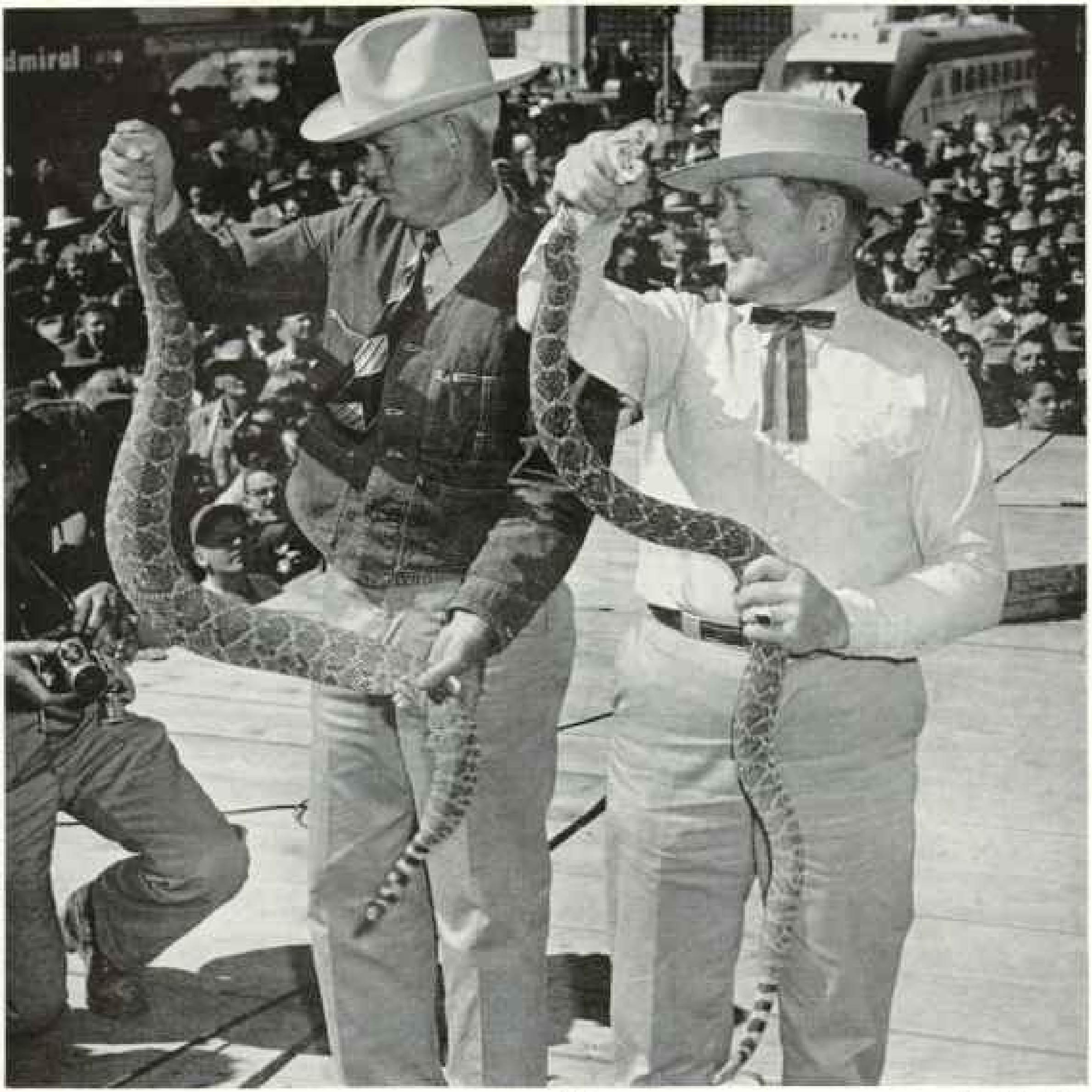
Even the young of venomous snakes are dangerous; their poison apparatus, and the instinct to use it, are fully developed at birth.

↓ Rattle Dry, Head Held High: Good Swimming Form for an Eastern Diamondback

Contrary to general belief, snakes can swim. They bite almost as effectively under water as on land. The distance swimming snakes can strike, however, is shortened by lack of firm support.

Ross Allen's Reptile Institute





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Dane Penland

Zoos and Medical Laboratories Profit from Oklahoma's Rattler Roundup

Members of the International Association of Rattlesnake Hunters annually converge on Okeene, Oklahoma; this year they bagged nearly a ton of the squirming killers. Much of the catch goes to biological laboratories for milking of venom, used in the manufacture of snakebite serum. Here proud hunters compete for largest rattler; neither of these specimens could approach the winner, a 75½-inch Western Diamondback.

during the heat of the day. Experiments prove that exposure to the full rays of the sun in the deserts of southern California can kill a sidewinder rattler in nine minutes. The reptiles of desert regions instinctively seek shady spots in which to spend the midday hours, and they do their hunting between dusk and dawn when it is cool.

King Snake Goes A-courting

A few weeks before the king snake's successful battle with the rattler, he had come out of winter hibernation and felt the urge to find a mate. His keen sense of smell quickly told him that no female king snake had passed near the section of the stone wall where he made his home. It was necessary, therefore, to travel.

Crossing the wheatfield, he entered the adjoining meadow. In a grove on a hill the king snake caught an odor that told him he was near the object of his search.

The grove held a network of trails made by a female snake, some of the scents faint with the passing of time, some freshly made. The freshest led him to a low-growing shrub

Harmless Water Snakes Thrill Visitors to a Florida Reptile Farm

Nonpoisonous water snakes, often mistaken for water moccasins (page 346), display quick tempers in the wild; once accustomed to captivity and regular meals, they become fat, lazy, and tolerant of humans. These wrigglers are exhibited in Ross Allen's Reptile Institute at Silver Springs.

near the edge of the grove. Here he found the female, glossy black with a chain of golden scales crossing her body at intervals. Her forked tongue—a sensitive receiver of the slightest smell as well as an organ of touch—darted in and out, bringing her news of the intruder; but she showed no fear.

The male crawled over her once or twice, and, as she remained passive, he laid his body against hers; soon mating was effected. Some time later the snakes moved apart and went their ways, the male eventually returning to his haunt near the stone wall.

About two months after the mating the female king snake realized she must find a nest for the eggs that were increasing in size within her body. She roamed among the bushes and shrubs of her favorite grove and finally entered a log partly filled with powdery, decaying wood. Knowing by age-old instinct that such a place is an ideal incubator, the mother snake coiled herself within the dark cavity of the log and after a while began to lay.

In the next two hours, at intervals of a few minutes, she deposited 15 white, leathery-shelled, cylindrical eggs in the wood dust. The eggs were about 1¼ inches long by ½ inch wide and lay in a heap where the female's body had encircled them. Shortly after the last one was laid, she untwined her body and crept away.

Babies Hatch in Nature's Incubator

She made no attempt to cover the eggs; they were already partly embedded in the soft wood pulp, and the cavity of the log was small and dark. She seemed to know that, if left undisturbed in their wooden incubator for several weeks, the eggs would hatch. The mother gave them no further attention and returned to her usual haunts on the other side of the grove.

The slight amount of heat generated by the decaying wood and the warmth of the midsummer sun striking on the outer surface of the log combined to speed the development of the embryos within the eggs. Stain from

the wood powder gradually colored the shells a dull brown; a short time after the eggs were laid they were practically invisible.

The soft, pliable, but tough shell changed in outline and contour as development of the embryo progressed, showing bulges and hollows to fit the small new body taking shape within. Three of the eggs were opened by ants and their contents eaten. The remaining 12 grew normally.

About five weeks after the mother had left them, one of the larger eggs began to heave and wobble. A tiny slit appeared in one end of the shell, and a pair of round bright eyes peered out for the first time. The whole head soon poked through the crevice. A little later an 8-inch snakelet perched atop the heap of eggs containing his laggard brothers and sisters.

He did not have long to wait for them. In a few hours the hollow log swarmed with baby snakes. By the third day, only a heap of empty torn shells was left to mark the site of the nest.

Snakelets Shed Skin to Grow

On the tip of each little snake's nose was a small, hard, pimplelike structure called the egg tooth, which had been sharp enough to make the first incision in the shell above the young snake's head. It would disappear soon after hatching.

The baby snakes did not immediately make their way outside. Still attached to each was the remainder of a yolk sac which had provided nourishment during the prehatching period; the youngsters had no need to hurry in seeking their first meal.

While resting near the scene of their hatching and still feeding upon the egg yolk, the little snakes began to grow ever so slightly. The scaly skin of snakes cannot stretch to accommodate growth, as does that of mammals and birds. Nature therefore has made provision for growth by the frequent shedding of the entire outer skin, leaving beneath it a new skin a little larger than the old one.

Jack Dermid

Rough Bark Provides a "Foothold" for a Bold Prowler

Snakes crawl by moving overlapping crosswise belly scales, or plates. Few species can climb trees as readily as this North Carolina Corn Snake (pages 351, 353), which selected a rough-barked loblolly pine for its demonstration. Handsome colors, hardiness, and docile nature make this yard-long constrictor a favorite of amateur naturalists.

In the shedding process a milky oil is secreted between the old and the new skins to loosen the outer one. The eye, permanently covered with the transparent eyelid skin, becomes milky for a day or two before the shedding, a fact which has led to the belief that snakes become blind just before they shed their skins. Certainly they cannot see plainly during this time and will often strike at anything that comes near them.

As the next stage of shedding approached, our little snakes presented an amusing appearance. Some of them wore white ruffs, like circus clowns; others sported bristling white mustaches. These comic effects resulted from the splitting of the old skin around the edges of the mouth, where shedding always begins, and the turning of the old skin over the head and neck, just as a glove might be pulled off wrong side out.

The little snakes now became very active and crawled under the small bits of wood in their nest in an effort to rub off completely the old clinging skin. Some got it off in one piece, turned inside out but preserving a perfect impression of its former owner, even to the head scales and the "window" over the eye. Others tore it into fragments before they got rid of it, so that white patches of parchmentlike skin trailed from every projection inside the log.

The ordeal of hatching and shedding was now past, and the contents of the yolk sac nearly used up. The young snakes were ready to emerge into the world beyond their log. No fraternal instinct held them together; each went his separate way.

Earthworms for Breakfast

As the first young king snake glided from the log into the sunlight, he was indeed an object of beauty. His miniature black scales glowed like polished jet, and the yellow chain pattern showed brightly in contrast.

His small forked tongue flickered in and out to bring him sensations of his surroundings, for a snake's tongue is an instrument of touch and smell combined. Although the tongue itself neither tastes nor smells, its tips carry traces of odors from the air or from anything they touch into a pair of sense organs in the roof of the mouth—smelling areas that augment those in the nose.

Instinct bidding the baby snake keep under cover, he made for a thicket of blackberries; beneath the bushes the ground was soft and moist from a recent rain. Merely by poking his head under a leaf our young snake secured a fine earthworm for his first breakfast.

He found good hunting, too, in the bramble patch for such small quarry as worms, small lizards, and salamanders, and he remained there for some weeks, amply fed and growing rapidly. Whenever he came upon rain water in some stony depression, he drank by partly submerging his head, expanding his lower jaws, and sucking the water into his throat.

Occasionally he encountered some of his brothers and sisters who had taken up residence in the same bramble patch, but he paid little attention to them. Skin shedding took place three or four times before the end of summer, and our little snake increased considerably in size.

Stiff Muscles Warn of Winter

He was hunting now for larger prey and had become a skillful climber. It was a lucky day for him when he found a bird's nest with eggs in a bush a few feet from the ground. He found a tunnel containing some newborn meadow mice and ate them all. One day he dined upon a garter snake, which he had no trouble in subduing, although it was three inches longer than he.

The warning of winter's approach comes to all woodland creatures in the increasing cold of night and the lessening of the sun's heat by day. Our little snake found it more and more difficult to uncoil his body after a long, chilly night, for the cold had partly stiffened his muscles.

He soon crept into a deep hole under the roots of a tree and worked his way back into a thick bed of drifted leaves that would form a blanket against winter's snow and ice. It did not matter to him that he acquired other bedfellows. A couple of large toads moved in after him; a spotted salamander and a score of millepedes were already under the leaves when he made his way in, although he never knew it.

The next five months were a complete blank so far as our young snake was concerned. Snow piled high around the tree trunk, and storms shook the branches, but nothing disturbed the deep trance of his hibernation. All of his vital forces slowed down, so that he required no food or water.

An insensibility far deeper than sleep overtook him. Only warmth could penetrate his

(Continued on page 349)

Painting by National Geographic Artist Walter A. Weber

Poised Body and Buzzing Rattle Warn All Comers: Don't Tread on Me!

Largest of North America's poisonous reptiles, the sinister **Eastern Diamondback Rattlesnake** has reached nearly nine feet. This nocturnal prowler's vertical pupils close more effectively than round ones to exclude daylight's glare.

Early Visitors to the New World, Seeing Rattlers for the First Time, Reported Serpents with Bells on Their Tails

To the Colonies' first settlers the **Timber Rattlesnake** (left) was as typical of their wild new homeland as the turkey or red Indian. Though widely feared, he is less irritable than other rattlers. Horns and a sidewise gait distinguish the little **Sidewinder,** or Horned Rattler (right), of our Southwestern deserts.

No Holds Are Barred When Scaly Scrappers Meet; for One, a 3-foot Dinner Hangs in the Balance

Unless the **Prairie Rattlesnake** turns tail, the odds are heavily in favor of his being swallowed half alive by the boldly banded **California King Snake.** Though rattlers have been known to kill themselves by accidentally striking their own bodies, their venom has little effect on the nonpoisonous King.

Black Nose Distinguishes a Killer; Harmless Mimics Both Wear Red

Ringed **Coral Snake** (lower), distant relative of India's cobra, seizes a blue-tailed skink; stubby fangs inject a nerve-destroying venom. In habits as well as colors the nonvenomous **Scarlet Snake** (left) and **Scarlet King Snake** (upper) copy the deadly Coral; all three are secretive, burrowing species of our Southeast.

Swift Death Lurks in Sinewy Coils; a Grain Thief Pays for His Crimes

Western ranchers value the lithe **Bull Snake** because of his appetite for rodent pests such as this Richardson's ground squirrel. Hens' eggs also attract the snake; one captive swallowed 14 at a meal. Automobiles take unusually high toll of this powerful constrictor, which sometimes reaches a length of 8 feet.

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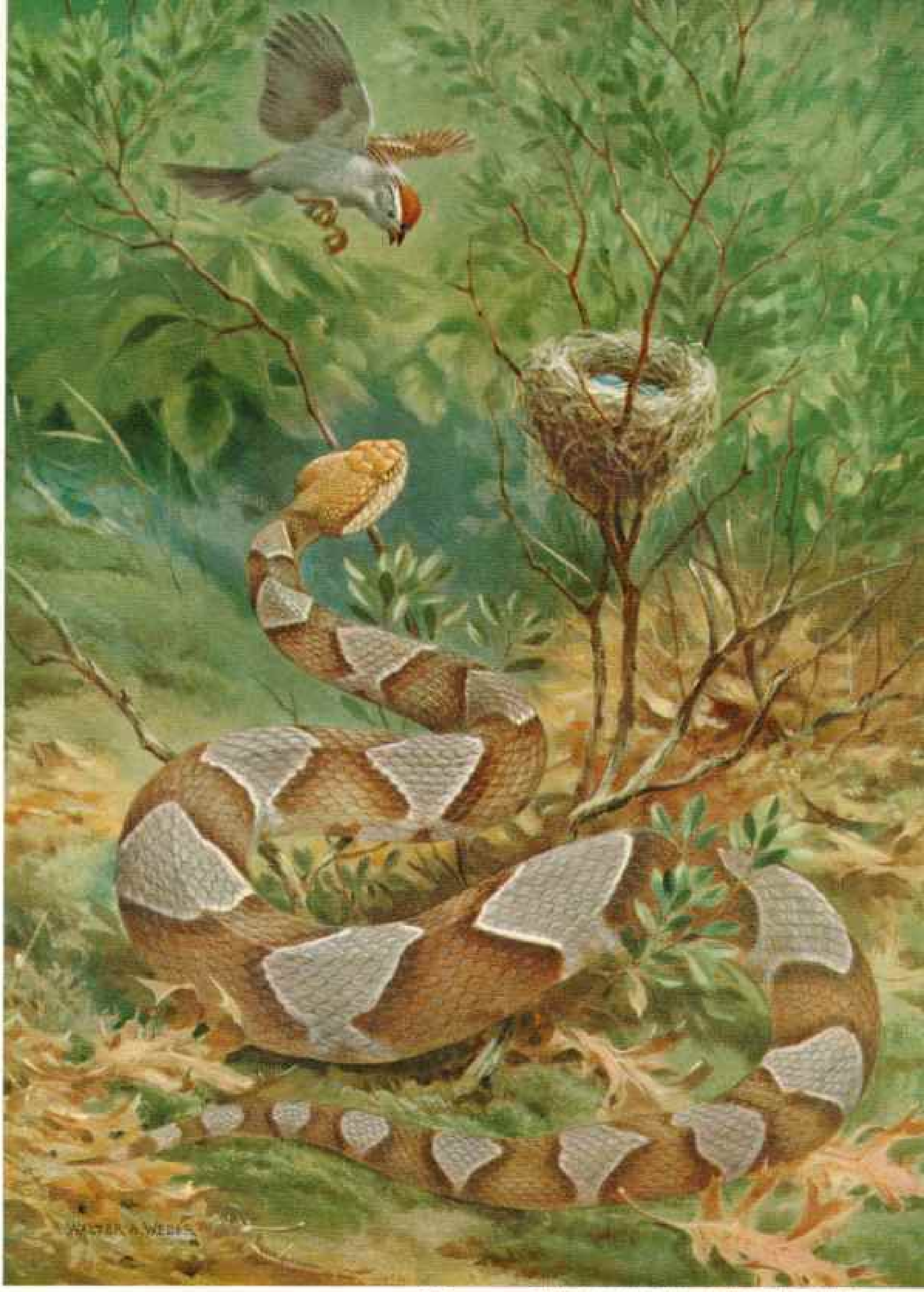
Deadly Fangs Mark One of These Fish Eaters, a Bad Disposition the Other

Only a practiced eye can differentiate quickly between the **Water Moccasin,** or Cottonmouth (lower), and the irritable but nonpoisonous **Banded Water Snake:** Cottonmouth has catlike pupils and a pit between eye and nostril.



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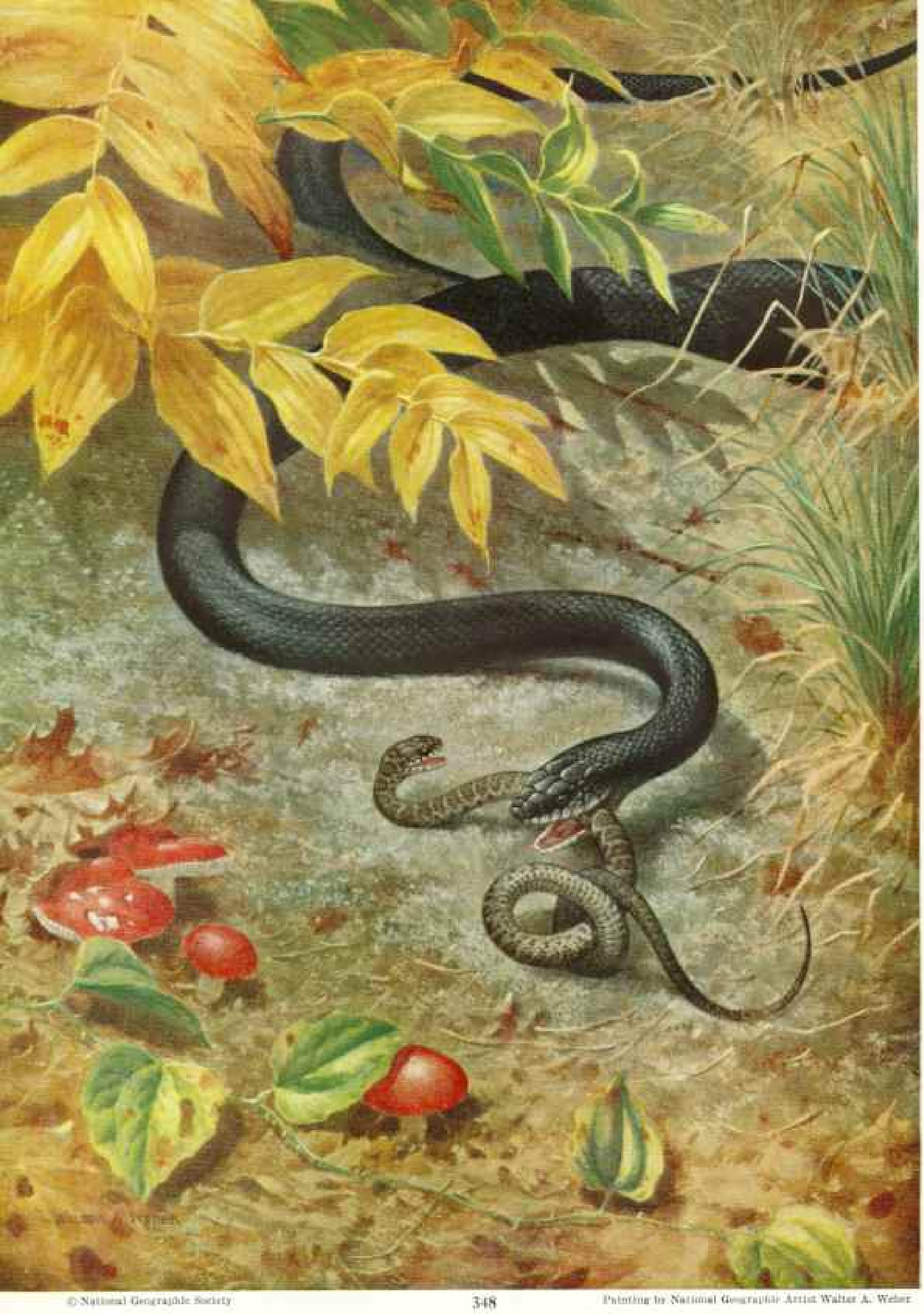
A Feathered Fury Defends Her Nest Against a Dragon 30 Times Her Size

Baby birds are a favorite springtime food of the richly marked **Copperhead;** mother chipping sparrow or her eggs would be acceptable substitutes. Earth colors effectively camouflage this venomous serpent.



Painting by National Geographic Artist Walter A. Weber

Junior Is Just Another Mouthful for This Sleek Cannibal

Snakes lack the intelligence to recognize their offspring. The speedy **Blacksnake,** plentiful in most eastern States, will eat his own spotted babies as readily as mice or frogs. The young become black during their third summer.

numbed consciousness. He was in no danger of freezing, however, for he had burrowed well below the frost level of the ground, and the decaying leaves that covered him generated some heat even in midwinter.

At last the sun turned northward. Leaves pricked out on the bushes, grass turned green, and brooks ran free of ice. The stiffened muscles of the hibernating snake became pliable with the increasing warmth. One day in early April he emerged from his hide-out to take up again his warm-weather existence of hunting and sleeping.

Farmer Recognizes a Friend

Finding his way to a barn, he dined on field mice and barn rats that were stealing the farmer's hard-won stores. As he sometimes traveled openly by day, the farmer saw him prowling about the foundations of the barn. Knowing him to be nonpoisonous and in search of destructive rodents, the farmer was careful not to step on him or harm him in any way.

The farmer knew, too, that if all the offspring of a pair of field mice were allowed to breed, and if all their descendants continued to breed, more than a million mice would spring from the original pair in a year. Rodent-eating snakes are of great value not only to agriculturists but to townspeople as well, for house rats are bearers of disease, and few towns have adequate facilities for trapping or poisoning them.

One day the farmer stooped over the young king snake, with his hand flat and his fingers held close together, giving the snake no surface to bite. Passing his hand over the snake's head, he gently grasped his neck and picked him up. The experience of a restraining hand was a new one to the snake, but as the farmer's grip was loose and the warmth of his hand pleasant, the reptile soon settled himself to enjoy the new position, with no attempt at biting.

Hens' Eggs Swallowed Whole

The farmer released the snake near the feed bin, where the rodents held nightly picnics. After this, the young snake stayed in the barn most of the time. His increasing appetite could be easily satisfied there. Although his dim reptilian intelligence could not comprehend the liking felt for him by the farmer, the snake's natural fearlessness and gentle habits made him seem almost like one of the domestic animals.

Our king snake was not wholly without fault in his barnyard tenure, however. In his "wild" days he had eaten birds' eggs whenever he came upon them; therefore he took as his right any hens' eggs that he found. Each egg was swallowed whole, as he had no way of breaking the shell. Digestive juices dissolved the shell, so that the lump which marked the position of the egg in his digestive tract soon disappeared. When the farmer considered the value of the many bushels of grain the king snake had saved for him by killing the rats that would have spoiled it, he did not begrudge a few hens' eggs in exchange.

The eastern king snake (*Lampropeltis getulus getulus*), the "hero" of our story, is sometimes called "chain snake" because of its skin pattern. It is found from southern New Jersey to northern Florida and Alabama. Closely related forms in other parts of the United States and Mexico differ mostly in the width and arrangement of the dark and light areas on the body.

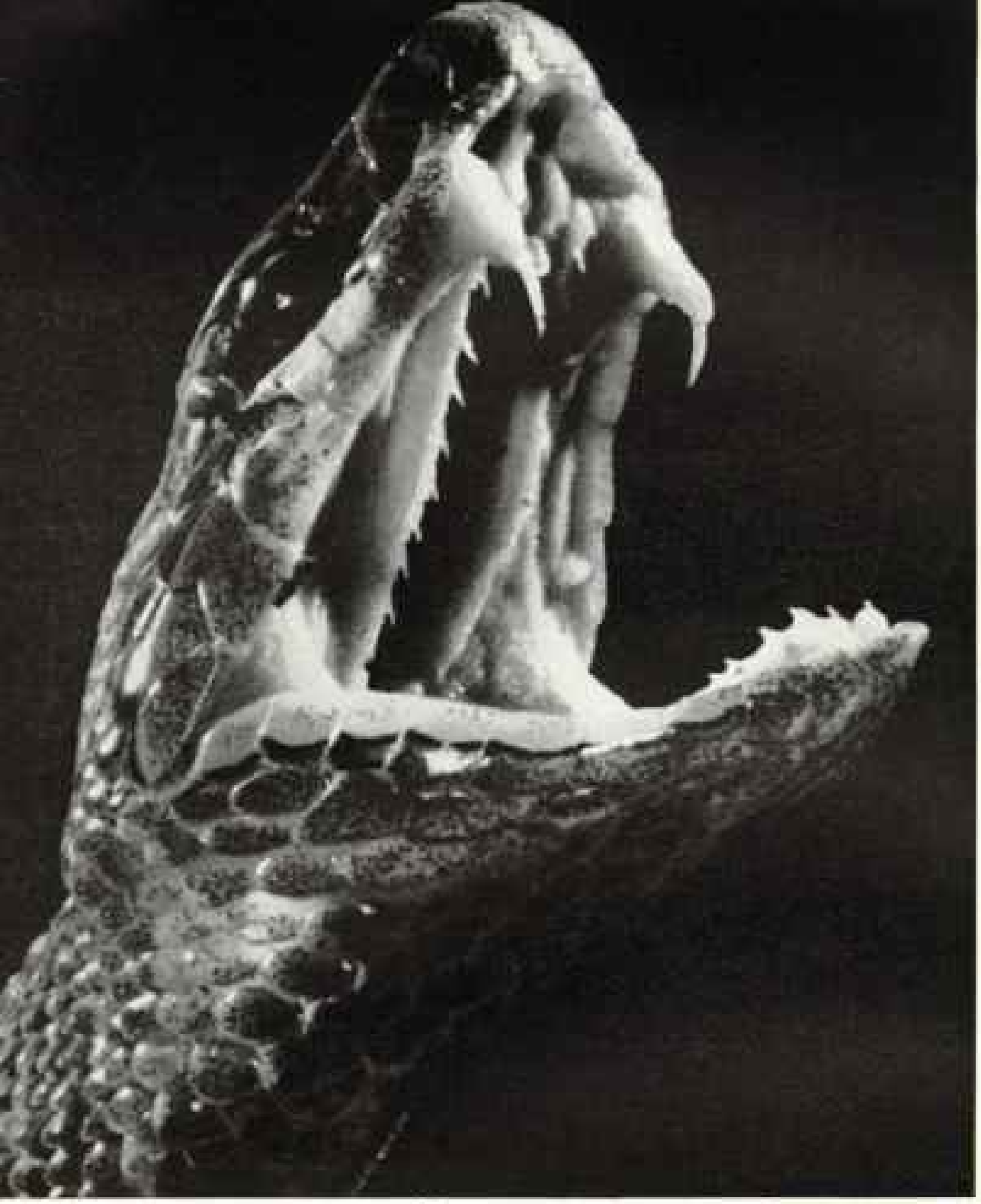
Myth of the "Horn Snake's" Sting

The California, or Pacific, king snake, occurring in California, Nevada, and Arizona, is often striped, especially in southern California. Sometimes banded ones are found; these were formerly considered as a separate form, to which the name of Boyle's king snake was given. But when a set of eggs from a single female produced both striped and banded young, it was realized that the one species had two distinct color patterns and that the striped and banded ones all belonged to the form *Lampropeltis getulus californiae* (page 343).

Milk snakes (*Lampropeltis doliata triangulum*) are closely related to the king snakes. Searching barns for rodents, they have been falsely accused of coming there to suck milk from the cows. Snakes have no sucking muscles strong enough to draw the milk, and the sharp teeth of a snake fastened on her udder would not long be tolerated by any cow in her right mind.

Many superstitions about snakes have grown up, usually with a small grain of truth to a bushel of invention. Such is that of the "horn snake," which is supposed to have a sting in its tail so powerful that, if it strikes a tree, the tree will die.

Here is the grain of truth in this story. There are two species of mud-dwelling snakes,



← Fangs Erected, Mouth Agape: Coppery Danger

Copperheads, among the commonest poisonous snakes of eastern North America, are responsible for many bites, but relatively weak venom makes fatalities rare (page 358). They frequent brushy and rocky areas from Massachusetts to Texas.

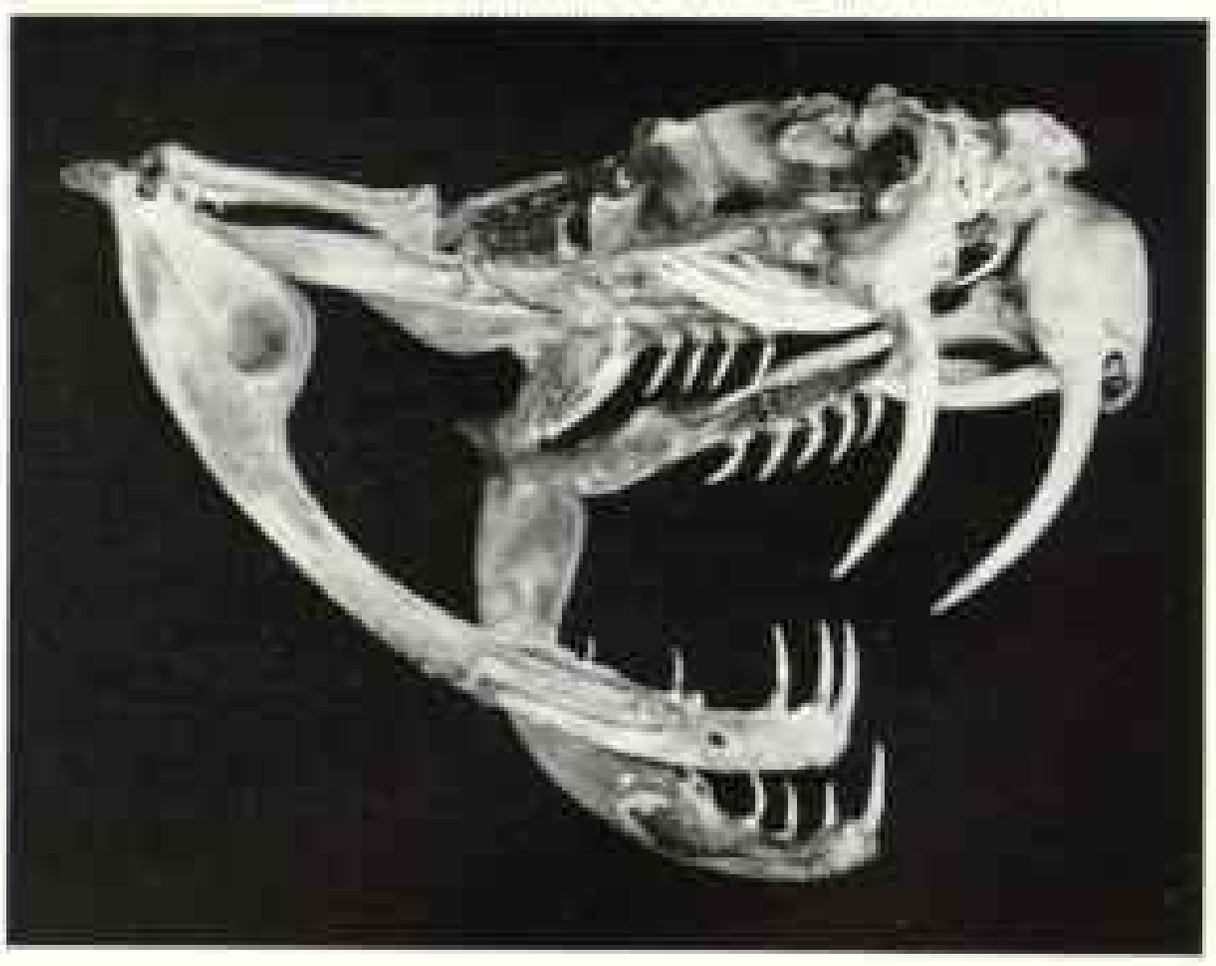
Robert K. Lunt

↓ Pit Viper's Skull: All Teeth and Jaw

Stripped of flesh, the fangs of an American pit viper are revealed as Nature's original hypodermic needles; channels carry poison through them from sacs behind the eyes. The snake usually keeps these oversize teeth laid back, but pulls them erect as it starts to bite. They are easily detached; sometimes one may remain in the snakebite. Another later moves up from the row of replacements visible behind the large fangs.

Lower jaw, divided at the chin, stretches apart to allow the snake to swallow animals larger than itself (page 335).

Ravi Dutton, New York Zoological Society



the mud snake (*Farancia abacura*) and the rainbow snake (*Abastor erythrogrammus*, page 355), which burrow in the ooze of ditches and swamps in the southern States. To secure leverage on their slippery way through the mud, they have developed a pointed terminal scale on the end of the tail.

This scale usually cannot break the skin of a person's hand. But when one of these snakes is picked up, it tries to push downward through its captor's fingers, and in so doing presses its tail against his hand—after which he usually vows that the snake was trying to sting.

In male snakes the sexual organ is often miscalled a "stinger."

The yellow-bellied racer (*Coluber constrictor flaviventris*) is found from the Mississippi to the Rocky Mountains and in most of the southern States. It grows to a length of nearly six feet. Like its close relative the black racer, or blacksnake (*Coluber constrictor constrictor*, page 348), it undergoes a complete change in appearance as it matures.

The young racer has a checkerboard pattern of dark-gray rectangular blotches on a pale ground. As growth progresses, the spots become dull, and the entire back and sides turn bluish gray or olive in the yellow-bellied racer, shiny black in the blacksnake. Such a complete change in pattern and color is not common among snakes. The young of most species are miniature copies of the adult, except that their colors are often lighter.

Another relative of the yellow-bellied racer

is the Great Basin, or striped, whip snake, *Masticophis taeniatus taeniatus*, occurring in the southwestern United States and northern Mexico. Its slender body and long tail show an extreme degree of streamlining.

Snakes Cannot Keep Up Fast Pace

The speed at which snakes travel has always been a subject for speculation. Although some snakes can escape from a man running over rough ground covered with underbrush, they can keep up such a speed for only a brief time. Our fastest species, the western whip snake, crawls at the rate of scarcely more than three miles per hour and when hunting prowls at a quarter of a mile per hour.

One of the largest snakes in the United States is the indigo snake, *Drymarchon corais couperi*, which is known to attain a length of 7 feet 9 inches (page 354). It has equally large relatives in Central and South America. Around human habitations it is—or should be—welcome as a good ratcatcher; it will also eat birds, lizards, frogs, toads, and other snakes. It ranges from South Carolina through the Gulf States to the Rio Grande.

Among our most valuable reptiles are the bull snakes and gopher snakes, of the genus *Pituophis*.

The bull snake, *Pituophis catenifer sayi* (page 345), grows to a length of more than eight feet and has an appetite in proportion to its size. Rats, mice, pocket gophers, rabbits, ground squirrels, and birds are its chief food. When alarmed, it gives a loud hiss by expelling air from its lungs against a flap of skin on the floor of its mouth, just at the end of the windpipe. It betrays its nervous temperament also by its habit of rapidly vibrating its tail. In dry leaves or grass the sound is similar to that produced by a rattlesnake.

The corn snake, *Elaphe guttata*, is another scourge of the rodent hordes. Farmers meet it often in cornfields where rats and mice forage as soon as the grain begins to ripen. Gentle in captivity, the corn snake is one of our most beautiful serpents (pages 339, 353).

Nearly invisible among the branches of low

Pink-eyed and Pearly, an Albino Corn Snake Contemplates Its Captor

The author describes this rare color variant of the common Corn Snake as one of the most beautiful of reptiles. Blood vessels gave it a pink color through its translucent skin; the normal pattern (page 353) showed only in contrasting scales of grayish white. Conspicuous in the woods, few albino snakes reach maturity in the wild; this one lived for a time in the National Zoological Park, Washington, D. C.

Ernest P. Walker

trees and bushes is the rough green snake, *Opheodrys aestivus* (page 356), commonly found from New Jersey to Florida and west to New Mexico. It feeds almost entirely on insects, especially on grasshoppers and crickets.

If one tries to attribute human characteristics to one's reptilian friends, the eastern hognosed snake, *Heterodon platyrhinos*, merits the title of bluffer. Here is one of the gentlest of snakes, scarcely ever attempting to bite. Yet when first captured he puts on one of the fiercest acts in the snake world (page 355).

Bluffing Hognose Huffs and Puffs

Inflating and flattening his head and neck, he expels his breath with a threatening hiss-s-s and jabs his head forward at the aggressor for all the world like a copperhead, which he somewhat resembles. Touch him lightly with a stick, and he begins to writhe and twist as if in utmost agony. Then he turns over on his back with his tongue hanging out of his mouth, as if he had not a breath of life left in him.

If you pick him up, he remains limp; if you place him right side up on the ground, he immediately turns on his back, to continue playing dead. Stand back out of sight for a minute, and the "dead" snake flops over, retracts his tongue, and crawls off about his business as if nothing had happened.

The hognose is so named because of a turned-up nose with a sharp ridge on top, useful in burrowing. Toads are his favorite food, although he occasionally eats frogs. The female lays from 12 to 42 eggs, usually in a dry, sandy place late in June, and the hatchlings appear in about three months. Some individuals are melanistic—that is, nearly black; others are almost brick red in color. Their greatest adult length is about 43 inches. They range over most of the eastern States, and closely related forms are found in Florida and the West.

Who can imagine the strange instincts of subterranean dwellers? The blind snakes of the genus *Leptotyphlops*, family Leptotyphlopidae, living in our southwestern States have forsaken the light of day for a perpetual existence in underground corridors.

These small burrowers are beautifully adapted for their close habitation. Minute glasslike scales and elongated streamlined bodies (8 to 12 inches) allow them to slip with ease through the smallest earth crevices. The tail is short and ends in a sharp, spiny point that can be pressed against the ground to add the infinitesimal amount of leverage needed to get past some pebble-sized obstruction.

The eyes are covered with thick, protective scales. At most, they can distinguish only between total blackness and the lesser gray which means that they are near the surface of the ground. But who needs keen eyesight underground? The minute flickering tongue unerringly feels out plenty of succulent worms and insect larvae.

No one yet knows how these tiny snakes find mates, but the eggs of some of them have been found, half the size of a pea, and the young have been hatched in the laboratory. When one knows how to look for them, blind snakes are quite abundant, though seldom found above ground. Their numbers prove how well their restricted existence protects them from the dangers that ordinarily beset small snakes of nonburrowing species.

Other burrowing snakes have eyes that, although small, have not degenerated. Under stones and fallen logs in most of our eastern States one is apt to find a highly polished tan-and-pink snake, about 10 inches long, which wriggles like an earthworm when it is picked up. This is the worm snake, *Carphophis amoenus*, fairly common but seldom seen. Almost constantly in hiding, it feeds upon soft-bodied insect larvae and earthworms.

The eastern ring-necked snake, *Diadophis punctatus edwardsi* (pages 356, 359), is also secretive in habit, concealing itself under leaves, in piles of debris, or in other sheltered places. Its maximum size is about 20 inches. The female lays up to 12 eggs, rather large in comparison with her small body. These eggs already contain well-developed embryos at the time they are laid, so that they hatch much sooner than those of most egg-laying snakes.

Poisonous Blackhead Harmless to Man

Several kinds of ringnecks are known, occurring in most of our States from the Atlantic to the Pacific.

The little DeKay's snake, *Storeria dekayi* (page 356), may be found hiding under debris and is abundant east of the Rocky Mountains. Viviparous, this snake gives birth to 12 to 20 living young in late summer, avoiding the hazards to which snake eggs are exposed.

The Great Plains black-headed snake, *Tantilla nigriceps*, occurs from Kansas to Texas. Though its head is no larger than a bean, it is

(Continued on page 357)

Painting by National Geographic Artist Walter A. Weber

Lucky the Farmer Whose Cornerib Is Guarded by This Bright-scaled Hunter

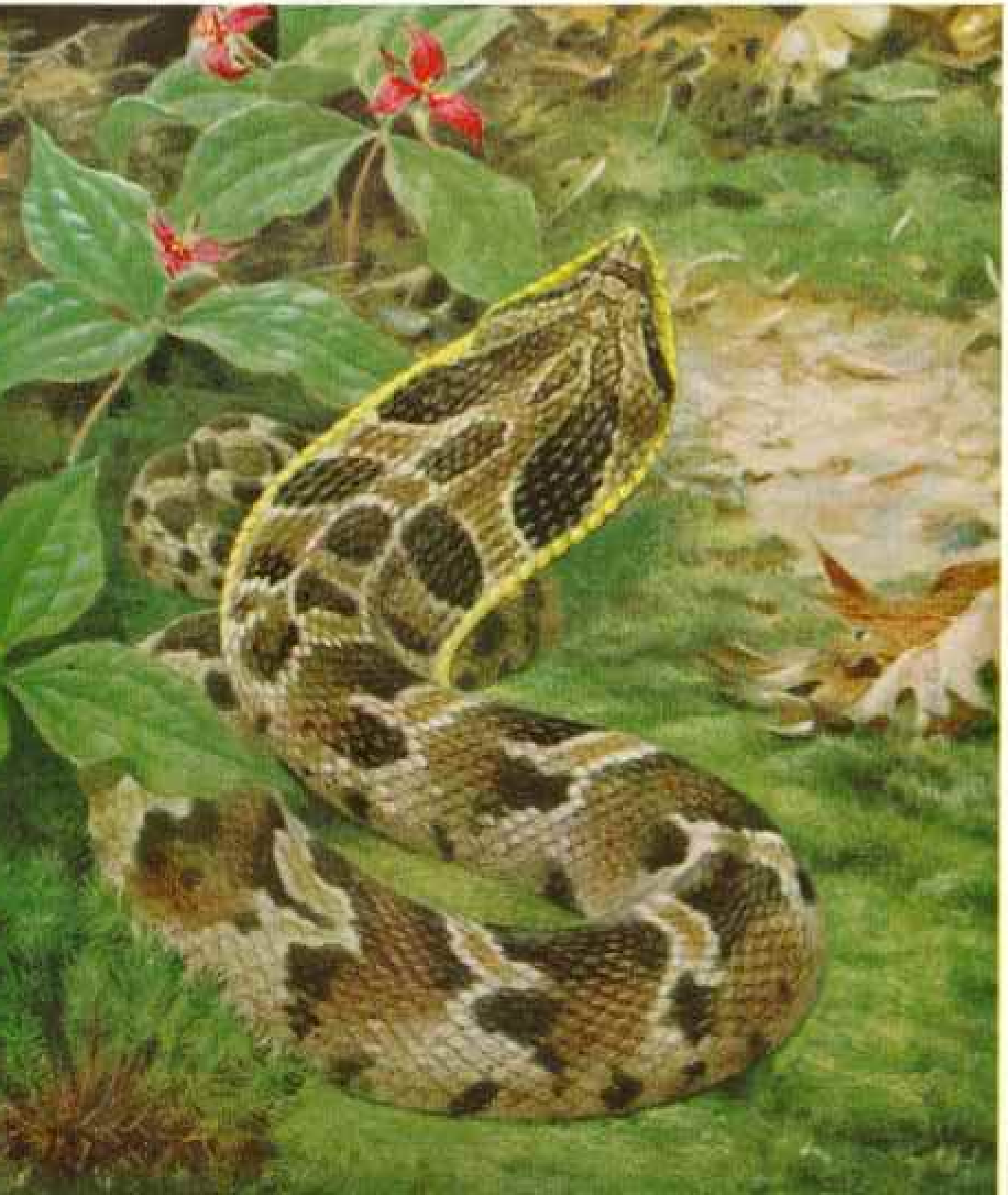
A taste for rodents makes the widely distributed **Corn Snake** one of our most useful reptiles. In spring the agile climber mars his reputation by scaling trees in search of young birds.

Gentle and Easily Tamed, This Mirror-shiny Serpent Makes a Spectacular Pet. He Is a Favorite of "Snake Charmers"

Carnival side shows often exhibit the nonpoisonous **Indigo Snake,** frequently found in burrows of Florida's gopher tortoise.

Nature's Ham Actor Relies on Bluff to Escape Enemies

The harmless **Hog-nosed Snake** huffs and puffs, and spreads a cobralike hood. If that fails to save him, he turns belly upward and convincingly plays dead.



Gaily Hued Swamp Dweller Lunches on a Spotted Salamander

Hidden in the mud, the shy, inoffensive **Rainbow Snake** is rarely seen. Back-country people believe that he takes tail in mouth and rolls like a hoop.

Paintings by National Geographic Artist Walter A. Weber

Harmless Prowlers Help Rid Your Garden of Insects

Among the commonest of eastern snakes, these visitors to suburban lawns and gardens vie for the same mouthful: a katydid. Ridged scales identify the **Rough Green Snake,** above; near-perfect camouflage protects him. Striped **Garter Snake** relies on a speedy getaway.

Secretive Habits Protect Snakedom's Miniatures

Plentiful if one knows where to look, the little **Ring-necked Snake** averages only a foot long; favorite haunts include stumps and hollow logs. **DeKay's Snake** (left), dwarfed relative of the water snakes, is even smaller. He finds ideal homes on trash-strewn lots.

provided with poison glands and tiny grooved fangs in the back part of its jaw. Since its minute teeth can scarcely puncture the skin of a human being, however, it may be classed with species harmless to man.

The eastern garter snake, *Thamnophis sirtalis sirtalis* (opposite), belongs to a genus of which at least one form is found in every State. One extends north into British Columbia; others are found as far south as Guatemala. All the garter snakes bear their young alive and some are very prolific; as many as 50 young may be born at a time.

The wandering garter snake, *Thamnophis elegans vagrans*, is much like its eastern cousin in habits. It is common along the coasts of Washington, Oregon, and California.

A close relative of the garter snake is the eastern ribbon snake, *Thamnophis sauritus sauritus*, occurring in most of the States east of the Mississippi. It lives in damp localities near ponds and streams and hunts tadpoles and salamanders for food. It has small families of only 12 or so, in contrast to the much larger litters of the garter snake.

Another group of snakes bearing live young belongs to the genus *Natrix*, or water snakes, with many species not only in this country but in Europe, Asia, and Africa as well. The banded water snake, *Natrix sipedon fasciata*, has the notoriously bad temper of most water snakes. Although it is not venomous (page 338), it can defend itself well by giving a lacerating bite with sharp-pointed teeth. As nearly all of this group eat fish, they are held in disfavor by sportsmen.

All the foregoing, except the blind snakes, are members of the largest snake family, the Colubridae, with members on every continent. Most of the Colubridae are nonpoisonous; a few have grooved rear fangs and poison glands.

Venomless Water Snakes Will Bite

Some harmless snakes appear at a casual glance to resemble certain of the poisonous kinds closely. In the Chesapeake Bay area, well outside the range of the true water moccasin, the common water snakes are often called "moccasins" by local fishermen.

Although the water snake will defend itself savagely by biting if annoyed, its teeth are solid, and it produces no venom. Because of its habit of climbing out of the water to bask on sloping tree trunks or stranded logs, it sometimes climbs into a boat at anchor, much to the consternation of the returning owner, who may find a hostile, hissing snake defending its right to stay aboard.

The differences in appearance between the true water moccasin and the water snake are well indicated in the illustration on page 346. The poisonous moccasin has a pit between eye and nostril; the harmless water snake lacks this feature.

Facial Pit Is a Sense Organ

This facial pit distinguishes the pit vipers, which include the rattlesnake, copperhead, and true water moccasin. A specialized sense organ, it consists of two cavities, between which lies a delicate membrane. The outer cavity, usually less than a quarter of an inch across, can be seen in the living snake. The inner cavity is concealed; a small pore in front of the eye gives access to it.

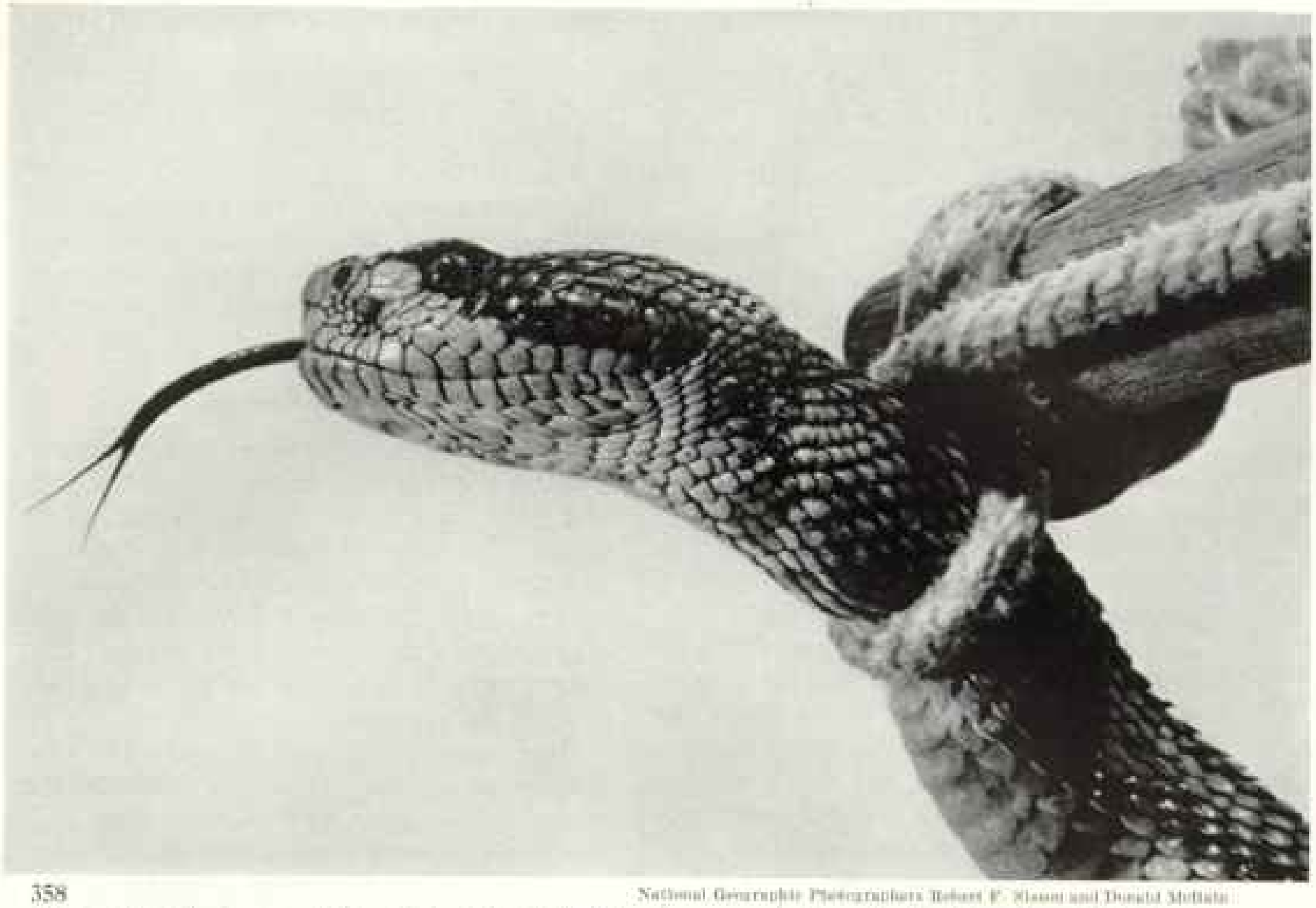
Even when blindfolded, the pit viper can distinguish between warm and cold objects moved in front of it some distance away and will direct its strike toward these objects even in total darkness. It tends to strike at the warm object more readily, but will also attack the cold one if it is moved vigorously in front of the snake.

Some of the pythons and boas have shallow, open depressions along the lips. Similar experiments of moving warm and cold objects in front of them have led to their striking in the same way as do the pit vipers. All such pits and labial grooves, therefore, enable the snakes which possess them to detect their prey by sensing its body temperature at a distance even in darkness. No wonder these snakes are so successful in hunting small mammals at night!

The poisoning apparatus of a pit viper is one of the most complex and effective mechanisms in the animal world. The bite is administered by a pair of long, hollow fangs on the upper jaw at the front of the mouth. These fangs, folded back against the roof of the mouth when the snake is not in action, are voluntarily erected when the mouth is opened to strike (page 350).

Behind each functional fang is a group of smaller ones, which will increase in size to take the place of the main one when it is either shed or broken off.

The modified salivary gland producing the poison shows as a prominent swelling on each side of the head at the outer angle of the jaw. (A popular belief is that all snakes with tri-



358 National Geographic Photographers Robert F. Sisson and Donald McBain

Flickering Tongue and Sensitive Pit Aid This Nocturnal Prowler in Locating His Supper

Snakes never "sting"; they bite. The forked tongue is a harmless but efficient organ of touch (page 340). The pit between eye and nostril is even more useful. Its delicate heat-detecting membrane helps a pit viper find his prey; sensing the presence of a rat or mouse by the warmth of its body, the serpent strikes unerringly (page 357). A noose on a stick holds this Timber Rattlesnake firmly and safely.

angular heads are poisonous. Many harmless snakes, however, have a neck distinctly narrower than the head, so that the head may appear quite triangular.) The poison is carried forward from the gland by a duct emptying at the base of the hollow fang. A sheath of whitish skin, surrounding the fang when it is retracted, keeps the poison from being lost.

The venom of all the pit vipers found in the United States is primarily hemotoxic; it damages the red blood cells and ruptures the capillary walls.

Diamondback Is Worst Killer

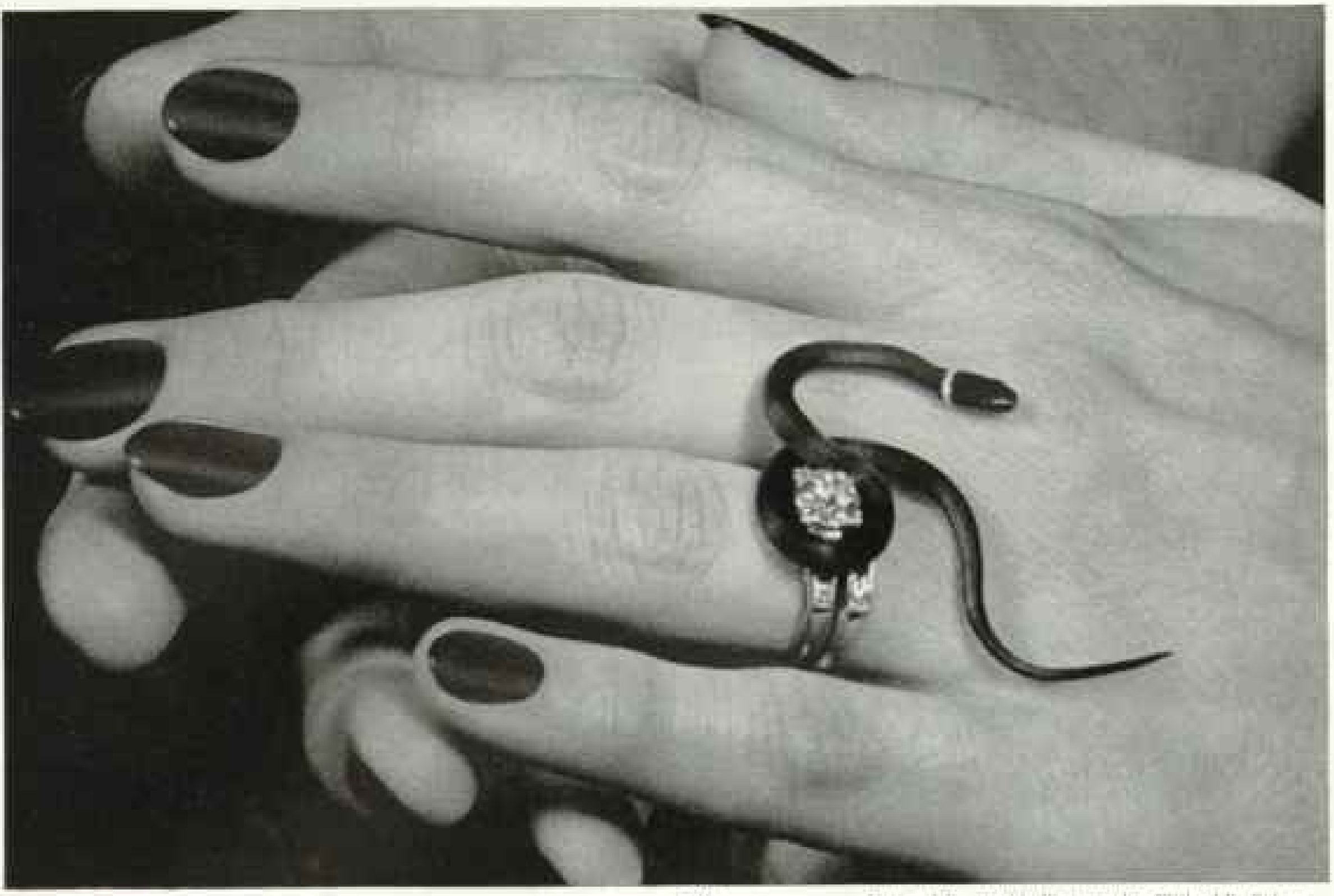
Probably the most dangerous snake in the United States, the one responsible for more deaths than any other, is the western diamondback rattler, *Crotalus atrox*, which has been known to reach a length of a little more than seven feet. An adult's fangs are almost an inch long and may produce as much as a teaspoonful of poison at one bite.

More people are actually bitten by the copperhead than by any other pit viper in the United States, but, because of the fairly low toxicity of its venom, its bite seldom causes death in human beings. Of course people have been known to die of shock and fright alone, even when bitten by a nonpoisonous snake.

Actually, antivenom serum has made death from snakebite in the United States rare indeed. Fresh venom is collected from a recently captured rattlesnake by causing it to bite through a thin piece of rubber stretched over a glass container. Pressure on the head above the enlarged venom glands forces the poison out. This "milking" may yield from a few drops up to a teaspoonful of a tasteless and odorless liquid, usually yellow in color. If dried quickly, it can be kept almost indefinitely and is shipped in that form to the serum-production laboratory.

There the venom is diluted and injected into the veins of a horse. Doses are gradually increased as the horse builds up its resistance. Within a few months the horse's blood serum has developed a substance capable of neutralizing the effects of the snake poison.

Some of the horse's blood is drawn, and the clear serum is separated. After being concentrated, this serum is ready for injection into human beings suffering from snakebite or into



359 National Geographic Photographer Willard R. Culver

Appropriate Perch for an Infant Ring-necked Snake: A Diamond Ring

This newly hatched baby may have come from one of Nature's rare community nurseries; as many as a dozen female Ringnecks sometimes use the same nest, filling it with 50 or more white leathery eggs. National Geographic artist Walter A. Weber, whose paintings illustrate this article, found the youngster on his 80-acre farm near Vienna, Virginia (pages 352, 356).

horses and cattle struck while grazing in rattlesnake-infested areas, such as those of the southwestern States.

The eastern diamondback rattlesnake, *Crotalus adamanteus* (page 341), can be found from North Carolina through Florida and west to the Mississippi. In former days, individuals more than eight feet long were not uncommon. Now, because of the increasing use of firearms and the penetration of hunters into swamps where the rattler once reigned supreme, specimens over six feet are rarely discovered.

A snake of this length has a striking range of about three feet. The coiled or S-shaped position which all rattlers assume when on the defensive gives them the muscular purchase to launch the front half of the body forward when they wish to strike. Heavy-bodied, the rattler does not leap off the ground as it delivers its bite.

All rattlers are live-bearing, and the eastern diamondback has 7 to 12 young at a time. The young feed on mice and in captivity grow rapidly, maturing in three years. The wild-caught adult is often nervous and ill at ease in captivity, rattling whenever a human being approaches its cage and sometimes refusing to feed.

The possession of a rattle is the exclusive mark of our American rattlers of the genera *Crotalus* and *Sistrurus*. At birth there is merely a little round "button" on the end of the tail. Soon after birth the skin is shed, and the first ring of the rattle begins to grow. At the second shedding, which takes place about two months after birth, this ring remains and hardens, encasing the base of the button. When the young snake vibrates its tail, a slight buzzing sound may be produced.

During the second summer the skin is shed three or four times, with new segments added to the rattle, each a little larger than the last. After a dozen or so rings have been produced, they tend to break off as the snake travels through heavy weeds or rough ground. Consequently, it is not possible to tell a snake's age simply by counting the number of its rattles.

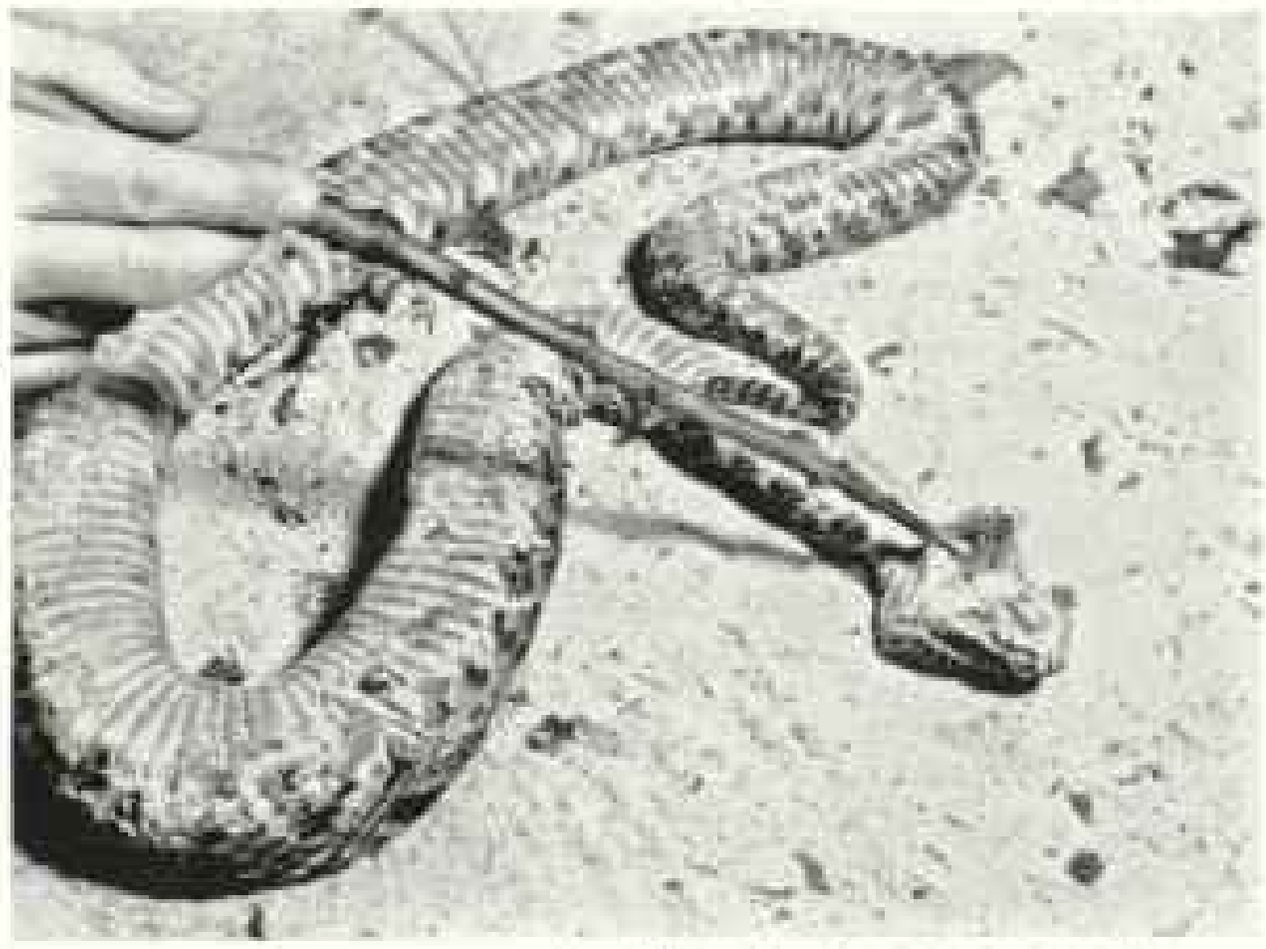
People often ask how to exterminate rattlesnakes near their mountain camps or homes. This is by no means easy. Perhaps the most effective way is to dynamite the hibernating

The Cardinal Rule of Getting Along in Wilderness Country: Watch Where You Put Your Feet

Photographs on these pages show right and wrong ways to behave in snake-infested areas. An incautious hiker (left) walks over a log without seeing a coiled Diamondback. Experienced outdoorsman (right) looks before he steps.

The Wise Woodsman Lift Logs and Stones as if Each One Sheltered an Angry Serpent

Snakes usually avoid contact with humans, but fight viciously if cornered or surprised. Facing a log or stone when picking it up (left) is asking for trouble; stand behind it (right), and you will see snake before it sees you.



Sam Dunton, New York Zoological Society

Dead Snakes Can Still Pack a Lethal Wallop; It's Safest to Investigate with a Stick

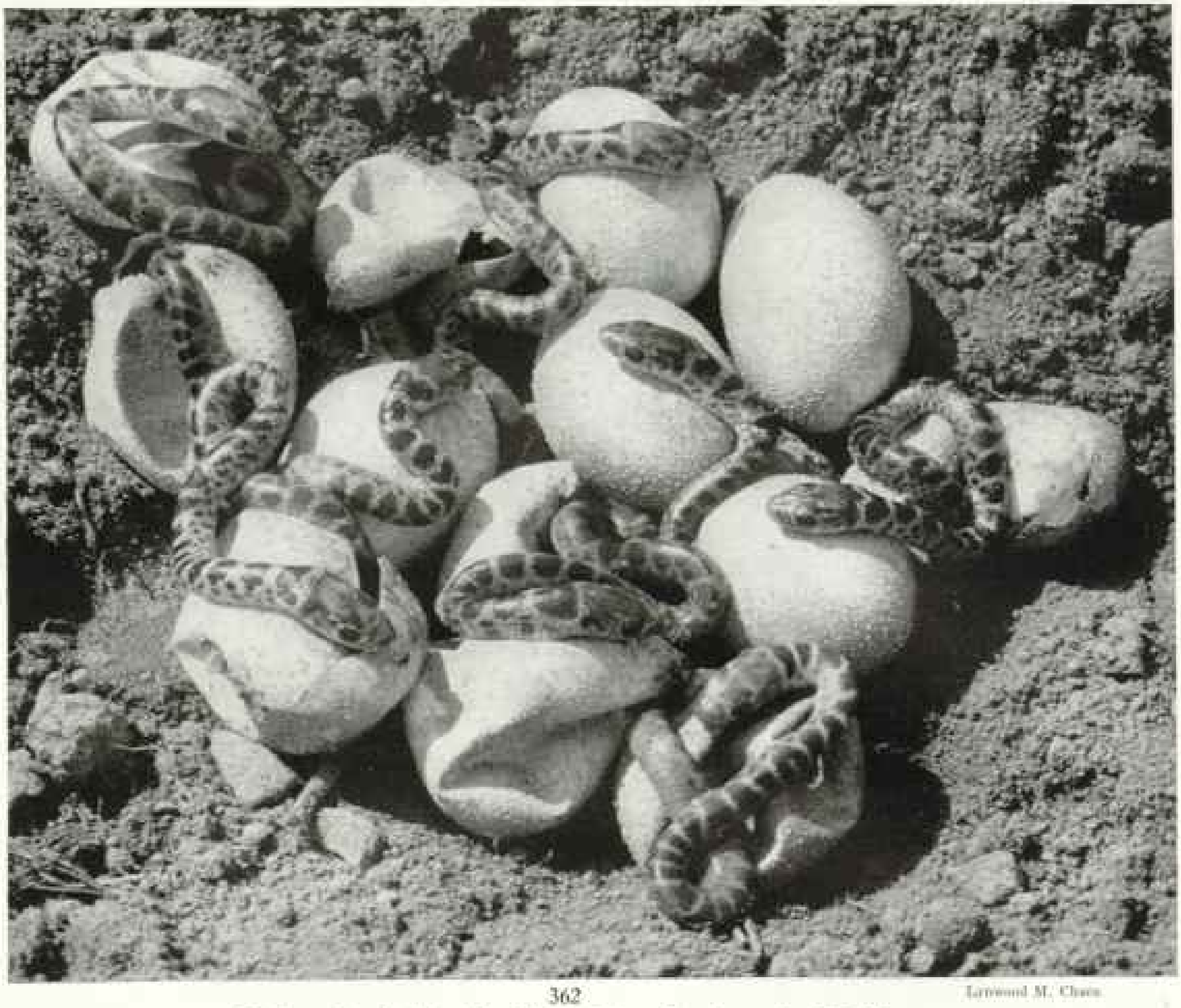
If a finger touches a freshly killed serpent, the jaws may snap shut with as painful an effect as if the animal were alive. Muscles writhing long after death give rise to the belief that the reptiles wait until sundown to die.

361

Ruth Dutton, New York Zoological Society

A Snake in Hand May Mean a Trip to the Doctor for an Incautious Youngster

Even a nonpoisonous snake, if cornered, may bite savagely. If it is necessary to investigate a hole or hollow log, use a stick. Other precautions in snake country: gather firewood only in daylight; don't make camp near rocky outcrops or brush piles; don't sleep on the ground; carry antivenom serum in wilderness areas where poisonous snakes are known to occur.



362 Lynwood M. Chace

Blacksnake Babies Get Their First Look at the World

Snakes usually deposit eggs in piles of rotting leaves or wood, where the heat of decay will aid the sun's warmth in incubation. These newborn Blacksnakes will lose their patterned coloration as they grow (page 348).

dens during the winter season when the snakes are inside.

Hogs are natural enemies of both poisonous and nonpoisonous snakes. Their thick layer of fat protects them from the bad effects of snake poison, and they will trample and eat any snake they see. Deer also stamp on any serpent they encounter and leave the flattened carcass.

Timber Rattlers Gather in Dens

Ranging from central Vermont to Georgia and west to Texas, Iowa, and Kansas, the banded or timber rattlesnake, *Crotalus horridus horridus* (pages 342, 358), attains a length of about six feet. Partial to rocky hillsides, these rattlers congregate in favorite dens to hibernate through the winter. In the spring, during the mating season, they linger at the mouths of the dens or on the ledges near them. Eventually they slip into the timber to hunt for their summer food of small rabbits, squirrels, rats, mice, and birds.

An inhabitant of the Great Plains, the prairie rattlesnake, *Crotalus viridis viridis* (page 343), is a vicious fighter, defending itself with unusual vigor when cornered. According to popular notions, it fraternizes with prairie dogs and burrowing owls. The truth is that a snake when disturbed will take refuge in any near-by cover, and in prairie-dog country that may be a burrow. When a rattler enters a prairie-dog burrow voluntarily, however, it is probably in search either of a meal of young prairie dogs or a place to rest while digesting its last meal. On the other hand, it may just want to get out of the sun.

Most rattlesnakes crawl straight forward, leaving a trail like that made by a smooth bicycle tire. But the little desert sidewinder, *Crotalus cerastes* (page 342), when in a hurry loops its body forward, first to one side, then

363 Sam Dutton, New York Zoological Society

Sunning Himself, a Coiled Copperhead Lies in the Path of a Careless Climber

Rock ledges are favorite sunning spots for Copperheads and rattlers. Climbers in such areas risk bites on face or hands unless they look before they reach.

to the other. Since the snake moves in a direction oblique to the one in which its head is pointing, it seems to be flowing sideways. This is the most efficient way of traveling over the sliding sands of the desert where these snakes live.

Various forms of the copperhead snake, *Ancistrodon contortrix* (pages 347, 350), appear in all of our eastern and southern States and west into Texas. In the East it prefers the same sort of rocky country inhabited by the timber rattler. One of the least dangerous of the three dozen species of pit vipers found within our borders, this snake is fairly numerous over its wide range.

Newborn copperheads have tail tips of a conspicuous sulphur yellow. When frogs or toads are put into a cage containing small copperheads, the little snakes elevate their tails and wiggle them to imitate the movements of a yellow grub. This presumably acts as a lure to the unsuspecting amphibians, enticing them to hop up, seize the supposed worm, and become themselves a meal for the owner of the tail.

The coral snakes of the family Elapidae produce a different kind of poison from that of most pit vipers. Neurotoxic venom of these reptiles attacks the nerve centers of the body, such as the one that controls breathing.

The coral snake, *Micrurus fulvius fulvius*, is found from North Carolina to Indiana and south from Florida to Texas. It reaches a length of 39 inches. Like the other members of its group, it lays eggs, about seven to a clutch. The adult feeds on lizards and other snakes.

The coral snake gives no warning when about to bite, but turns its head with lightning speed, grasps its prey, holds on, and chews until the small fangs have punctured the skin several times. Its bite can be fatal

National Geographic Photographers Robert F. Sisson and Donald McBain

Wheeled Death Stalks Snakes on Every Highway

Snakes like to sun on the warm surface of roads and seldom are quick-witted enough to escape onrushing wheels. One scientist estimates that nearly 6,000,000 are killed annually in the United States by automobiles. Most deaths are accidental, but swerving tire marks often indicate that a motorist has murdered a good rat exterminator. Aside from man, hawks, skunks, and snake-eating snakes are the reptiles' chief enemies.

for a human being, and the snake, though seemingly sluggish, should be given a wide berth.

The coral's beautiful colors are copied by some nonpoisonous snakes in apparent mimicry. The scarlet snake, *Cemophora coccinea*, and the scarlet king snake, *Lampropeltis doliata doliata*, have red and yellow bands separated by narrow black ones; the poisonous coral snake has wide black and red bands separated by narrow yellow ones. The head of the coral snake is solid black from the eyes forward; the nonpoisonous mimics have reddish or yellow heads with no black in front of the eyes (page 344).

Boas Have Remains of Hind Legs

The fifth and last family of snakes to be found within the United States is the Boidae, or boas, represented by five forms found in the Pacific and far-western States. The rosy boa, *Lichanura roscofusca*, is gentle and fearless and does not resist being picked up. When threatened, however, it rolls into a tight ball. It feeds on birds and small mammals and is fully grown at a length of three feet.

A relative of the mighty anaconda and of the boa constrictor, the little rosy boa sports, like all members of the boa family, a small flap or spurlike projection on each side of the end of its body, the remains of once-functional hind limbs.

This, then, is the brief story of our snake friends and foes. Most of the fear we feel for them is totally without basis. We can claim many of them as powerful allies in the never-ending war upon rodents; in unpopulated areas even the poisonous snakes can be beneficial.

Man and his automobiles are the worst enemies of snakes. Also, because of his pleasure in killing, his superstitions, and his prejudices, man destroys creatures that could, at no cost, greatly assist his multimillion-dollar campaigns against crop-destroying pests.

Perhaps one day, more schooled in natural history, we shall be able to view the serpent clan with less fear and greater objectivity and even refrain from murdering its members on sight. It should not take too much reflection to recognize that the snake, like the often despised hawk, owl, fox, and weasel, has a vital and logical role to play in the maintenance of Nature's delicate balance.

Helping Holland Rebuild Her Land

American Students Lend a Hand as the Gallant Dutch Repair the Ravages of Their Country's Old Enemy, the Sea

By Gilbert M. Grosvenor and Charles Neave

"DISASTROUS Flood Engulfs Holland"
"Gale-swept Sea Breaches Dutch Dikes"
"Raging Waters Wreck 7 Centuries of Labor"

Those grim headlines of February 1, 1953, roused us as nothing else, not even a surprise visit from Dean Wiggin, could have done.

The two of us, juniors and roommates at Yale University, read on in horror. Last night, while we slept in the safety of our campus room, the tiny Netherlands, admired and loved by generations of Americans, had met with disaster at the hand of its ancient foe, the sea.

Floods Take 1,800 Lives

Half of the land the Dutch had laboriously wrested from the waves in 700 years was under water. More than a half million people, a twentieth of the population, had been in the path of the fury; 1,800 perished. The damage was estimated at 5 percent of Holland's national income.

A one-in-a-million combination of high spring tides and furious winds of hurricane force had swept in from the North Sea to batter the Netherlands coast. The roaring waves broke through dikes as high as two-story buildings.

Perhaps the quiet determination of the Dutch to put the past behind them and rebuild their land tugged at our hearts. In any event, the idea occurred to us one evening that we might *do* something about it. Couldn't we do without the gay summer whirl and go fix dikes at one of the work camps set up by the Netherlands Government?

A phone call to the Netherlands Office for Foreign Student Relations in New York the next morning proved that this was one of our brighter ideas.

The NBBS—that's how the Dutch abbreviate the long title—had the perfect program. Students like us from many nations had contracted to spend three-week periods repairing smashed dikes and salt-poisoned fields. We'd work with these students and live with them in youth hostels; our assignment would be to Brielle (map, page 370).

"And now here's a little surprise for you," continued the NBBS spokesman. "You'll work all right, but you'll be paid, as well as given meals and lodging.

"We'll give you low fares and an interesting trip over. Finally, you'll have your week ends free for seeing the country."

We signed up. And on a sizzling July morning, with 700 other college students aboard, the S. S. *Groote Beer* steamed out of Hoboken bound for Rotterdam.

The ship had been leased by the NBBS solely to take students to Europe. Passage was $300 a round trip. On board were boys and girls from Indiana, Northwestern, Yale, Harvard, De Pauw, Princeton, Vassar, New York University, and others.

"And brother," said Charlie Neave after a quick turn on deck, "there are seven girls to every boy! Let the skipper go by way of Rio if he wants!"

But it wasn't all dating and dancing. Everybody was on a mission he considered serious. Some were using precious vacations to further their studies in art and music.

A number, especially girls, planned to live as members of European families. This way they would learn to understand other people and, in return, show them that Americans, seen close up, are pretty good Joes, too.

Holland Sheltered Pilgrim Fathers

Using the talents of professors and advanced students to good advantage, the NBBS organized informal classes on European life and culture (page 366).

Charlie, for one, had anticipated a morning of deck tennis with a lovely Wellesley junior. Instead, he found himself sprawled on the fo'castle in the sun, while a professor of history reminded the group how much America owes to the early explorers and traders from the Netherlands. The professor spoke, too, of the refuge from persecution which Holland provided the Pilgrim Fathers in the years preceding their voyage to the New World.

From him the passengers heard the story of Adriaen Block, the Dutch sea captain for whom Block Island is named. They learned that Princeton's Nassau Hall takes its name

← School Keeps at Sea for Collegians Bound Abroad

Sprawled on S.S. *Groote Beer*'s sunny fo'castle, American college students attend impromptu classes in the art, customs, and languages of Europe. The ship, chartered by the Netherlands Office for Foreign Student Relations, accommodated 700 lively young people on this Atlantic crossing in July, 1953.

Students had serious missions abroad. Some planned visits to art or music centers. Others had contracted to help the Netherlands repair damage caused by the worst floods in five centuries. The authors, juniors at Yale, devoted their summer vacation to shoveling muck in salt-poisoned fields near Brielle (page 378). Alongside them toiled students from nine other lands. As they worked, they gained mutual respect and understanding.

↓ High Jinks Enliven an Ocean Voyage

Student passengers held a talent show in midpassage. The "Tigertown Five," a dance band from Princeton, furnished the music. These college girls, so the program said, are doing a cancan. Ship's signal flags and life preservers provide decorations.

↑Aboard *Groote Beer* Girls Outnumber Boys Seven to One

↠ Ship's Captain Coenraad Bouman spends off-duty moments chatting with his passengers.

Below, right: Midwestern college girls plan itineraries with the help of a National Geographic Map of Europe.

from Dutch Queen Juliana's royal House of Orange-Nassau. So does Orange, Connecticut, down the road from New Haven.

Another discussion brought out the almost incredible story of Holland's conquest of the sea. The Dutch, since the 13th century, have taken 2,700 square miles of their territory, some 17 percent of their homeland, not from their neighbors but from the waters. Floods meant only single battles lost; nearly always the Netherlands retook the lost ground and went on to capture more.*

Steward Doubles as Teacher

Jerry, a steward, inspired some of his charges to learn at least a few Dutch phrases. Charlie was sleeping late one morning after a bull session. Barging into the cabin, Jerry, with a flourish, set a steaming cup of coffee on his middle.

"Wakee! Oops, oops!" he said.

"If you can't do any better than that," said Charlie severely, "I guess we'll have to learn your language."

"Yah, OK," said Jerry. "Wakee oops!"

So Charlie promptly joined a deck class held by a young Netherlands doctor, a former Yale student, and next morning sprang the fruits of the first lesson on Jerry. Shocked at his pronunciation, Jerry settled down to giving some serious lessons of his own.

One day the white cliffs of Dover loomed over the port bow. The next morning, while a brass band especially turned out in honor of our group's arrival rooted and tooted on the pier, the *Groote Beer* docked in Rotterdam.

Our schedule said we were to assemble at the railroad station the next day for the trip to Brielle. Deciding we could cram in a visit to Amsterdam and still make it, we boarded a train and soon found ourselves rattling through the Rotterdam suburbs.

Beside the tracks clustered gardens, some gay with flowers, some wearing the solid green of the vegetable patch. In the center of each plot stood a little wooden shack.

"Now what do you make of those?" asked Charlie.

"These we call 'people's gardens,'" spoke up an elderly gentleman across the compartment. "City Dutchmen come out here on week ends and enjoy themselves under the sun. They have not many hobbies, and this they like so much they sleep the nights here. The gardens are little because land costs much where one must make it out of water."

The train flew across land unrelieved by so much as one small hill. Every available acre was under cultivation in this densely populated country only twice the size of New Jersey. Cattle roamed in unfenced fields.

"No fences, yes, but do you overlook the drainage ditches?" asked our Dutch friend. "Like moats, they keep the beasts where they belong."

Soccer fields were exceptions—they had fences, maybe to keep the cows out. Such playing areas fairly dot the Netherlands. We found that Dutch youths—indeed, most young Europeans—count soccer, or association football, their national game (page 385).

"You wouldn't catch me playing wing on *that* field," said Charlie, pointing to one with a canal *for* a side line. "Chase the ball out of bounds, and you land in the drink."

"*Ja*," chuckled our friend, "no Dutch boy is a citizen until he falls one time in a canal. Football is one way to make citizens."

Sailboats plied even the narrowest waterways. Sometimes they gave the illusion of sailing through pastures. One appeared about to ram a grazing cow.

Amsterdam was a maze of canals and bridges. Countless pilings, driven into the marshy ground, support the buildings of the old section.

Low Country Was Made for Cycling

Cyclists engulfed us as we walked the streets. One reason there are so many bicycles in the Netherlands is that there are few hills. Traffic cops ticket a bike rider or a motorist with impartiality.

"Now there's an idea for you," Charlie said to Gibby (Gilbert M.) Grosvenor, indicating a couple riding side by side. "Look how the boy friend shoves her in the small of the back. She doesn't even have to pedal!"

Bikes had lights powered by small generators run by friction against the front tires. The trouble is that when the bicycle stops, the light goes out.

One night we were driving down a dark road; ahead a dozen taillights, glowing like rubies, suddenly vanished. Sensing a mass

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Mid-Century Holland Builds Her Future," by Sydney Clark, December, 1950; "Holland Rises from War and Water," by Thomas R. Henry, February, 1946; and "Behind Netherlands Sea Ramparts," by McFall Kerbey, February, 1940.

Kodachrome by Gilbert M. Grosvenor

Sunday in Spakenburg: Nets, Like Ghostly Sails, Dry in Summer's Sunshine

An old fisherman dandles his grandson in a camera study that faithfully captures the mood of a 17th-century Dutch painting. On weekdays these boats fish in IJsel Meer, the lake made by diking the Zuider Zee's mouth.

Scheveningen
's Gravenhage
Delft
Vlaardingen
Schiedam
Hoek van Holland
Rozenburg
Brielse Maas
Brielle
Rotterdam
Papendrecht
Hellevoetsluis
Dordrecht
Goeree
Stellendam
Middelharnis
Overflakkee
Merwede
Maas
Schouwen
Oude Tonge
Zierikzee
Duiveland
Noord Beveland
Oudewerkse
Breda
Thulen
Steenbergen
Dombu
Veere
Tholen
Roosendaal
Walcheren
Goes
Bergen op Zoom
Middelburg
Oosterschelde
Zuid Beveland
Westerschelde
Norwich
Terneuzen
BELGIUM
Antwerpen
(Antwerp)
AREAS INUNDATED BY 1953 FLOOD
0 5 10 15
STATUTE MILES
Flooded area
ENGLAND
Ipswich
73 miles to London
Clacton on Sea
North Sea
Den Helder
Texel
Vlieland
Waddenzee
Afsluitdijk
Enkhuizen
Alkmaar
Hoorn
IJmuiden
Edam
Spaarndam
Volendam
Haarlem
Zaandam
Heemstede
Amsterdam
Hilversum
Katwijk aan Zee
Leiden
Soestdijk
UTRECHT
Utrecht
Gouda
's Gravenhage
(The Hague)
Brielle
Voorne
Rotterdam
Schouwen
Duiveland
Oosterhout
Westkapelle
Breda
Tilburg
(Flushing) Vlissingen
Baarle Hertog
Terneuzen
Turnhout
Antwerpen
(Antwerp)
Margate
Ramsgate
Deal
Dover
Oostende
(Ostend)
Brugge
Hoboken
St. Niklaas
Lokeren
Lier
Geel
Strait of Dover
Dunkerque
(Dunkirk)
Gent
Mechelen
BELGIUM
Calais
Bourbourg
Roeselare
Aalst
Bruxelles
(Brussels)
Leuven
Cap (Cape) Gris Nez
Kortrijk
Tienen
Boulogne sur Mer
St. Omer
Hazebrouck
Bailleul
Béthune
Auchel
Lens
Berck sur Mer
FRANCE
Liévin
Arras
98 miles to Paris
Meer lake
Noord north
Oost Oosten east
West west
Zee sea
Zuid south
Road
Ferry
Proposed dike
Sand dunes
Land below sea level
Canal
STATUTE MILES
© National Geographic Map
Drawn by William N. Palmstrom and Irvin E. Allemon

Pumping station, adjusts water levels behind dikes
Six foot man
Clay
Sand
Canal
Cross-section of
ZEELAND SEA DIKE
Scale: One inch is approximately 40 feet
Drawn by William N. Palmstrom

capsize, Gibby slammed on the car brakes. The taillights reappeared up the road. The cyclists had merely honored a stop sign.

In our hotel lobby was a city map showing waterways slicing close by most of the places we wanted to visit.

Wives Paced Balcony of Weepers' Tower

"Take the sight-seeing boat," advised the hotel clerk. "It's the best way to see Amsterdam. If you get lost, remember this: the main canals run in five semicircles around the Central Station. Follow any one of them, and you come back to the trains in time."

A floating charabanc with a guide who declaimed in four languages, the boat chugged under bridges and along placid stretches where moss grew thick on stone canal walls. Leafy branches scraped the glass roof. Images of old houses stood reflected in the water.

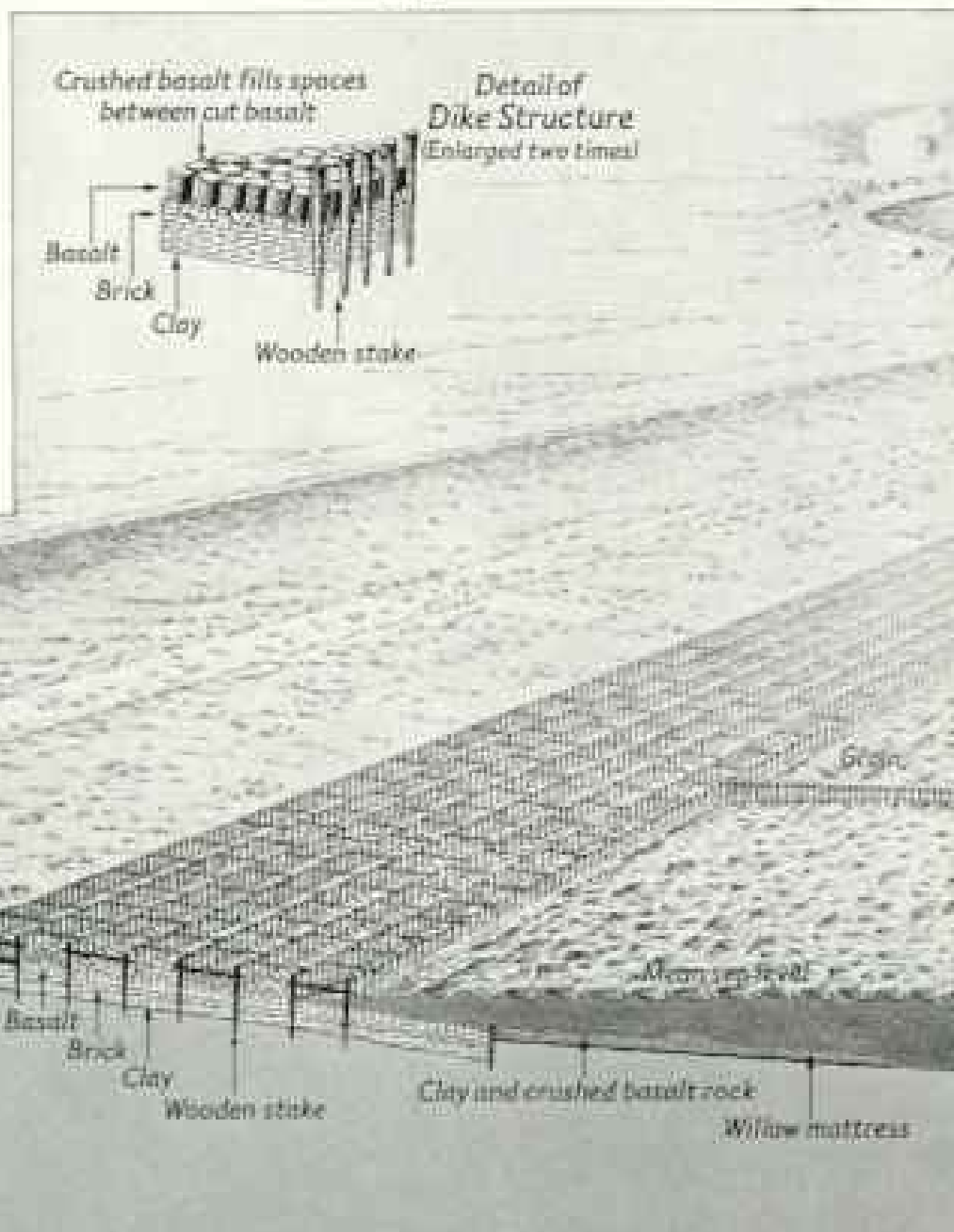
"Amsterdam, because of its 50 canals and 400 bridges, is sometimes called the 'Venice of the North,'" intoned the guide dutifully.

"Hey! What do we do now?" broke in

(Continued on page 377)

The Netherlands: Victor over the Sea

A quarter of the lowlands country popularly called Holland lies below sea level. Without the dikes, major storms would flood almost half the land. Electric pumps dispose of rain water and seepage; in days gone by the job was entrusted to windmills.



Brielle, a Sea of Terra-cotta Roofs, Overlooks the Brielse Maas River to Rozenburg Island. Sails Fleck the Placid Waters

Prince William the Silent's "Sea Beggars" sailed up this blue stream in 1572 to capture Brielle and touch off the successful Dutch war of independence against Spain. Here the authors lived in an international work camp during their Netherlands stay. Wide avenue near the edge of town is a canal.

Student Workers Take the Cable-ferry Home. Late Daters Sometimes Found the Barge on the Wrong Side and Had to Swim

To help the Dutch in adversity, youth rallied from far and near: the Negro student on the bank came from Africa's Gold Coast. The ferry's heavy cable sinks to let shipping pass. Trees in the heavily cultivated western Netherlands grow chiefly along canals or roads.

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Black Star

Like a Knife Cutting Edam Cheese, Flood Waters Slice a Peaceful Village Asunder

Dikes at Papendrecht, 17 miles from the sea, succumbed to the swollen Merwede River. Here the scouring current pours into lowlands behind the dike. Workers with sandbags try to keep the breach from widening.

black star

A Town Awaits Rescue by Helicopter

Until helicopters came, rescuers in boats often faced tragic decisions: with room for only two, and ten people huddled on a tottering roof, who was to go and who be left? These villagers on Overflakkee Island were all evacuated by a copter which landed on a bit of roadway beside their stricken homes.

➔ After the rescues, nine U. S. Air Force helicopters paid a call on Queen Juliana at Soestdijk. Here Princess Margriet gets set for a spin over the royal palace.

♠ **Youths of Three Nations Battle at Table Soccer**

In a Brielle cafe coauthor Charles Neuve, in white shirt, teams with a French lad against an Italian boy and an American soldier on leave from Germany, who wears moccasins and leather breeches.

♦ **Hans Brinker's Hero Plugs the Spaarndam Dike**

The little boy whose finger saved the dike existed only in *Hans Brinker or the Silver Skates*. To satisfy American visitors bent on seeing the famous scene, the Dutch erected this statue of the mythical 8-year-old.

Gibby. "They can't get around these tight corners."

But they did, sometimes backing the engine and often nudging the walls, and we rambled on through the city's "water streets."

Entering Amsterdam's famous harbor, we passed a curious little round tower with a balcony.

"The Weepers' Tower, where wives and sweethearts walked the balcony, waiting for the men to come back from the sea," said the guide.

"Twenty-nine," Gibby said, as the tour ended.

"Twenty-nine what? Girls who winked back at you?" asked Charlie.

"No, bridges. We passed under 29."

Students Ad-lib in Eight Languages

The rest of the day we prowled on foot. We liked the old section best, with its tiny alleys and its houses leaning precariously over the sidewalks.

One curious side street is only wide enough for a man to squeeze through. As Charlie put it, a man with a big lunch under his belt couldn't get past the corner.

Time to leave came all too soon. We took the train back to Rotterdam and joined the boys who would be our companions for the next three weeks. An NBBS representative introduced us all around.

Language was a problem at first. A minor mishap showed us how to solve it. Philippe, a French boy, had brought a bike into the bus, and on a sharp corner it fell over. The saddle hit Philippe in the ribs.

"*Zut!*" said Philippe. "*Cette sacrée selle!*"

"*Nein,*" chimed in German Sven. "*Das ist ein Sattel!*"

"*Una sella,*" said Vittorio of Italy.

"*Zadel,*" countered a Dutch youth.

And before we stopped kicking that subject around, we could also name a saddle in Hungarian, Danish, and Ewe—the native tongue of a boy from the African Gold Coast.

Camp conversations eventually became a conglomeration of eight languages, with English as the base. Most Western Europeans study English in school. In addition, its use as an international language of airmen is spreading it rapidly around the globe.

In the bus we became acquainted with Ernest, born in Hungary. He had lived and studied in the Netherlands for many years and knew a great deal about the country.

"The big dike over there," he said in his excellent English, "is really two dikes. In between them runs a canal that carries seagoing ships."

"I knew the Dutch made their land," said Gibby, "but this is the first time I ever heard they made their rivers, too."

Presently the masts and funnel of a big ship appeared above the bank. About the same time, our bus dived into a short tunnel beneath the monstrous canal. Gibby claimed afterwards that he had heard the thunder of screws passing overhead, but Charlie said it was only the rattle of a bus window.

Brielle is on Voorne Island. In 1572 the "Sea Beggars," led by William de la Marck, captured the town for Prince William the Silent. The battle signaled the general uprising that eventually brought independence from the Spanish.

For this reason Brielle is dear to the hearts of Dutchmen. It is a typically clean town, its bright houses hung with shutters in striking colors. Snowy lace curtains hang at spotless windows (page 372).

Mirrors angling downward from second-story windows mystified us until Ernest explained they were put up by householders so they can see who is knocking at the front door.

"A girl can look her suitors over with these," Ernest said. "Maybe she won't be 'at home' after she takes a peep."

"That stops you in Brielle," Charlie taunted his roommate. "Better pick the houses without mirrors!"

Nazi Bunker Becomes Home

"All out for the Youth Hostel!" shouted the NBBS man.

We stared as we climbed out. Nothing resembling a human habitation was in sight.

"There, across the canal," said NBBS. "It's a wartime German bunker. Unless you feel like swimming, you get there on this iron barge. You pull it across yourself, on a cable" (page 373).

Home, partly underground, turned out to be as comfortable as it was inconspicuous. Concrete chambers that once housed Nazi guns and soldiers now did duty as dormitories, dayroom, and kitchen. Outside, rusty barbed wire still festooned the grassy roof. Later, it served us as a clothesline.

After a supper of meat and potatoes, we drew lots for bunks. There were 40 students

Muscles Strain. Rail Cars Bring Fill for a Sea-gouged Field

The authors and 38 campmates contributed to international good will by toiling on flood-damaged Voorne Island. Expert dumpcart operators coasted the last few yards of this half-mile run; those less skilled sometimes saw their top-heavy *kipwagens* jump the track.

← A Hollander in tradition's wooden shoes helps switch a car.

↓ Salt water still drowns the land at left, but crops flourish on the other side of the road-topped inner dike. Cyclists with "rumble-seat" passenger head for Oude Tonge. A little girl (inset) solos valiantly on her brother's bike.

in the camp, representing 10 different nationalities. Only four were Americans—ourselves and two Harvard juniors.

Twenty, including the Harvards, drew bunks upstairs. We Yales and 18 others made up our double-deckers, just like the ones in New Haven, in the downstairs dorm.

Brielle Offers a Warm Welcome

In the dayroom the assistant mayor and a delegation of Brielle townspeople gave us an official welcome. His Honor delivered a speech. We couldn't understand much of it, of course, and neither could we manage conversation with the Brielle folk. But coffee and cookies in quantities went the rounds; this language we could understand.

That evening the NBBS man gave us our schedule.

"So the kitchen can serve breakfast in shifts," he began, "the upstairs gets up at 5:30 a.m., downstairs at 6:30."

The Harvards groaned. The Elis grinned.

"Upstairs group, work starts at 7. Downstairs at 8. Upstairs, finish at 4:30 p.m. Downstairs, 5:30."

The Elis groaned. The Harvards grinned.

The first morning Charlie thought he was back on the *Groote Beer*.

"Wakee! Wakee!" But it was Mr. Fink, proprietor of the hostel, not Jerry, who woke us. He had no trouble with us, however, for everybody wanted to see the flood damage and get started repairing it.

Voorne is in South Holland Province, near the northern border of Zeeland. Mostly reclaimed land lying well below sea level, Zeeland and North Brabant bore the brunt of the February flood.

The 6-mile trip from the hostel to the work area opened our eyes to the complexity of the Dutch water engineers' problems. Like most Americans, we had visualized Netherlands dikes with their feet forever in the sea, but here we found dikes guarding inland fields.

We learned there are three kinds of dikes in Holland. Big ones standing in the sea, the "watchers," fend off the first assaults of the waves. If they crumble, the "sleepers" behind them take over. Finally come the "dreamers," last-resort defenders of individual farms, even fields.

Sleepers and dreamers alike had found their slumbers rudely interrupted in February. Near our work was a place where a sea dike had let go. It had been rebuilt and the land behind it pumped dry, but the grass on its slope had not been replanted as yet. A 200-yard patch of brown earth told us where the water had rushed through.

"Like most watchers that failed," said our supervisor, a government engineer, "this one did not break in front, where it is strongly reinforced.

"No, the water came over the top and undermined it from behind, where there is only sand. Once there is a hole all the way through, tides surging back and forth destroy a dike in a short time."

Behind the watcher, more than one sleeper had been overpowered. Shovels on shoulders, we walked through once verdant wheat and potato fields now covered with scraggly briers and fine gray silt. A long mound of raw muck stood 10 feet high. Half a mile away a lake lay in the middle of a field.

"It's your job to fill the lake with the dirt in the mound," said the engineer. "We have some equipment to do the hauling.

"Where did the mound come from? Well, the flood filled up the canal behind the dike with tons of muck. We dredged the canal, and this mound is the spoil."

"How about the lake?" somebody asked.

"The tides gouged it. What a crazy, wasteful thing is the sea! Why couldn't it have dredged the canal deeper and built the field higher? Anyway, the farmer who owns this land is luckier than some. His lake is only 10 feet deep. There are 90-foot ones on Schouwen Duiveland."

Students Power a Railroad

The promised hauling equipment was a railroad. We were the locomotives. The cars, fortunately, were little, and two fellows could push them along the level rails.

They were called *kipwagens* and had dump mechanisms. Some of the boys took corners too fast, and the kipwagens jumped the tracks. Junk on the rails spilled them, too, especially when they were top-heavy with students stealing rides (page 378).

We paired off and started shoveling muck into kipwagens. The first day must have shaken our supervisor's confidence in the rising generation. Blisters appeared, backs ached, rest breaks multiplied.

With only two loads moved per team, Vittorio pushed dank black hair out of his eyes and shouted: "*Mangiare!*"

(Continued on page 389)

Kodachromes by Gilbert M. Grosvenor and Charles Nesbit (lower)

↑ **Delft: Arched Bridge and Moat Make This Burgher's Home a Castle**

From the blue of the sky, reflected in its canals, Delft takes the color of its famed china. Native son Jan Vermeer captured the same rich azure in his paintings. Flowers, delight of every Dutchman, blaze in the garden of a snug brick cottage.

↓ **Walcheren Islanders Jog to Church on a Road of Handlaid Brick**

Allied planes bombed Walcheren's dikes in 1944 to flood out Nazi garrisons commanding the approaches to Antwerp. But the island largely escaped the 1953 flood, as the presence of a grown horse implies: many farm animals drowned wherever the waters struck.

Souvenirs and Household Treasures Nearly Hide the Walls of a Marken Island Cottage

This fisherman's widow, with spryness belying her years, keeps the mementos of a lifetime faithfully dusted. Curtains hide the bed-in-a-cupboard during the day. Marken women favor red and blue.

Kodachrome by Gilbert M. Grosvenor

Theodore Roosevelt's Picture Hangs Below the Clock. Prized Plates Crowd the Shelf

Trying to photograph the tiny room, coauthor Grosvenor could find no place to stand. "Get on the stove," said the widow. "When I was a bride, 60 years ago, another man took my picture from that same spot."

A Zuider Zee Boat Wings Home to Spakenburg

Successive invasions by the sea, from the 9th to the 13th century, carved the Zuider Zee into the heart of the Netherlands. In 1932 the nation shut off the North Sea with a 20-mile dike; Zuider Zee became a lake, IJsel Meer, ringed with inland ports such as Spakenburg.

Hundreds of smacks like this fat sailboat caught herring in the salty Zuider Zee. Today's fresh water yields mainly flounders and eels. More than one former fisherman, working a farm reclaimed from the waters, plows where once he cast his nets.

These women wear Spakenburg's starched shoulder boards, which suggest a milkmaid's wooden yoke. The boat, sailing with a fair breeze, has partly lowered her sail to slow down and will shortly drop it and coast in to the moorings.

Holland Calls Soccer Its National Game

Captains of boys' school teams at Scheveningen decide which goal they will defend by walking toward each other heel-to-toe. Last man who can put a whole foot on the ground gets his choice.

↑ "Three Bunches a Guilder!" Cries a Utrecht Flower Vendor

Each day this merchant trundles his bicycle-powered flower cart through the streets. Here he features gladioli, dahlias, daisies, and baby's-breath; earlier in the season his cart runs riot with tulips. The Dutch guilder is worth about 27 cents.

↓ Mijnheer and Mevrouw Kasse Celebrate a Wedding Anniversary

Mr. Kasse, prosperous farmer of Veere, on Walcheren Island, invited the authors to share his happiness and apologized for bunking them in a fragrant hayloft. Women of the family serve cookies and preserves to a gathering of neighbors.

Dutch City Girls on a Ferry Wear Shorts, Staid Countryfolk Wouldn't Approve!

Sand bars and shifting channels make tricky going among Zeeland's islands. The ferry, one of many in the watery southern province, makes ready to leave for Overflakkee from Hellevoetsluis on Voorne Island.

Kodachrome by Gilbert M. Grosvenor

Hoorn's Guardian Tower Dreams of Past Glory. Its Clock Has Marked Time for Centuries

During Holland's Golden Age, in the 17th century, cargoes from far places poured onto the quays of Hoorn. Today the Afsluit dike isolates the village from the sea. Shutters cover long-empty gunports under the tower eaves.

"No lunch yet," said the boss, "but you can stop for 10 minutes." He strolled over to Charlie. "How do you like the work?"

"Well, frankly, I'm a little disappointed. I pictured us standing in the waves like heroes, fixing holes in dikes."

"Ah yes, but you're doing work just as important. You're fixing the land so it will grow things again, and feed the people of Holland.

"Your job isn't the end, either. After you're through, the farmer will have to get all the salt out of the soil. It may take him 5 years before he makes a decent living for his family again."

He told us how international cooperation and aid had averted even greater disaster.

Helicopters Saved Many Lives

"United States helicopters were really lifesavers," he said. "They went anywhere a boat could, and some places where boats couldn't. Time and again they whisked people to safety through the air" (page 375).

He said all sea dikes had been repaired except those on Schouwen Duiveland, where water still covered most of the island. Soon after we returned to the States, we heard the last break had been closed (page 398).

We went back to work with a better understanding of our jobs. We even had the feel of the kipwagens before the ex-air-raid siren blew for lunch.

Carrying our cheese sandwiches and milk, we visited a farmer whose cows were calves and whose watchdog was just a friendly, gangling puppy. All his grown beasts, he said, had drowned in the flood.

We climbed the sea dike and marveled at its size. Sitting on its edge, we watched the peaceful march of coastwise shipping on smiling blue water. Last February desperate people had clung to the top of such dikes until, exhausted, they slipped off and were drowned in the flood.

"*Au travail!*" Down the wind came the voice of the engineer. The gang trooped back to work.

By midafternoon we'd dug the mound far back from the tracks.

"Now what?" Gibby asked. "Do they bring up a new railroad every night?"

"Where's that Yankee know-how?" retorted our Dutch boss. "Put the crowbar under the rails and shove." The track slid over easily. Ours was a versatile railroad.

Nobody was sorry when the sun began to sink and quitting time drew near. Days later, of course, we looked back with amusement on our first puny efforts in the salt-rimed fields.

As time went by, we grew more limber. The kipwagens rolled faster, shovels flew, the mound dwindled, and the "Lake of Voorne" became a pond.

Now the work was routine, and the big moment of the week was knockoff time Friday afternoon. Some boys went right off the first week end to see the sights in Amsterdam, Rotterdam, or The Hague ('s Gravenhage), but we hired a little car and set out Saturday morning to tour the southern countryside.

On a ferry from Hellevoetsluis to Overflakkee Island, a truckload of piglets perfumed the fresh sea air (page 387).

"The baby pigs have an evil smell," said the friendly truck driver, "but their story is the Golden Rule.

"In 1944 the Allies, unhappily, had to bomb the dikes of Walcheren Island to flood the Nazis from the sea approaches to Antwerp. The farms of Walcheren were ruined. Although poor themselves, the farmers of Overflakkee sent aid to the people on Walcheren.

"Today we of Walcheren, not harmed by the last flood, return good for good—we send little pigs to Overflakkee."

New Canaan Helped Clothe Oude Tonge

If Voorne was damaged, Overflakkee was all but destroyed (page 375). The harbor at Middelharnis was gone, its boats left high and dry in barren fields. The few houses still standing were gutted.

"Gibby," said Charlie, "I want to go to Oude Tonge. New Canaan, Connecticut, my home town, adopted the village after the flood and sent over a whole load of clothes."

Built atop an inner dike, the road to the town was in surprisingly good condition. What the unconquered barrier had done for farmers behind it was plain to see. On the left, farms lay barren, homes and barns were in ruins, and water stood in the fields; on the right, ripe grain awaited threshing (page 379).

Protesting dirt in the fuel, the little car bucked to a halt. A farmer, alone, picked stolidly through the wreckage of a house—on the left side of the road. He pulled a broken doll from under a sodden mattress. His expression did not change, but his eyes clouded. We asked no questions.

Kodachrome by Gilbert M. Grosvenor

Immaculate Yachts Lie Aloof from Tubby Workboats in Hoorn's Hook-shaped Harbor

Famed Dutch navigator Willem Schouten named South America's southern tip Cape Horn after his home town. This scene, shot from the town's clock tower (page 388), looks down on a sailboat heading for IJsel Meer.

"At least," he volunteered, "the government is good to me. They are giving me a new barn and a half house, besides paying me for the crops I cannot grow in this foulness."

"A half house?"

"The barn was new, the house 30 years old. They pay only part on a house that old." He paused. "Will you share my lunch?" he asked, fishing a cheese sandwich from a bag. "I am sorry I have nothing else."

We drove in silence into Oude Tonge. Water stains high on its walls marked the flood's crest. Here more than 300 people died in the February disaster. About one-fifth of the total loss of life occurred in this area.

An Aftermath of Floods: Drought

Ironically, the people seemed to be worrying more about a lack of water than the recent surplus. It was fresh water they were worrying about, though.

Because Holland is so low and so near the sea, wells have a trick of yielding brackish water. Government works in normal times provide enough water for everybody, but the flood wrecked some of the plants, and here was Oude Tonge in fear of drought.

We visited an old church with a tall tower. Three pretty girls were prying at a pile of broken furniture and upended flagstones blocking the entrance. Appreciatively we surveyed the "natives."

"Not bad at all," declared Charlie.

"A real scenic attraction," Gibby agreed.

A blonde in blue jeans glanced up from her work, eyes flashing.

"When you characters finish sizing up the field," she said, "you can come help with these rocks."

Abashed, we did. Our picturesque Dutch maids turned out to be Kansas coeds.

They told us they had a work camp of their own, and although they weren't often asked to reset flagstones, they had found plenty of work for feminine hands. With considerable regret we said goodby after an hour's penitent labor.

Oude Tonge's cafe, we discovered, was doing double duty. Dropping by for a snack, we ran into a clinic in full swing. Nurses inoculated babies on billiard tables. While baby music rocked the walls, we downed our tea and then started out by ferry for Walcheren.

In sharp contrast to stricken Overflakkee, Walcheren proved green and lovely. A policeman told us it owed its preservation to the largest dikes in Zeeland, the Westkapelle ramparts that tower 15 feet above the tide.

"Few people stayed bitter about the Allied flooding," the policeman informed us. "Indeed, we Dutch long ago showed them the trick. In 1574 the Prince of Orange opened the dikes so his ships could sail inland and save Leiden from the Spaniards. The same tactics kept the French army from capturing Amsterdam in 1672."

Walcheren used American press-agent devices when it set about restoring its forests. "Plant a tree on Walcheren," ran one slogan, "and the island will again be the Garden of Zeeland." It worked. Today healthy young trees bought with contributions reach hopefully towards the sky.

We dined in Veere while music from the town-hall carillon floated on the evening air. The program was Bach; we thought the bells, cast in centuries-old foundries, superior even to the ones in our Harkness Tower at Yale.

"Sleep is about to get me," said Gibby after the meal. "Let's find an inn."

"I have a better idea," Ernest said. "Let's ask a farmer to put us up. We'll save money, and we'll really see how the people live."

In Place of an Inn, a Hayloft

Doubting anybody would take strangers in, we drove into the country.

"Here's a nice one," said Ernest. "Pull up." He came back out of the house in a moment, wearing his broadest smile.

"Well, I'll be derned! He got away with it," said Charlie.

"We'll have to sleep in the hayloft because they don't have any spare beds," said Ernest, "but we're in on a party. Mijnheer and Mevrouw Kasse are celebrating their 30th wedding anniversary."

Our hosts gave us homemade preserves and cookies and treated us like members of the family. The womenfolk sewed, while Mr. Kasse and a neighbor quietly talked farming. There was no radio or television (page 386).

At bedtime Mr. Kasse gave us blankets, lit a lantern, and led us out to the barn.

"Now you strike the hay," he chuckled. "For boys, the best sleeping is in the hayloft."

Vaguely aware of cows below, we slept the sleep of the just in softly scented comfort.

Early next morning when we turned out, three pairs of wooden shoes—papa, mamma,

An Electric "Clock" Rules Aalsmeer's Flower Mart

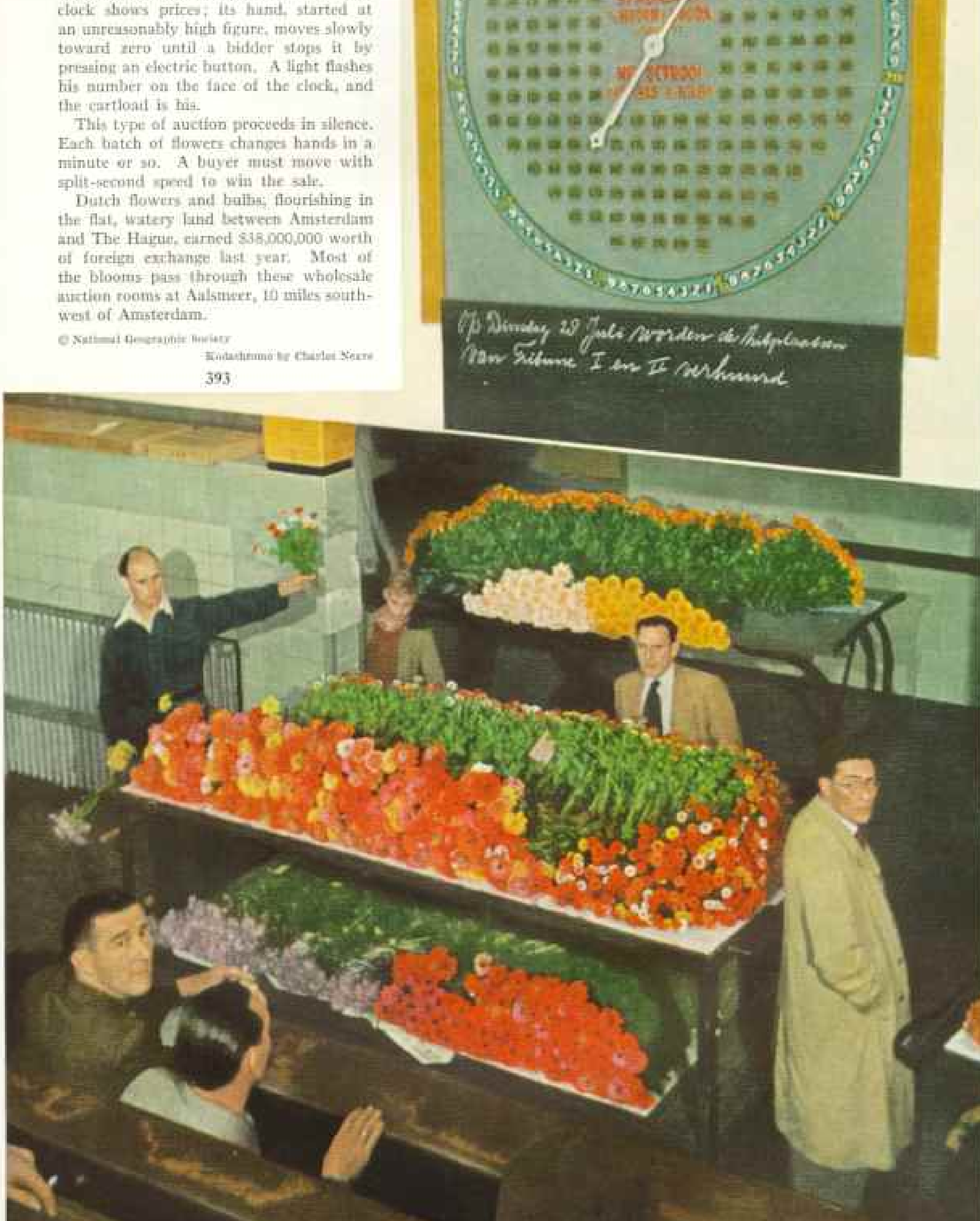
Fields of blossoms grow almost to the doors of the market (page 400); a barge canal leads directly in to the selling floors. From numbered seats in an amphitheater, buyers (lower left) inspect blooms passing through on double-banked carts.

An auctioneer high in a gallery rings a bell to announce each cartload sale. The clock shows prices; its hand, started at an unreasonably high figure, moves slowly toward zero until a bidder stops it by pressing an electric button. A light flashes his number on the face of the clock, and the cartload is his.

This type of auction proceeds in silence. Each batch of flowers changes hands in a minute or so. A buyer must move with split-second speed to win the sale.

Dutch flowers and bulbs, flourishing in the flat, watery land between Amsterdam and The Hague, earned $38,000,000 worth of foreign exchange last year. Most of the blooms pass through these wholesale auction rooms at Aalsmeer, 10 miles southwest of Amsterdam.

Kodachrome by Charles Nesbe



← The Last Gap:
a Flood Crew Moves In
for the Kill

A torrent still charges like a malevolent beast through the narrow gap between pilings and sandbags, but Holland's "water-builders" have almost closed the dike breach. Soon the boats will push woven willow rafts (background) into the snarling current and sink them with stones; such mats keep the water from gullying the bottom. Onto this foundation of weighted mats the workers will sink prefabricated concrete caissons to complete the closure (page 399).

↓ Dutch Soldiers Win
a Sea Battle

Troops from Belgium, Great Britain, France, and the United States helped the Netherlands lick its old enemy, the sea, in 1953. Around a storm-punched break, these men build an emergency dam. Its horseshoe shape, as Dutchmen learned centuries ago, best foils currents. When the dam is tight, the original dike can be mended.

and daughter size—stood ranged outside the farmhouse door.

"Means they're not up," said Ernest. "Sunday's the only morning they can sleep. We'll leave a thank-you note."

Hoping to photograph islanders in Sunday costumes, we drove back to Veere. Several Dutch towns have a unique costume. Walcheren women are known, for instance, for their snowy, starched caps (page 381).

The devout folk of Veere, however, showed a reluctance to pose on the Sabbath. Respecting their feelings, we went down to the harbor to see the fishing fleet.

Always the boats are home on Sunday. Nets, drying in the sun, hung from masts like ghostly sails. Old fishermen spun yarns near by. Yachtsmen called to each other as they made ready for a day's sail. Freshly painted, a blue double-ended boat lay high on tide-bared yellow sands.

"Look over there!" said Charlie. "Van Gogh painted a scene just like that."

We went on to Domburg, and there we saw ramparts which never yield to the sea. Huge dunes of sand, they serve not only as impregnable dikes but as reservoirs.

The sand catches rain. The fresh water collects in pools beneath the dunes, and the Dutch pipe the water to their towns.

Unfortunately, there are not enough natural dunes. Only 200 miles of coast have them, whereas the Dutch have built 1,800 miles of artificial dikes. Beaches rivaling the ones at Cape Cod front the Domburg dunes.

Week ends like this broke the monotony of daily shoveling. So did little sights from bus windows as we rode to and from our work.

Orange Streamer Honors Royal Birthday

One day every flagpole along the way erupted a fluttering orange streamer above its Dutch flag. The bus driver told us it was August 5, Princess Irene's birthday.

"The Dutch love the royal family and fly orange streamers in honor of the House of Orange every time one of them has a birthday," he said.

Our work gave us a chance to kid each other about our supposed national characteristics. Germans and Swiss, we claimed, were methodical. English and Danes worked hard and fast. Americans worked in spurts. French enthusiasm sometimes lagged; Italians on occasion sang instead of shoveling.

Because the railroad was single track, the number-one kipwagen set the pace for all others behind it. At first we Americans had the lead car, and, with typical Yankee pride, went too fast. An Italian team replaced us. They went too slow.

Finally we called an international council, which paired a Swiss and an Italian in the lead. The Swiss worked out an elaborate timetable, but the Italian wouldn't let him keep to it. The result was a pace that suited everybody, including the Dutch boss, and the work went merrily on.

We daubed names in red clay on kipwagen sides: Tarzan, Der Optimist, Plato, Malvolio, the Black Spasm. At noon we swam from the sea dike or played soccer.

In wooden shoes, the Dutch boys naturally made unbeatable fullbacks, and never once did the *klompen* take off through the air after the kicked ball.

Nights we sat around hearing about each other's lives, backgrounds, countries, ambitions. Most of the foreign students were taking technical courses at college. Vittorio planned to be a doctor, Philippe an architect.

Pointed Caps Say These Girls Live in Volendam

Several old towns in rural Holland still retain their distinctive costumes. Those who know traditional Dutch dress often can tell at a glance not only where a woman lives, but whether she is Protestant or Catholic, married or single.

Like near-by Marken Island, Volendam looks to fishing and tourists for its livelihood. Its men still wear the baggy black breeches so often pictured in American school geographies of the past.

← Returning home from mass, these little girls wear Sunday dress, topped by winged white-lace caps.

→ Dark cap, striped blouse, and narrow tasseled scarf hint that this Volendam maid sat for her portrait on a weekday (page 412). Red-coral choker, however, suggests Sunday best.

Tradition Demands Ringlets in Marken

No automobiles disturb the age-old peace of Marken Island, in IJsel Meer off Volendam. While his wife knits, a retired fisherman reads his family Bible, an heirloom. The ladder leads to a storage loft; curtains mask sleeping alcoves (page 382).

Kasse (no relation to the Walcheren Kasses) was an organic chemist in his native Holland. Ernest, the camp genius, had already earned two doctorates and was working on a third!

Only language ever caused misunderstandings. At dinner one night Gibby asked for potatoes, but by the time they reached him from the other end of the table, they had turned into bread.

People back home have asked us how boys from nations so recently at each other's throats got along together. We answered truthfully:

"Just fine. We were a bunch of guys with shovels, not rifles."

Waltzing in a Brielle Houseboat

We caught Vittorio dressing up one night while he rattled the windows with Neapolitan love songs.

"*Stasera* plenty *ballare*," he informed us. "Dancing at music boat tonight! *Andiamo*, my *paesani!*"

Eager to see the Latin technique tried out in the Netherlands, we went. All the maids and blades of Brielle were on hand.

© National Foto-Persbureau, KLM

↑ Machines of War Turn the Tide at Ouwerkerk

When this picture was taken, on the morning of November 6, 1953, all other large gaps had been restored. Before midnight this breach, too, was closed, and all Holland stood again behind her ramparts.

Concrete Phoenix caissons, designed in England for the Normandy invasion, won the Ouwerkerk victory. Here two of the 7,500-ton giants rest in the last gap, and two more await their turn. Through pipelines (upper right, on trestle) huge floating dredges suck sea-bottom sand for fill.

←The dike's repaired, the water's gone. Now's the time for little Dutch girls to scrub scooters.

For music, American records twirled on a wheezy phonograph. In the tight quarters of a houseboat moored to a canal bank, klompen were a menace. Just as disconcerting as a wood-shod kick in the shins was the supplementary vocalizing by Dutch girls. They sang "Good Night, Irene" and "Tennessee Waltz" without knowing what the English words meant.

Vittorio's dazzling smile brought him plenty of partners. Philippe, crestfallen, was turned down by every girl in the place.

A week later he discovered the polite "Would you care to dance?" (bow low from the hips) that Kasse taught him to parrot in Dutch really meant "I hate dancing, don't you?"

A holiday gave us a free weekday to see the famous cheese market at Alkmaar. We left camp early on a Friday and drove to a dairy near Alkmaar where Mijnheer Best made prize-winning Edam cheeses (page 405). Most Edam cheeses actually come from around Alkmaar, not Edam. Mr. Best took us through his scrupulously clean plant, explained how he made his cheeses, and showed us a rack ready for market.

"But they're yellow," said Charlie. "Edam cheeses we buy back home are red."

"Those are export cheeses." Mr. Best ex-

Fields of Bloom Make a Crazy Quilt in Aalsmeer

Dutch engineers key the nation's master water-level plan to mean water level at Amsterdam. Thousands of farm acres lie below this level. By manipulating gates, lowlanders such as this flower grower can raise or lower the water table beneath individual crops. Bulbs, for example, like a constant water level.

Harvesting, the farmer pulls his barge with a hooked pole. He will take the loaded boat directly into the near-by auction building (page 393). Water lilies grow wild.

← Dahlias Brighten a Market Square: Utrecht

Rome garrisoned Utrecht by A.D. 48. Today the Netherlands' ancient city holds Saturday morning flower marts in this brick-paved square.

Kodachromes by Gilbert M. Grosvenor and Charles Nesbit (upper)

plained. "The only difference is they have red wrappers."

Then we headed for Alkmaar. The cheese market, held every Friday from early summer through fall, is one of the Netherlands' best known tourist attractions (pages 406-409).

Cheeses Stack Like Cannonballs

Dairymen like Mr. Best bring the results of a week's work into town early in the morning and pile the cheeses like cannonballs under tarpaulins in the market square. Before the selling begins, buyers make the rounds, thumping and plugging the globes as an American housewife does a watermelon.

We found the square jammed so tight with sight-seers that porters had difficulty moving around with their loads. They called continuously for room.

Another renowned Netherlands market which we were to see later in the summer was the flower auction at Aalsmeer. Here the bidding moves down instead of up, and an electric "clock" on a wall, instead of a chanting auctioneer, announces the prices (page 393).

The day after our Alkmaar visit, we drove to Volendam and boarded a ferry for the run to Marken Island in Lake IJsel.

Marken Folk Cling to Native Costume

We left the car behind. Tiny Marken forbids automobiles, discourages bicycles. Once it was an island of fishermen. Then, in 1932, the government completed the great dike across the mouth of the Zuider Zee.* The old salt arm of the sea became fresh Lake IJsel, and the fishing declined.

Today there are still many fishermen, but selling trinkets to tourists has become a major industry. Posing in photogenic native costume helps business.

Women wear long bright-red or blue skirts and blouses heavy with embroidery (page 397). Men favor black knickers, high black jackets without collars, and black brimmed hats.

All day in summer, the ferries disgorge swarms of sight-seers. By evening the Markers are fed up with strangers, and it is not always easy to get inside their homes.

We persuaded a minister—Marken is Protestant—to intercede for us with a fisherman's elderly widow, and she invited us into her spotless one-room cottage. An antique-collector's paradise, it was filled with old kitchen utensils, samplers, and all manner of bric-a-brac. On the walls hung blue delftware (page 382).

Parted curtains revealed a snug bed in an alcove, high above the floor.

"How in the world does she ever climb up there?" Gibby whispered to Charlie.

"This is how!" said the widow. And grabbing a stool, she scrambled quick as a squirrel into the alcove.

She showed us a pair of beautifully carved wooden shoes. In accordance with island custom, her husband had given them to her as a wedding present.

"How's President Eisenhower these days?" she suddenly asked. "I'll always admire that man."

And she showed us, above her doorway in a place of honor, Mr. Eisenhower's framed picture in colors.

We spent Sunday touring the rich farming provinces of Utrecht, Gelderland, and Overijsel, along the south shore of IJsel Meer. Untouched by the flood, this part of the Netherlands was yielding rich harvests.

We watched a farmer re-thatch his roof with the help of his two sons. He didn't take off the old thatching but lifted the lower, unfastened ends of the weathered bundles with a wooden paddle and stuffed the new bundles beneath them.

To mix the old and the new so the unfastened new thatch wouldn't slip off, he whacked the roof vigorously with the paddle.

Sight of a house where a pair of wooden shoes dangled from a signboard caused Charlie to jam on the brakes. Said he:

"I've always wondered how they made these klompen, and now I'm going to find out."

Wooden Shoes: 75 Cents a Pair

The klompenmaker obligingly opened his shop and showed us. First hewing a small log into proper shape with an ax, he picked up a tool looking like an oversize paper cutter and finished off the outside.

Then, with a razor-sharp gouge a foot-and-a-half long, he whittled out room for the wearer's foot. He made no measurements, but trusted his eye.

The chips fairly flew. Our friend told us he can turn out a pair of shoes, scraped

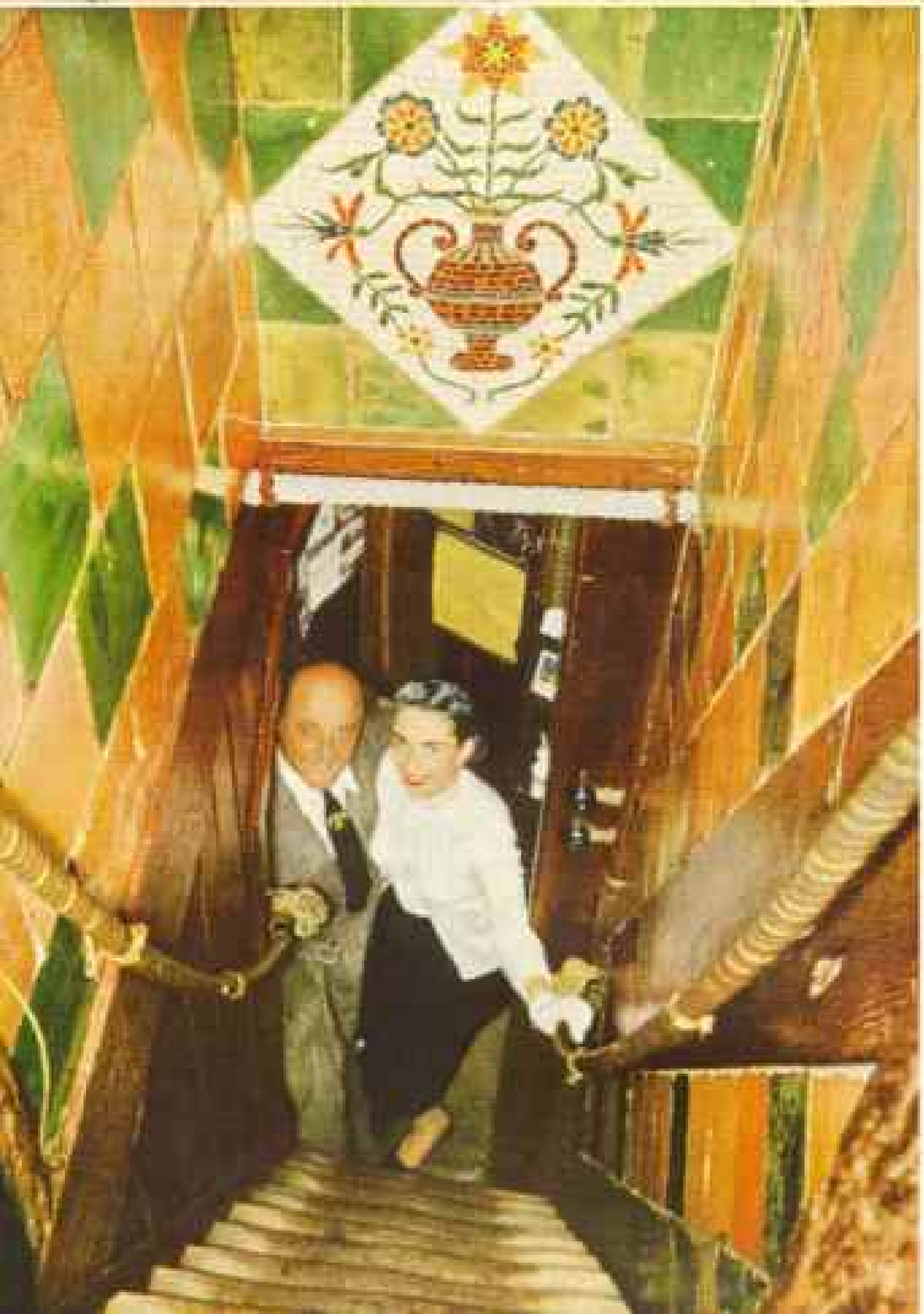
*See "A New Country Awaits Discovery," by J. C. M. Kruisinga, National Geographic Magazine, September, 1933.

Wicker Beach Chairs Foil Chilly North Sea Winds at Scheveningen

Natural dunes, like those behind this beach, line 200 miles of Netherlands coast. Stronger than man-made dikes, they thwarted the assaulting sea in 1953.

During World War II the Dutch underground used the name "Scheveningen" to unmask German agents: only a Netherlander can pronounce it correctly. Fearing an Allied invasion on this coast, Nazis strongly fortified the town and destroyed its piers.

Both British and Dutch make Scheveningen a vacation spot; the resort is especially popular with the people of The Hague, near by. As on the coast of Maine, a briskness in the air tempers the sun's heat.



← Stairs So Steep Need Stout Hand Ropes

Foreign vacationists in Amsterdam congregate in the Five Flies restaurant. The 3-centuries-old structure, like many other buildings in the Netherlands capital, rests on pilings driven into the soggy soil. Ladderlike stairs lead to its second-floor dining room.

An antique dealer before he became a restaurateur, the owner furnished his establishment with old curios (opposite page). A five-flies design adorns his necktie.

403 © Kodachromes by Charles Nesza (opposite) and Gilbert M. Grosvenor

Empty Barrels Tease Guests with Labels Like "Bride's Tears" and "Perfect Happiness"

At the Five Flies, hand-hewn beams, old steins, and a birdless birdcage lend color to a cellar rendezvous.

smooth with a bit of glass, in two hours. He makes four pairs a day and charges his customers 75 cents a pair.

"Why don't you paint them?" Gibby asked.

The shoemaker frowned. "Some do," he said. "It's to hide bad wood. I use the best."

We'd been advised not to miss Urk, even though it is well off the usual sight-seer's track. It was impossible to fit the trip into a week end, however, so we drove over after camp had closed.

The trip in the car intrigued us because we knew that not many years ago we'd have drowned trying the same thing. Urk was once an island in the Zuider Zee.

How Urk Joined the Mainland

Today it stands at the edge of the 118,000-acre Noordoost Polder, one of the wonders of the modern world. Holland's ingenious engineers built the polder—the word means reclaimed land—out of IJsel Meer.

They started in 1936 by building a dam out from the lake's eastern shore. They pushed it steadily out into the shallow water, turned it south, then drove it back to the mainland. Altogether, it is 55 miles long.

In 1941 three pumping stations commenced sucking the water out of the man-made lake-within-a-lake and flinging it over the dam into Lake IJsel, at 954,000 gallons per minute.

The next year the polder was dry, and farmers began moving in. They had maps, printed in advance, showing boundaries of counties, towns, even individual farms. Canals were already in being; the engineers, figuring it was easier to dredge than dig, had cut them across the lake bottom before the polder was drained.

Eels Replace Zuider Zee's Herring

Streets of Urk show the changes reclamation brought to the island. Beside traditional lamp-lit homes of fishermen stand the modern houses of landsmen, newcomers who have electricity.

It was Saturday, and we stood talking to a retired fisherman while we waited for Urk's fishing boats to return from their week's work in IJsel Meer (page 410).

"What happened to Urk will happen to other places," said our new friend. "They plan to make polder land out of more of the lake soon."

The boats came chugging home. They still work under sail, but nowadays they carry auxiliary engines. Fish cargoes seemed mostly baby flounders and eels.

"The flat ones are plaice," said the fisherman. "They did not mind the change from salt to fresh water, and the eels are multiplying beyond belief. But the herring trapped behind the dam across the Zuider Zee's mouth slowly died. Only the few boats that go out into the sea through the dike locks still catch them."

Down cobblestoned streets too narrow for the car, we walked to the home of the chief net weaver. In a loft three men in red undershirts and baggy black breeches plied wooden bobbins. The net twine was nylon.

"One boat, especially a herring vessel, needs eight nets a year," the weavers told us. "One of us, working alone, can make a net in six weeks."

Old sailors all, these men spoke of the flood without bitterness.

"Even if our community had been hit this time, as it has been hit in the past, we would not have been angry for long, as landsmen are," one said.

"The flood was a disaster, yes, but remember: Holland makes a large part of her living from the sea. It is our great enemy and our great friend at the same time."

Striped Poles Record Land's Shift

Our stint of repairing the "great enemy's" ravages was moving to its close. Impressed with our plan to write about his country, our Dutch boss had us turn in our shovels on one of the final days and sent us with a government inspector making a routine tour.

The inspector's name was Mr. Blink, and he taught us many things, starting with the reason for the red-and-white poles standing on canal banks.

"They help measure the elevation of the land," he explained. "In the Netherlands we must know accurately the elevation at any place to the very inch, so the levels of water and land can be kept in balance.

"Each community knows where its water must stand if its drainage ditches are to drain and irrigation ditches to irrigate. Even an individual farmer has his own water plan.

"Obviously, if the land rises or sinks, the water level must be changed. You would be surprised how the land we think of as fixed does change its elevation."

The flood drastically changed elevations,

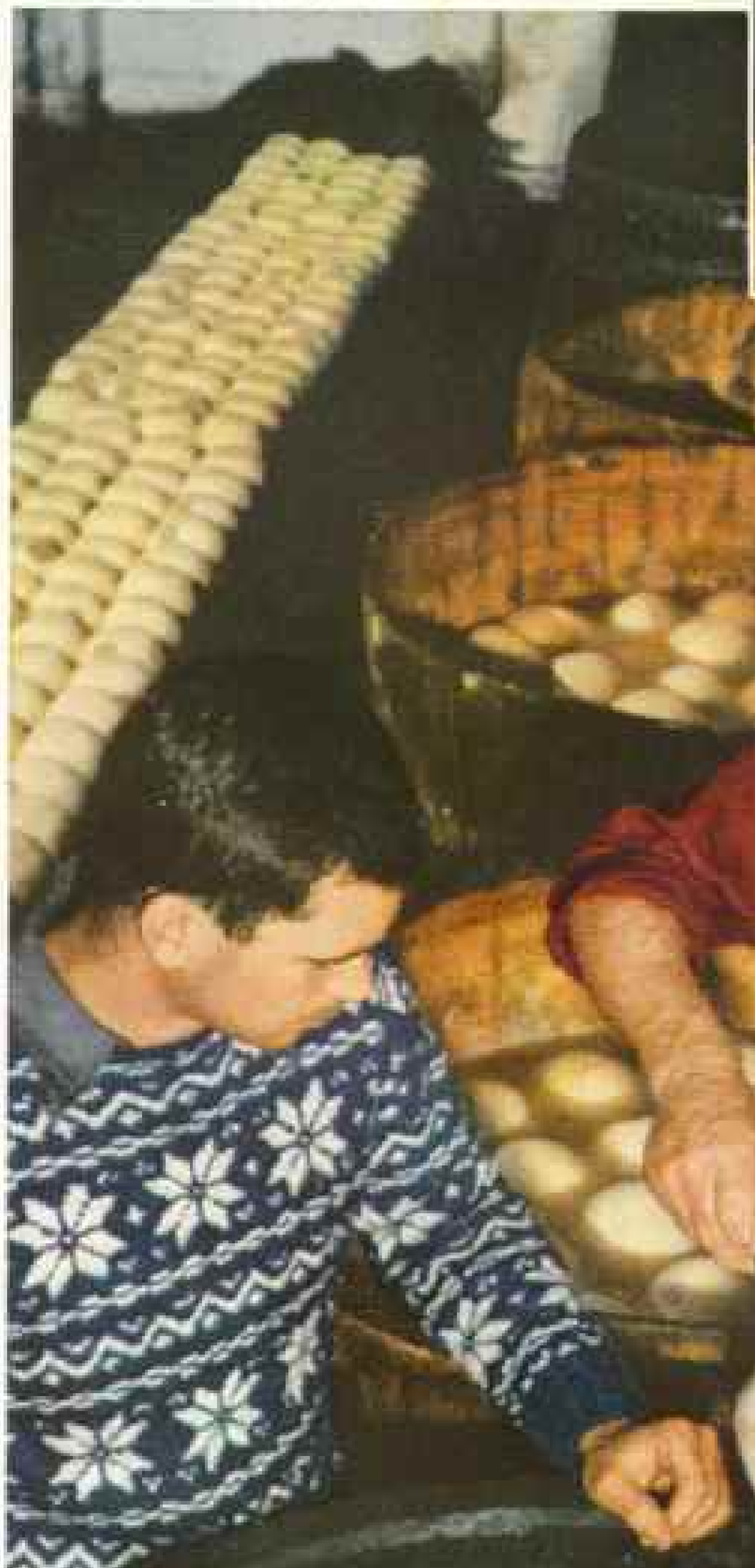
(Continued on page 413)

Dairy Farmers Mold Curds → into Melon-shaped Cheeses

Most Edam cheeses come not from Edam, but from farm-factories around Alkmaar. Visiting one, the authors watched Mijnheer Best and his wife at their daily chore of turning out 100 plump cheeses.

Early each morning the Bests, who have won many prizes for their specialty, heat milk in huge vats and add rennet to make it curdle. Then they drain off the whey for feeding livestock and slice the custardlike curds into blocks.

Here the Bests wrap the rubbery squares in cheesecloth and cram them into muglike pots, or "cheese heads," for shaping. Molded, they will be stacked in vertical racks behind the couple and pressed for several hours under heavy red counterweights to extract the last drop of whey. Relieved of cloth wrappers, the yellow globes then acquire flavor and thick rinds in tubs of brine (below).



← Hollow? Soggy? Crumbly? Plugging Will Tell

"The government makes us stamp our number on every cheese," Mr. Best told the authors. "If ever we made a bad one, they could trace it right back to us."

Here Gibby Grosvenor watches his host test a new cheese with a hollow "trier." Its mates, already bearing government stamps, still soak in the brine; others, turned daily to produce flat tops and bottoms, age in a rack (left). After 16 days of aging, each cheese begins to acquire its characteristic mild flavor and is ready for the Alkmaar market (pages 406-9).

Edams for export get red-wax coats. They keep well for a year, meanwhile hardening and picking up a sharp tang.

Kodachromes by Gilbert M. Grosvenor and Charles Nesbit (lower)

Sight-seers and Cheese Buyers Jam the Market Square in Alkmaar

Every Friday from spring through fall cheese makers from miles around display the week's output in long covered rows across this plaza. Buyers make careful tests, tasting, smelling, and thumping cheeses like watermelons. Dickering proceeds with a minimum of words. The farmer quotes a price and holds out his hand; the bargain is sealed with a handclasp. On other days, sheep, pigs, and cattle replace cheeses in the market place.

→ Porters in double harness, wearing the colored hats of their guild, somehow keep clean in traditional white.


LUNCHROOM

One Slip and Stacked Cheeses Would Scatter Like Marbles

Despite 300-pound loads, trotting porters rarely trip with these long-shafted barrows.

Skillful as a Juggler, a Farmer Unloads Cheeses Two at a Time. National Flags Honor Foreign Buyers in Alkmaar

↑ **Baggy-breeched Fishermen of Urk Dawdle at the Harbor's Edge. Gay Kerchiefs Relieve Their Somber Garb**

Until 1932 maps showed Urk as an island in the Zuider Zee; a vast polder—land stolen from the sea—now ties the town to the mainland. Old-time residents still long for the isolation they once enjoyed and stubbornly cling to the customs and clothes of bygone days.

↓ A Staphorst family makes a Sabbath supper on bread and cheese. Only as a courtesy to the authors would these devout people face a camera on Sunday. Women-folk wear the town's unique helmets; father prizes the heirloom buttons on his shirt and the gold "blackberries" at his throat.

Kodachrome by Charles Nauve

Knife-ridged Houses Cling to Each Other on a Quiet Street in Volendam

Pedestrians walk here in safety; only bicycles may share the narrow canalside road. Street lamp speaks of modern times, but the costumes of these Dutch-bobbed ladies could be those of generations ago.

he told us. Everywhere we saw work parties taking new measurements.

Other groups laid tile pipes in regularly spaced rows of ditches across fields. Later the ditches would be covered.

Mr. Blink said these underground conduits were gradually replacing Holland's old open ditches. Though narrow, the ditches remove much arable land from cultivation.

Buried Pipes Save Land for the Plow

"It is ingenious, this system," said the inspector. "Rain seeps through the ground into the pipes. The pipes carry the water to small ditches. The ditches lead to canals that store the water.

"If the canals go over their calculated levels, we pump water out into the sea, using the great pumps that have largely done away with the picturesque windmills.

"If, however, there comes a dry time, the canal water is sent back through the drainage ditches and the pipes to irrigate the fields. We can vary the level from field to field to suit individual crops."

Backtracking to Overflakkee, we inspected the newly repaired sea dike near Middelharnis. Mr. Blink explained how such dikes were built (diagram, page 370).

"For centuries we faced their seaward sides with mats of woven willow boughs, dumped on clay and brick, and topped that with heavy basalt rocks imported and cut to a standard shape.

"Sometimes such dikes lasted 600 years. The great 20-mile dike across the Zuider Zee is built this way. We are experimenting here with layers of concrete-capped asphalt in place of clay."

The old "Law of the Spade" said a man must keep the dikes fronting his property in repair, or turn his land over to someone who would. "Dike or depart," said the edict.

Today, diking is too big a job for individuals, so the Government does the work. But from Mr. Blink we learned that a vestige of the old law is still in operation.

A man is allowed to open an inland dike on his property if he can control the break, and has labor and materials on hand to cope with any emergency. Mr. Blink told us of a farmer near Middelharnis who had actually tried it—with rather unfortunate consequences.

This man had been flooded out in February, said our friend. The outer sea dike or "watcher" was still breached, but his inner "sleeper" had been repaired. His fields, however, remained swampy. When an exceptionally low tide gave him an opportunity to drain off the water, he opened the dike.

Before he could close it again, the tide turned, the sea rushed back, and the farmer was flooded worse than before. Had a neighbor's land been inundated, the farmer would have been haled to court. As it was, said Mr. Blink, the inspector lectured him severely.

Outside Stellendam workmen were spreading chalky white stuff on the land.

"It is gypsum," said the inspector. "Only since the war have we learned that gypsum can put back in the soil the calcium the sea took out.

"Imported, it's expensive, but it cuts in half the recovery time of the land. Maybe in two years this man will get a good crop of barley. Four years, and he could get potatoes or sugar beets, which like salted soil less.

"But even a crop unfit for harvest is better than none. At least it protects the land against wind erosion."

And now the time came to say goodby, not only to Mr. Blink, but to Brielle, to our comrades in toil, and to Holland.

The assistant mayor and the Brielle folk returned to the hostel to bid us farewell. The official speech was no more understandable than the first one, however, and our conversations with the townspeople bogged down in apologetic smiles and helpless shrugs.

Farewell—in French-Canadian

This was real tragedy. Nobody wanted to say much—just that we'd enjoyed each other's company and would part the best of friends—but even this was beyond us.

"Heck," Gibby said in the thickening silence. "Let's sing something." Desperately he started the first song that came to mind:

Alouette, gentille Alouette . . .

Smiles appeared in the crowded dayroom like sunshine through clouds.

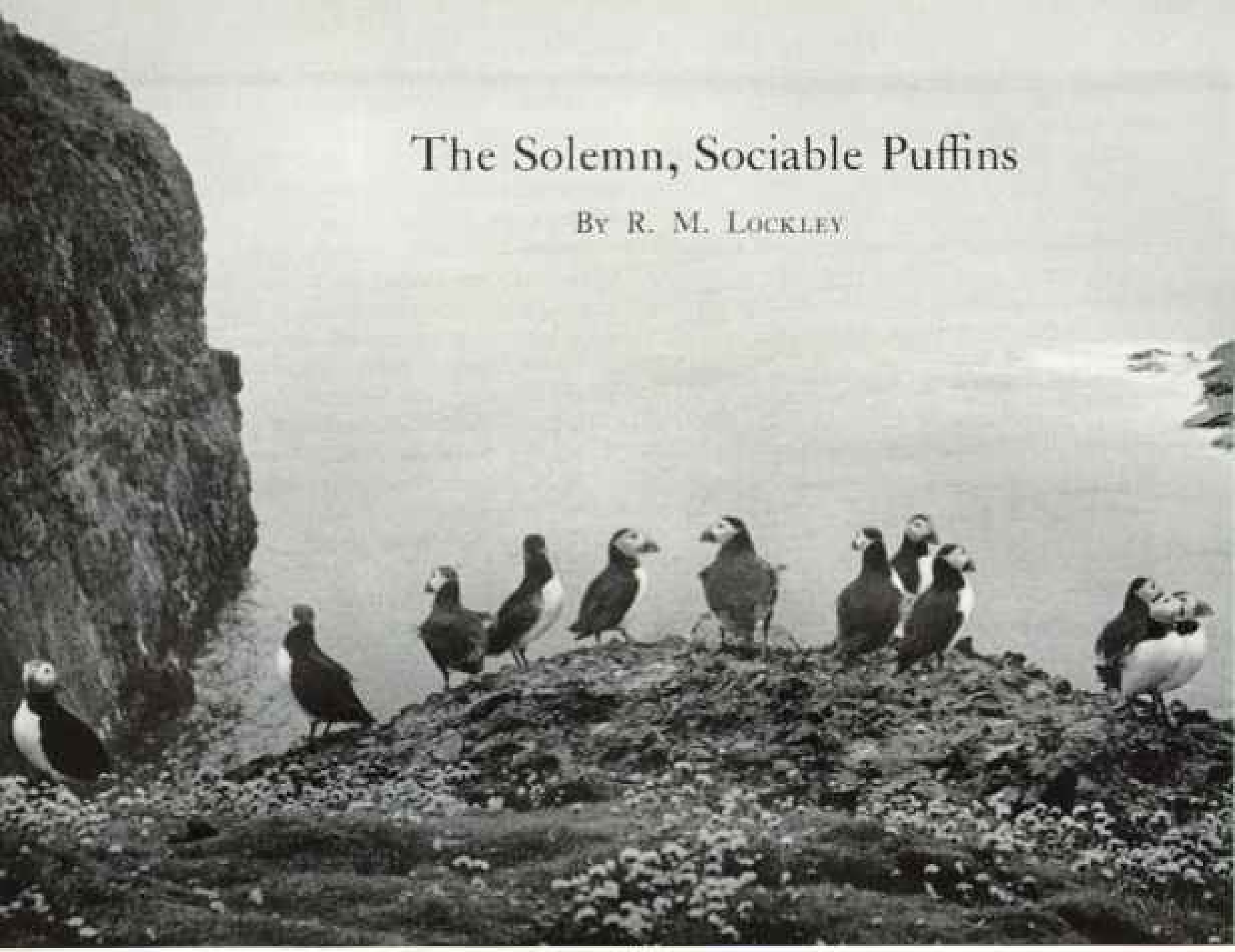
Alouette, je te plumerai . . .

Every voice took up the next line.

And thus we parted, joined in the bond of the universally known old French-Canadian song whose words had not the slightest bearing on the occasion. A strange parting, but somehow everybody thought it a good one.

The Solemn, Sociable Puffins

By R. M. Lockley



GRAY and yellow, the crannied cliffs rose abruptly from the Atlantic's surge, and at their feet, on the weed-wreathed rocks of low tide, seals basked in the springtime sun.

Above me a thousand sea birds wheeled and tumbled through the lucent air, while a host of others bobbed on the calm blue water, stood about in gossipy groups along the shore, or bustled to and from their nesting burrows.

This, on the maps, was the island of Skomer, a small sliver of southwestern Wales lying off the coast of Pembrokeshire. To me, however, it was and is *Lundaland*, which in the pleasant Norwegian means "Land of the Puffins."

Puffins Winter on the Open Atlantic

The long war years over, I had come back to Lundaland to resume my study of these delightful bottle-nosed sea parrots and to try to fill some of the many gaps in our knowledge of their life cycle.

From my observation blind I could look out upon long slopes garlanded with gay-beaked puffins. The murmur of the gentle spring wind was lost in the cries of herring gulls and kittiwakes and in the groaning love notes of Atlantic murres and razor-billed auks nesting in crevices of the island's palisades.

I was focusing my attention especially upon one pair of puffins—a male whom I called Frater and his mate whom I dubbed Cula, after the scientific name for their species, *Fratercula arctica*. Frater's head and bill were a little larger than his wife's, but so similar were the pair in coloring and plumage that I would often have been hard put to tell one from the other at a distance, had it not been for the aluminum bands with which I had ringed them. Frater wore his on his right leg, Cula on her left.

Where Frater and Cula had spent the winter I had no means of telling. I knew only that, early in spring, the puffin flocks abandon their life out on the open sea and concentrate near their breeding grounds off the coasts of Maine, eastern Canada, Greenland, Jan Mayen, Iceland, Spitsbergen, the Faeroes, and the islands of northwestern Europe. In the mild climate of Wales they appear at the end of March,

Eggs May Cool, but Puffins Nesting on Skomer Island Take Time Out for Play

This seagirt rock lies among a rugged group of small Norse-named islands off the southwest coast of Wales. From April to August nesting birds crowd its high cliffs.

Gathering together in late afternoon, puffins stand and stare about, splash in the sea below, or stage mass "joy flights" (page 421). Rocky inclines provide perfect taxiing strips for take-offs.

Few men are as familiar with these misty shores as author Lockley, chairman of the West Wales Field Society. For 12 years he lived near Skomer on lonely Skokholm Island, site of the first coastal bird observatory and bird-marking station in the British Isles.

J. Ritchie

settling in "rafts" on the sea below their nesting islands.*

After eight months at sea the older birds naturally require a while to reacquaint themselves once again with the bay, the piece of cliff, the burrow they frequented the year before, and perhaps to seek out last season's mate, though we haven't enough evidence yet to be sure that puffins prove so faithful.

Birds Pick Their Partners at Sea

It's plain, however, that these early assemblies on the water are essential for the selection of partners. Here is the grand puffin marriage bureau; here on the waves all matings take place (never on dry land).

From my post ashore I watched these rafts of puffins daily thicken in number during late March and early April. As the birds' excitement rose, mating increased. Sometimes the course of puffin love ran smooth. But often little skirmishes would break out as a lone male would seek to seduce a mated female and be driven away by her spouse.

Frater and Cula mated on the sea before they came ashore, and for days afterwards they would return to flirt and play on the water. But this phase soon ended. The egg was already developing in Cula, and more serious matters were at hand: it was time for the pair to reconnoiter an old burrow and make it shipshape for the season.

Early in April, while many puffins still sported in the rafts below, my pair fluttered to land with a few hundred others. Settling on the outcrops of rock, they stared around for hours on end. Not until a day or so later did they decide that all was well with their ancient Lundaland and enter the burrows close to my tent.

New Tenants Evict Rabbits

These were immemorial puffin dens, the work of centuries of occupation. I would have thought they needed little repair, having been kept well in order by their rabbit tenants during the winter. But Frater and Cula obviously disagreed. The rabbits, wary of the puffin's powerful bill, had not stayed upon the order of their going—they had vanished. Using their great bills as pickaxes and their sharp-clawed paddles as shovels, the puffins proceeded to scratch loose earth and debris backward out of the burrow, showering it over the green grass.†

I repeat that I considered such exertion unnecessary; but I suppose that if you are as full of energy as a puffin in the spring, you must relieve it somehow. Frater, indeed, was so excited and ambitious that he would often start a completely new burrow. He would dig frantically for about 10 seconds, stop, then walk away, as if he had thought better of it.

* See "We Live Alone, and Like It—on an Island," by R. M. Lockley, National Geographic Magazine, August, 1938.

† See, in the National Geographic Magazine: "Lundy, Treasure Island of Birds," by Col. P. T. Etherton, May, 1947; and "Birds of the Northern Seas," by Alexander Wetmore, January, 1936.

His favorite pastime was the gathering of nesting material, which, however, he put to no practical use. He would pick up a feather or a stone, or pluck a big mouthful of grass or campion, and sometimes he would carry his burden below ground. But more often than not he would return to the surface with the load still in his mouth and presently, getting bored, would let it drop.

Like all puffins, Frater and Cula only dabbled at lining the nest site at the end of the burrow. But they got vast enjoyment out of playing with material. They would seize upon a fine feather or a long ribbon of seaweed and flaunt it about until their puffin neighbors, aroused and envious, would sometimes try to snatch the trophy for themselves. It was, however, all very idle and inconsequential behavior. I thought of Walt Whitman's lines:

> I think I could turn and live with animals,
> they are so placid and self-contain'd;
> I stand and look at them long and long. . . .
> Not one is dissatisfied—not one is demented
> with the mania of owning things . . .

The egg which Cula eventually laid in early May rested, I discovered, on the bare earth. While Cula was busy indoors, Frater, like a thousand other males at their burrows near my tent, stood guard at the entrance to his home. Stork's-bill, pearlwort, campion, and buckhorn plantain framed this bower, and the lawn in front of it had been neatly grazed by rabbits.

Male Takes His Turn on Egg

He did not remain permanently on sentry go, however. Sometimes he changed places with Cula and took his turn at incubation. At other times both of them would go off to feed for a few hours at sea.

The puffinry held to a definite schedule each day during spring and early summer. From dawn to early afternoon parents incubated their eggs or fed the chicks; in the latter half of the day they relaxed agreeably, sitting about out of doors, visiting neighbors, and observing all the little pleasures of the social round.

Now, it is a general rule among birds that, where the sexes are outwardly indistinguishable, monogamy and, frequently, mutual display are practiced; polygamy, where it occurs, seems to be for those species where the male's plumage is spectacular and the female's dull. It is thought that the purpose of bright colors in Nature is to stimulate, attracting or repelling the viewer. Since puffin males and females look very much alike, their brightly colored bills serve as mutual stimulation, providing an emotional bond that keeps the pair together while occupied in their domestic duties on land.

Frater usually, but not always, initiated the billing ceremony by advancing upon Cula with his great nose thrust forward and quivering slightly, until it was pressed against one side of hers. In this position they nuzzled each other with every appearance of enjoying themselves, like cosseting lovers (page 418).

Soon, however, neighboring puffins, sitting idly outside their burrows, would become so stimulated by this performance that they would be drawn with mincing steps irresistibly toward the performers. Sometimes they joined right in. But even if they merely stood about in a ring, their presence would break up the ceremony; the lovers seemed to resent the intrusion.

Occasionally Frater would hurl himself at one of the interfering males. If a fight developed, however, this too would be squelched by the crowding in of excited spectators. Any untoward encounter among the puffins, in fact, seemed to meet the same fate: the aroused bystanders would smother the squabble out of sheer curiosity.

Yawns Threaten Intruders

Almost a silent bird, the puffin gives its warnings to intruders visually rather than vocally, holding its bill open for several seconds in a kind of fixed yawn that displays the throat's bright lemon-yellow interior.

If a visitor continues to encroach, the puffin drops its threat yawn for a more aggressive attitude. It lowers its head, presenting the black crown and brilliant beak fully to the unloved one, bristles its neck feathers, cocks its tail, and opens its bill.

When, on the other hand, a bird desires to encourage an advance, it will flick its head upwards, hiding the colored bill and exposing the neutral black and white throat. It may accompany this gesture with a soft grunt.

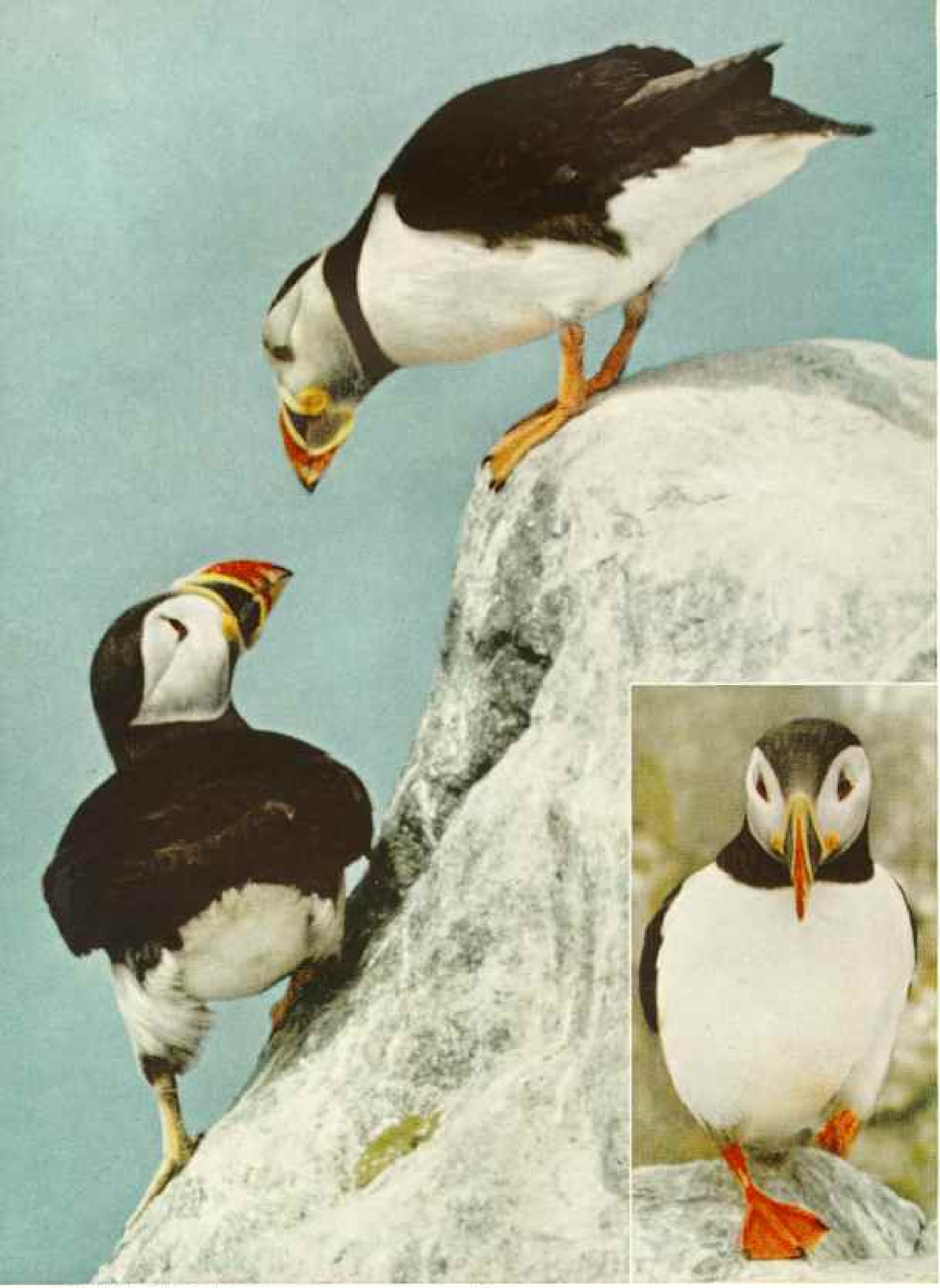
As a rule, however, puffins are silent, growling only when fighting, when caught in the hand, or occasionally to send up a signal from their underground burrows. At the pleasant social gatherings which enliven the late afternoons, the taciturn puffin conducts a subtle conversation with its fellows simply by raising or lowering its head.

All members of the colony take part in these soirées. Cula regularly left her egg each afternoon to bathe and spruce herself before joining

Kodachrome by R. U. Bowers

Puffin's Gaudy, Clownlike Beak Ill Befits a Solemn Air and Formal Wear

A circus-wagon bill distinguishes *Fratercula arctica* from other North Atlantic sea birds. Arctic fishermen call him the "sea parrot." He bobs about far at sea from late summer till spring, when he nests on coastal islands.



Prelude to a Kiss: When Bill Meets Bill, Puffins Nuzzle Affectionately

Off Maine's coast Machias Seal Island mates share incubation chores in rocky tunnels. Sexes are hard to distinguish. Except for orange-red accessories, the puffin's full dinner dress (inset) resembles the penguin's.

↑ Stop, Look, and Listen! Puffins Ponder a Take-off

Though powerfully muscled, puffins are heavy-bodied and small-winged; they like to dive from heights to gain momentum for full flight.

The puffin's intense curiosity often costs him his life. Even his formidable enemy, the black-backed gull, can walk about puffinries, arousing more interest than alarm. Each year half a million birds are netted in Iceland and the Faeroes, where feathers and down are prized for trade and the meat as food. Ruthless slaughter has almost wiped out some breeding colonies.

"Hors D'oeuvres . . .?" →

The puffin swims underwater to capture live fish. When his bill opens to seize prey, an elastic "lip" remains firmly closed on earlier catches.

Kodachromes by R. C. Hermes

↑ Vivid Beaks Stir Mating Instincts

Bright colors stimulate both male and female at breeding season. At sea, as summer wanes, the birds shed horny bill coverings in strips. Polished white cheeks turn gray, and the eye's red rim disappears.

↓ Land Bores; the Open Sea Calls

By late July puffins spend increasing time on the waves and soon vanish out to sea. Fat nestlings left behind in burrows fast a few days, then stroll to cliff's edge at night and plunge into the water.

Kodachromes by Helen G. Cruickshank

the assembly. Nor would Frater deny himself by taking a turn on the nest. The egg was left to cool for a few hours while the adults stood about and stared, indulged in mass "joy flights" in the air above Lundaland, or splashed and swam in the sea below.

No one watching the puffinry during these idle, off-duty hours could doubt that this was a recreation period. The puffins nose-rubbed, dug holes, played with feathers and grass, chased away an occasional rabbit, and preened their plumage, all as carefree as a schoolyard of children. Even when a peregrine falcon would swoop low or a great black-backed gull with its murdering bill would snatch away one of their number from time to time, the social round would go gaily on.

Two Brood Spots but Only One Egg

In three burrows which I kept under observation I found that the incubation of the egg took 40, 42, and 43 days, respectively. The large egg is covered with a white, limy deposit overlying rich mauve or lilac markings. These, if the shell be illuminated against a strong light, appear almost as striking as the scrollings on the egg of the razor-billed auk.

Like the auk, the puffin usually lays but one egg, although, curiously enough, both birds have two brood spots for incubating the egg. High up on each side of the lower breast, these bare patches are remarkably small. In order to press the egg against them and warm it with the body's heat (which is 108° Fahrenheit), the puffin must tuck the egg partly under one wing and lean rather than sit upon it. Other auks, such as the murre, which also lay but one egg, have a single large brood spot more conveniently situated between the thighs.

The puffin's twin brood patches, the motley pattern of its shell markings, and its habit of carrying nesting material all suggest that it formerly laid two richly colored camouflaged eggs in a well-made nest in the open. If so, then its burrowing habit, measured against the centuries of the bird's evolution, must be comparatively recent.

On hatching, the chick is covered with a thick down, sooty above and white on the breast. Its beak is small, pointed, and armed with a little yellow tooth (used for breaking out of the shell). Open-eyed, the baby puffin is lively, able to walk, and possessed of a very feeble chirp. With its warm coat it needs little brooding; the bare patches under its parents' wings soon grow over.

The first sign that hatching time has arrived in Lundaland is the appearance of fish in the bills of the adults. At other seasons the full-grown puffins swallow underwater the small fish and marine organisms on which they feed, probably to avoid attacks by pirate gulls and jaegers on the surface. At any rate, twice a day from mid-June onward Frater and Cula brought bundles of fresh fish back to the burrow (page 419).

I estimated that their chick—whom I called Lundapisa after the name the Faeroe islanders give to young puffins—devoured more than 2,000 small fishes during his sojourn in the burrow and ate nearly his own weight in each 24 hours. It was not, however, very hard work feeding him, and Frater and Cula still found time each day to attend the afternoon social assembly on the cliffs. In fact, the fashionable promenades of Lundaland were now more crowded than ever with adult puffins, and the same strenuous billing, burrowing, and carrying of nesting material continued unabated.

Parents Leave No Puffin Sitter

I noticed, however, that Frater and Cula were becoming less conspicuous in these goings on; instead, they rested a good deal at the entrance to the burrow or flew off for hours at sea. Their plumage was much abraded, and the colors of their legs and bills had grown dull. I began to realize indeed that, as midsummer drew on, the old breeders seemed to be giving way to a younger, more active crowd of "teen-age" small-beaked puffins with only two horny transverse age ridges on their bills.

From the inconsequential behavior of these newcomers and the fact that they never carried fish, I surmised they were nonbreeders. Probably they were visiting the island for the first time since they had left it as fledglings—certainly for the first time this year. They paddled about uncertainly, dug holes perfunctorily, and even invaded Cula's burrow. Frater, when he happened to be about, would either drive them away or, if they were not too aggressive, let them hang around. His territorial instinct had weakened considerably.

Those keen new amateur colonists would inspect each other or go up to an old breeder and offer to rub bills. They seemed to be testing for friendliness, or perhaps trying to ascertain the sex of the old-timer (sex recognition in males and females outwardly alike may well be a bit difficult for the sexually immature nonbreeder). They would even "play house"

together, stalking in and out of some new, inadequate burrow.

Clearly, it was all good practice. The young puffins were forming their first deep attachments to this part of Lundaland, experimenting as sweethearts with partnerships that might well end in more lasting bonds during the years ahead. Some young pairs even spent a midsummer night or two in an empty burrow.

As for Frater and Cula, they were less and less inclined to sleep at home now. Their burrow was becoming verminous with blood-sucking ticks, fleas, and mites, and they were beginning to lose interest in Lundapisa, now a ball of fat and down. At last, about the 40th day, they forsook Lundapisa altogether and went away to sea. I never saw them again.

Chick Checks Out Under Cover of Night

Lundapisa remained alone in his burrow. He was well feathered now, and almost as big as his parents. But he lacked all color save black and white, and his beak was a short, broad dagger only faintly resembling an adult's bill. A little of the natal down still clung like a ruff about his neck.

When I dragged the chick from his hole to hand him, he protested feebly in a goslinglike exhalation and hastily dived back into the burrow as soon as I released him.

For a week he remained alone and fasting, except for an occasional nibble at roots and debris in the burrow. While his winter plumage and strong quills in wing and tail were growing, he lived quietly off his fat. At this stage he weighed about 9½ ounces, roughly a third less than he would as an adult.

Nestlings of the Atlantic murre and the razor-billed auk, born on open ledges and exposed to storms and predators, spend a mere two weeks on land. Comparatively safe in the cool depths of his burrow, Lundapisa, however, was in no hurry to encounter the dangerous outer world. What mental process or innate wisdom told him when to leave the burrow, I do not know.

But this I found: young deserted puffins like Lundapisa always make the journey to the sea at night, when the gulls and other avian enemies are sleeping. As soon as the brief darkness of a July night has fallen, the fledgling strolls forth and, taking the downward path, walks without hesitation over the edge of the cliff.

With my electric torch in hand I watched this momentous event night after night, marveling at the youngster's brisk determination to put as much distance as possible between himself and his land enemies by morning.

What happened when the bird reached the water at night I found hard to follow. But by keeping back a number of fledglings and releasing them in the morning, I was able to study their behavior. The youngster's first instinct on being thrown into the water in daylight, I discovered, was to dive, as if to get back to the safety of the dark burrow. Some fledglings, indeed, remained under for as long as 27 seconds before they came up, gasping for air. They would bathe, preen, sip water like a farmyard hen (holding the head up to let the water run down the throat), then dive again.

Each time the young puffins surfaced they had advanced farther from land. Soon their dives became shorter, with longer intervals at the surface, as if they were becoming less afraid of the bright light of day. When a gull swooped at them, they would dive at once and come up far away, effectively fooling the shallow-plunging gulls. By midday not a fledgling remained near enough to the shore to be seen.

Safe at Sea, Puffin Learns to Fly

Later, voyaging at sea in August and September, I would come upon these young puffins. Always alone, never mingling with the few remaining adults, the little black-nosed sea parrot would be making its way toward the infinity of the North Atlantic, far out of sight of land, to learn for itself the art of fishing and flying.

Well and good. I knew—as perhaps the puffin did not—that one day in some distant springtime its innate sense of geographical position would infallibly bring it home across the Atlantic wastes to the island of its birth. There it would begin, in its turn, those early terrestrial friendships that would lead to the remarkable events of the nesting season in Lundaland.

Eastman of Rochester: Photographic Pioneer

A Gifted Bank Clerk, Born a Century Ago, Revolutionized Picture Taking and Made "Kodak" a Household Name

By Allan C. Fisher, Jr.

National Geographic Magazine Staff

IT would be entirely possible to visit Rochester, New York, without ever discussing George Eastman. But it would not be easy. For in this camera-conscious city Eastman's name comes up as naturally and inevitably as Ford's in Detroit or Du Pont's in Wilmington.

"What was he really like?" I asked one of Eastman's long-time associates, Dr. C. E. Kenneth Mees.

Dr. Mees, vice president for research at Eastman Kodak Company, studied the ceiling of his office a moment. "You could say he was a gifted inventor, I suppose. Or a production genius. Or even a wizard at business organization. And you'd be right. But he was something more important: he was an enthusiastic amateur."

An Amateur Makes Over an Industry

For the father of popular photography it might seem an unlikely characterization. George Eastman revolutionized an entire industry and amassed one of the great fortunes of our times. During 1954, the centennial of his birth, spokesmen for science, government, and business are solemnly commemorating his meteoric career.

Yet Dr. Mees stressed a basic fact. It took Eastman, an avid amateur cameraman as a youth, to bring to the infant photographic industry a new and highly unprofessional viewpoint. For it was Eastman's firm belief that *everyone* should be able to take pictures.

When George Eastman went into business for himself in 1880, photography was a cumbersome, technical handicraft, with relatively few followers. Within a decade he and his associates had so simplified photographic processes that even a bright child could take snapshots. His greatest contributions: introduction of flexible film in roll holders and a revolutionary little camera, the Kodak.

By coincidence the year 1888 saw both the advent of the Kodak camera and the birth of the National Geographic Society. In the new era of photography ushered in by Eastman's camera and film, your Society was soon publishing historic "firsts" in pictures from all corners of the globe.

But not even Eastman could have foretold the tremendous impact of his work. Today the United States alone contains 35 million amateur photographers, busily recording babies and bathing beauties, mountain peaks and family pets. The 1954 output of these devotees, plus that of 55,000 professional photographers, is expected to total some *two billion* pictures.

On July 12, 1954, the 100th anniversary of Eastman's birth, the Government honored his achievements by issuing a 3-cent postage stamp bearing his portrait (page 438). Representatives of the photographic industry joined in first-day-of-issue ceremonies at Rochester.

Today the little firm he founded on vision and a shoestring—the Eastman Kodak Company—is the world's largest manufacturer of photographic products, with plants both here and abroad. Its three huge installations in Rochester alone employ 37,000.

George Eastman's rags-to-riches saga rivaled anything from the pages of Horatio Alger. He was only seven when his father died, leaving the family almost penniless. To eke out a living for her son and two daughters, the widow took in boarders at her home in Rochester. By the time he was 13, George had assumed a breadwinner's role and was hard at work as an office boy, earning $3 a week. At 19 he was employed as a $15-a-week clerk at the Rochester Savings Bank.

George Buys a Wet-plate Outfit

Four years later he invested $94.36 of his savings in the complex paraphernalia of wet-plate photography. His outfit included a big stereoscopic camera, tripod, glass jars, dishes, funnels, scales, chemicals, and darkroom tent (page 424).

The process then necessary to take pictures was as messy as a taffy pull on a hot summer day. Photographers used glass plates as a negative base. They coated these plates with

National Geographic Photographer David S. Boyer

Photographing Niagara Falls Was No Pastime for Honeymooners in Eastman's Youth

"Snapshot" had not become a common word in 1880, the year George Eastman founded his business in Rochester, New York. Picture taking was a technical handicraft. Its followers seemed as mysterious as medieval alchemists. Then, within a decade, Eastman revolutionized photography. Rolls of flexible film replaced bulky glass plates, and the simple Kodak camera enabled anyone to take snapshots (lower right).

This scene depicts the tedious wet-plate process used by Eastman as an amateur in 1877. The photographer has just prepared a plate in his field darkroom tent. First he coated glass with sticky collodion, then bathed it in light-sensitive silver nitrate. Now, clutching a holder containing the still wet plate, his boy assistant scurries to the camera. The photographer, after making a 3- to 4-second exposure, must duck into the tent and develop the picture before it dries. Paraphernalia shown are from the collection of George Eastman House, museum of photography.

By 1880 dry plates coated with gelatin were just coming into general use. Eastman was one of the first to make them in America.

Right: One of the first Kodak-armed amateurs aims at friends. His box camera was simplicity itself, and Eastman's new roll film gave 100 exposures without reloading (pages 429, 436). This picture, probably made in 1888, shows a section of the Genesee River, now part of a Rochester park.

Eastman House

This Portrait of Eastman at 29 Tested His New Film

In 1884 the young businessman patented "American Film," a paper roll coated with sensitized gelatin. After development the gelatin could be stripped from its base, becoming a transparent negative (page 436). This picture, though on American Film, is a print. Eastman made it from an unknown negative, probably glass, to see if the emulsion would reproduce a clear image. Later he signed and dated his laboratory experiment. The film was brittle, and in the course of years some pieces have broken off.

English Photographers Work While the Sun Shines at an Outdoor Studio in 1845

W. H. Fox Talbot, who owned this studio at Reading, England, was the first to make successful prints from negatives (page 435). Film was not yet invented, so Talbot used sensitized paper. Often the paper's grain marred his pictures, and photographers turned to glass as a negative base. One cameraman (left) copies an engraving. Another makes a portrait while his subject sits like a stuffed owl for the long exposure.

collodion, containing a halide salt in suspension, then dipped them in a solution of nitrate of silver, thus making the light-sensitive silver salt that captures photographic images. The plates had to be exposed while still wet and developed immediately afterward; hence the all-too-apt term, "wet plate."

Young George mastered this technique the hard way. He lugged his 70 pounds of equipment out into the countryside to set up his darkroom tent and make pictures.

"One did not 'take' a camera; one accompanied the outfit of which the camera was only a part," he later observed. "I learned that it took not only a strong but also a dauntless man to be an outdoor photographer . . . It seemed that one ought to be able to carry less than a pack-horse load."

And so it must have seemed to Mathew Brady, the great Civil War photographer. He used a wagon or pack horses to carry his heavy wet-plate apparatus, as did Alexander Gardner and William Henry Jackson, famous for their photographs of the frontier West.

While mulling over the weight problem, Eastman read every technical publication on photography he could find. His research impressed him with the half-successes, groping failures, and blind alleys that had beset the history of picture taking.

But by 1839, just 15 years before Eastman's birth, Louis Daguerre had demonstrated in Paris a successful technique for making photographs on copper sheets plated with silver, an event that can be said to mark the beginning of practical photography.

Men had known for more than a century that silver salts were sensitive to light. Predecessors of Daguerre had obtained crude images on paper coated with silver nitrate. In these "pictures" the light areas of the subject were opaque and the shadows bright. We know such images today as negatives.

But Daguerre astonished the world by making positives, pictures that showed light,

(Continued on page 435)

Milady Must Freeze Like a Statue for Her Daguerreotype Portrait

Louis Daguerre, French contemporary of Talbot, amazed the world in 1839 with a demonstration of photography on silver-coated copper plates (opposite page). His process, marking the beginning of practical photography, yielded brilliant, mirrorlike pictures. Soon daguerreotype studios flourished in many lands.

Early portrait subjects gazed as if hypnotized at the camera, not daring to move a muscle during the long exposure.

Here models show how daguerreotypes were made in an American studio of 1848.

Daguerreotypes Were Tricky

If great-grandfather held a daguerreotype in front of a dark surface that did not reflect light, he saw the image as a positive. But perhaps he tilted the plate toward his white shirt. In a twinkling the positive became a negative. Light reflected from the shirt reversed light and dark tones in the picture.

This daguerreotype illustrates the effect. Black velvet (lower left) and white cardboard lie at bottom. One woman looks natural because her image is in front of the dark velvet. But the other woman, reflecting glare from the paper, has changed into a ghostly negative.

National Geographic Photographer Robert F. Sisson

← **London, 1890, as Seen by the Kodak**

Fred Church, a patent attorney, took these snapshots on a business trip to Europe with Eastman. Church was armed with the No. 2 Kodak camera, using the new nitrocellulose film introduced the previous year. Like its predecessor, this camera took round pictures. This view shows Trafalgar Square.

All photographs on this page are from the Eastman House collection.

Tourists, Then and Now, Snapped the Eiffel Tower →

Kodak camera No. 2 was slightly larger than the No. 1 model (opposite page), and its pictures were bigger. This snapshot is reproduced nearly actual size, 3½ inches in diameter. The camera made 60 snapshots without reloading.

← **Belles Stroll at Monte Carlo**

Church "Kodaked" strangers, such as these unidentified women, but he rarely pointed the camera at his boss. The photographic pioneer was a reticent man and shunned publicity. Though Eastman's name was world-famous, he often walked the streets of Rochester unrecognized.

Kodak No. 1, a Simple Box Camera, Brought Photography to Everyone

Eastman's little Kodak camera, introduced in 1888, combined simplicity of operation with the advantages of roll film, enabling any tyro to take pictures. The camera weighed only 22 ounces. Owners pulled a string to set the shutter and pressed a button to release it. A key wound the film. This Kodak is from the Eastman House collection. The girl holds her camera in "operating position" as recommended in an 1888 advertisement.

On a single roll the No. 1 model took 100 snapshots 2½ inches in diameter. A later model made pictures an inch larger (opposite). After a roll was exposed, the camera went to Rochester where Eastman employees developed the pictures, made one print of each, and inserted new film (page 436).

National Geographic Photographer Robert F. Sisson

↑ **A Misspelling? No, "Kodok" Is an African Village Visited by Eastman**

In 1928, while boating up the Nile, the inventor saw this name on a map of the Anglo-Egyptian Sudan. Struck by the similarity to the trade name "Kodak," he lettered the sign on canvas and took his party to the village for a picture. Eastman, holding a camera, is flanked by his guide, Martin Johnson; Dr. Albert D. Kaiser, now Rochester's health officer; and Osa Johnson.

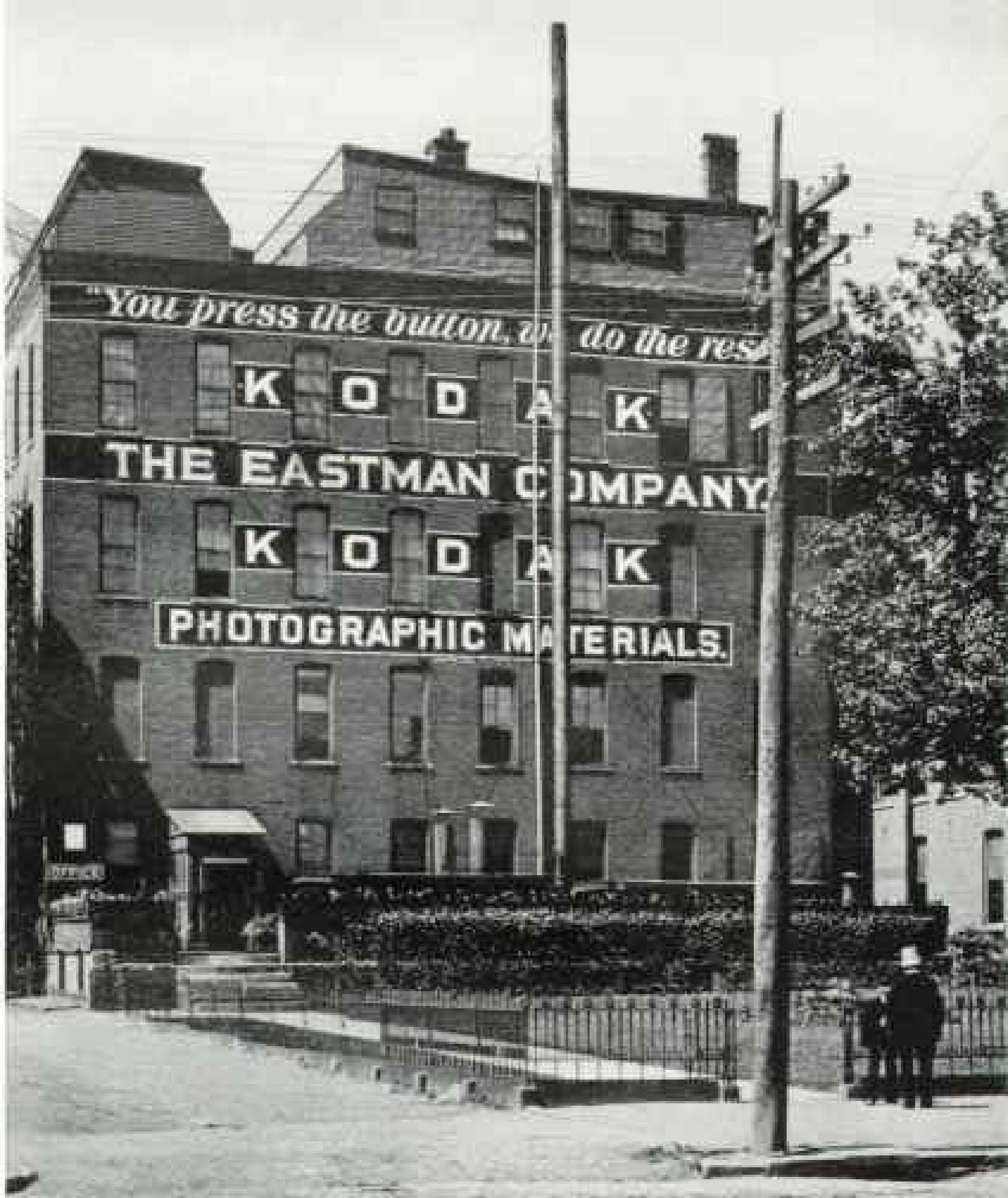
↓ **Rochester's First Citizen Does KP Duty in Canada**

Eastman, a lifelong bachelor who had known poverty as a child, worked tirelessly until he built his business and his fortune. Later he became an outdoor enthusiast and big-game hunter. On vacations he liked to cook and always took charge of the camp kitchen. Here he washes dishes on a camping trip at Cascapedia. His companions are unidentified.

Eastman's Early Factory Bore a Famous Slogan

A rented 3d-story loft housed the photographic pioneer's original business venture. Two years later, in 1882, he built this factory on State Street in Rochester. The inspired slogan, "You press the button, we do the rest," made its bow to the public in 1889 Kodak advertisements. This picture was made sometime prior to May 23, 1892, when the firm's name was changed to Eastman Kodak Company. Today Kodak Tower, the company's skyscraper headquarters, stands on the site.

In the 1880's employees printed photographs by sunlight. These girls placed negative and printing paper in a holder, exposed them under the skylight, then fixed the prints in hypo solution. A print could be made in a minute or two except on cloudy days, when 10 minutes was the average. Paper then available was not sensitive enough for printing by artificial light; such paper was invented in 1892. This penthouse stood atop the old factory (above, left).



Eastman Home

From a Little "Peep Show" Mighty Hollywood Grew

Modern movies trace their lineage back to a humble origin, Thomas A. Edison's 1894 Kinetoscope. This first commercially practical motion-picture machine used Eastman's nitrocellulose film (page 437). An Eastman House visitor peers into the Kinetoscope viewer. In the old days a nickel in a slot started the film. It flowed over the rollers and past a revolving shutter in the viewer.

National Geographic Photographer Robert F. Sisson

Eastman and Edison Meet at Rochester

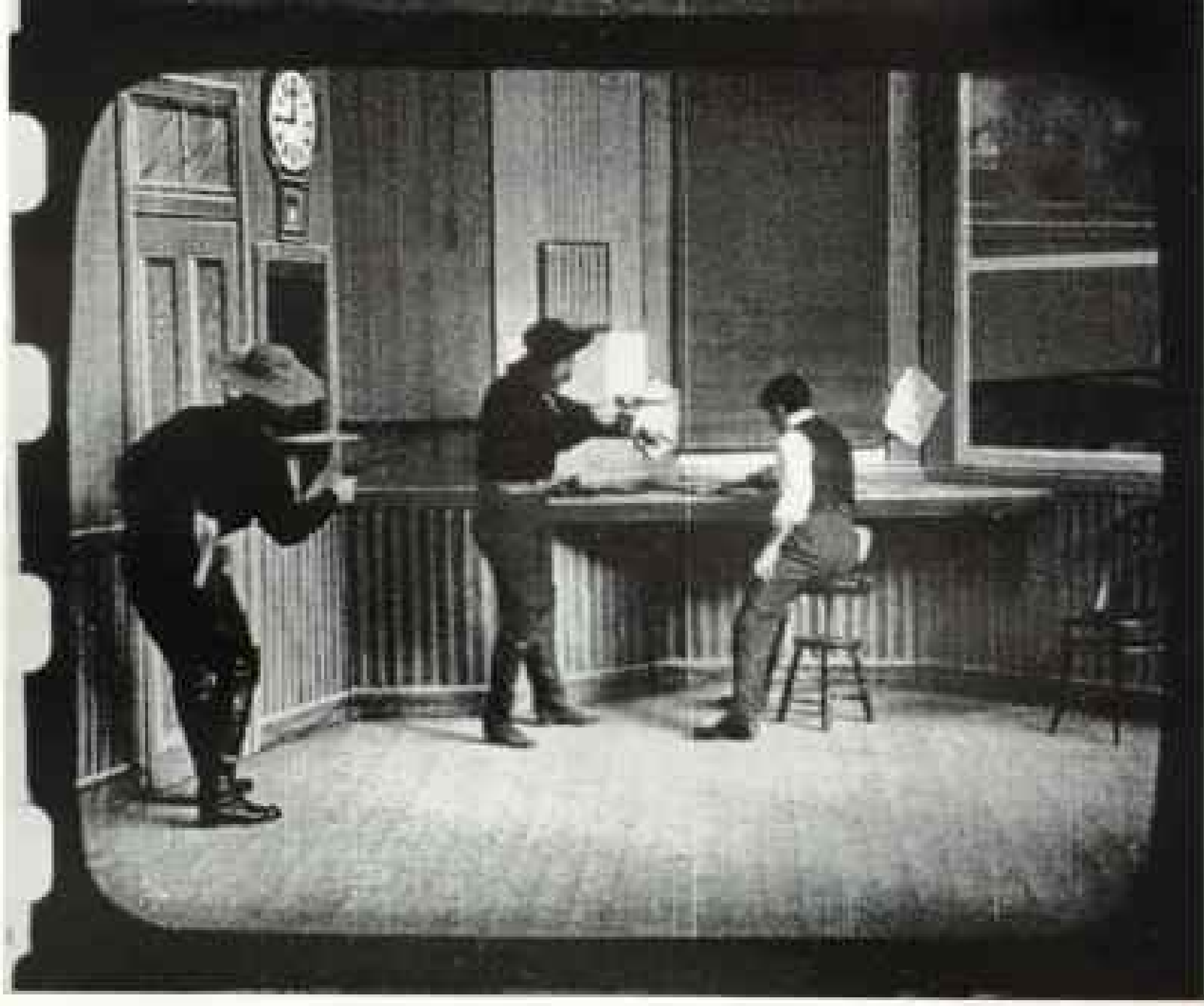
For many years the companies headed by the wizards of Rochester and Menlo Park worked in close collaboration. When this photograph was made in 1928, Edison was Eastman's guest at a party launching color movie film as an amateur process.

Eastman House

Moviedom's First Villains Flourish Guns →

In 1896 Edison demonstrated the Vitascope projector, invented by Thomas Armat, and soon motion-picture houses blossomed on the land. This scene is from "The Great Train Robbery," a smash box-office hit of 1903 and the first movie to establish the "story picture." It was an Edison production made in New Jersey on Eastman film. Obviously these two blackguards deserve to be hissed. They are threatening to shoot the young station agent if he warns the oncoming train.

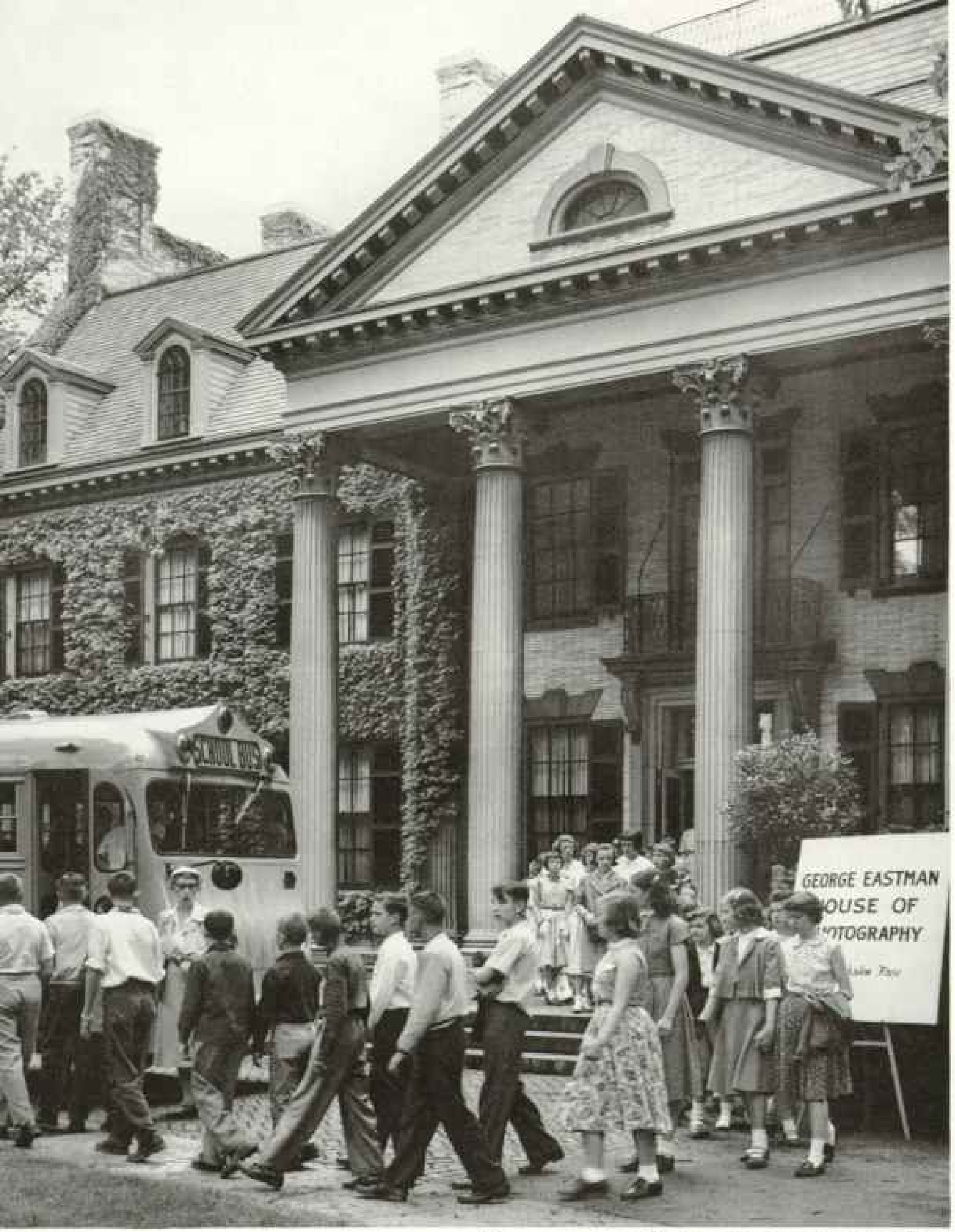
Eastman House



↓ **Youthful Faces Reflect a Moment of Drama in a Nature Film at Eastman House**

These intent school children are watching a battle to the death between a snake and a bird. Their emotions vary, but certainly no one is bored! One girl seems to be lifted from her seat. The youngsters were unaware of the photographer, who took his picture in semidarkness by infrared film. Eastman House owns a valuable collection of historic films and screens them for visitors.

National Geographic Photographer David S. Boyer



National Geographic Photographer Robert F. Sisson

Eastman House, with a Treasure-trove of Exhibits, Tells the Story of Photography

George Eastman lived in this Rochester mansion until his death in 1932. Today, as a museum of photography, it is a living memorial to him. Here visitors may inspect the old cameras and paraphernalia of photography's past and trace its development to the present. Many of Eastman's possessions—books, furniture, and paintings by old masters—remain for all to see. The museum, a mecca for picture enthusiasts, drew 250,000 visitors in 1953. School children often attend in groups, supplementing classroom studies (page 438).

National Geographic Photographer Robert F. Sisson

Children Hear an Explanation of an Old Glass Plate Coating Machine

Eastman's first invention was a machine to mass-produce dry plates, successors to the unlamented wet plates. This particular model illustrates a later process. Conveyor belts carried the glass beneath a silver bucket filled with sensitized gelatin (upper left). Rubber tubes fed the gelatin to spreaders that applied an even coat on each plate (center left). A cooling system chilled and set the gelatin as plates moved along the bolt. Warren Stevens of Eastman House lifts a spreader for the youngsters' inspection.

shadows, and details as they appear to the eye. His technique was based in part upon earlier experiments by a compatriot, J. Nicéphore Niepce.

Daguerre fumed his plates with iodine vapor, forming silver iodide. Thus sensitized, the plates were exposed in a camera obscura, forerunner of the modern camera and a device used by artists since the 16th century to trace images. Light, acting upon the silver salts, formed latent pictures which Daguerre developed in mercury vapor. So that light would not affect his pictures, he fixed them in sodium thiosulfate, the "hypo" solution still used today.

"Mirror with a Memory"

In effect, the Frenchman had bypassed the now familiar negative process. He had demonstrated that a natural-looking positive picture could be obtained on a sheet of mirror-bright silver.

The daguerreotype, remarkable for its clarity, soon won world-wide popularity. Oliver Wendell Holmes enthusiastically labeled it "the mirror with a memory." A lineal descendant, the cheaper tintype, soon became vastly popular.

But both shared a serious disadvantage. Copies could not be made except by rephotographing the original picture.

W. H. Fox Talbot, an English contemporary of Daguerre, showed how to overcome this difficulty. He used paper for negatives, but unlike others he "fixed" his negatives and then printed them on other sheets of paper. The prints had lights and shadows properly arranged (page 426).

It was an epochal achievement, the same negative-positive technique we use today. Talbot demonstrated his paper-negative method in London prior to Daguerre's Paris announcement. Unfortunately, however, the grain of the paper often marred his pictures, and the

significance of his process was not fully appreciated at the time.

When George Eastman was bitten by the photographic bug, glass had replaced metal and paper as a negative base. The wet-plate process which tried his patience—and his back—had been perfected by an Englishman, Frederick Scott Archer. Soon young George read exciting accounts of another English process, the *dry* plate.

Richard Maddox had coated glass with silver salts suspended in gelatin, and his plates retained their sensitivity when dry. Moreover, this emulsion had been improved by Charles Bennett, so that photographs could be taken at 1/25 of a second, far faster than was possible with any wet-plate concoction George could brew.

Gelatin Plates Simplified Photography

Gelatin plates eliminated the field darkroom tent, and their split-second exposure time enabled photographers to hold cameras in their hands while snapping pictures. The Rochester lad reveled in this new freedom. Working at night, he modified Bennett's formula and cooked his emulsion in kettles.

At that time photographers prepared their gelatin plates laboriously by pouring emulsion on the glass and spreading it with a rod. In his spare time George invented a machine that applied sensitized gelatin uniformly by a roller. Hustling over to England, he obtained a British patent; later he received one from the United States.

By Thanksgiving of 1880, Eastman was in part-time business for himself supplying dry plates. Late that year he obtained a partner, Col. Henry A. Strong, one of his mother's boarders. Strong invested $1,000 (later more), enabling his young colleague to resign from the bank, rent larger quarters, and devote full time to the fledgling business.

Problems cropped up early. Once Eastman's plates, while in the hands of dealers, lost their sensitivity. Recalling his wares, he spent months seeking the trouble. Finally he discovered the quality of his gelatin was poor, and the difficulty was corrected.

But glass plates were bulky and breakable, and Eastman wanted something better. For a brief time he marketed rolls of sensitized paper to be used in any camera in a holder jointly patented by Eastman and William H. Walker. After development the paper was made translucent with castor oil.

Still, as with Fox Talbot, the grain of the paper showed. Continuous-roll negative material, though it gave many exposures without reloading, had to be transparent to be successful. Eastman tried again.

In 1884 he patented his "American Film." It had a paper base coated with soluble gelatin, then a layer of collodion and a layer of sensitized but insoluble gelatin. After exposure and development this forerunner of modern film was softened in warm water; then the sensitive layer was peeled from the paper and reinforced with a sheet of clear gelatin. The result was a transparent negative (page 425).

An unimaginative man might have been content with the existing professional market for his new product. But not George Eastman. In 1888 he introduced the little box Kodak camera loaded with American Film. With the inspired slogan, "You press the button, we do the rest," he sold cameras as fast as he could make them.

This virtually foolproof contrivance could be bought for $25 with a 100-exposure roll already inserted. After all the pictures had been taken, it could be sent to Rochester where technicians developed the exposures, made one print of each, and reloaded the camera—all for $10 (page 429).

Though this technique proved a vast success, many people failed at first to see the significance of popular photography. Critics derided Eastman, and some of his stockholders thought he was building a bubble.

In Rochester I examined many private papers bearing on Eastman's life, and among them I found a spirited letter of reply, dated 1892, from the inventor to one of his carping stockholders. In part, it said:

"A New System of Photography"

"The success of the Kodak is not due simply to its being a neat and handy instrument which has been widely advertised and which struck the passing fancy as a new fad. It is the exponent of a radically new system of photography which admits the whole public to practice the art."

Eastman's viewpoint was soon vindicated. Film and Kodak sales zoomed like a thermometer reading in the Sahara. For the first time in its history, photography had been democratized. Papa, Junior, Aunt Jane, Grandma—everyone could be a photographer of sorts!

The little camera had been on the market

Budding Amateurs Receive Initiation into the Secrets of High-speed Photography

Curator Beaumont Newhall and his Eastman House colleagues bring a missionary zeal to their work with young people, the photographers of tomorrow. They devote many hours to instruction of children, and each year they train students from the University of Rochester, who work at the museum for college credits. Here Newhall explains a motion picture projected on a miniature screen at his back. The film, taken at ultrahigh speed, records the seemingly lazy flight of a housefly.

only a year when Eastman brought forth an improved No. 2 model. But, far more significant, 1889 saw him introduce the world's first commercially successful transparent, flexible film on rolls. It made possible the photographic industry's phenomenal growth.

First Motion Picture Film

Henry M. Reichenbach, an Eastman chemist, patented the formula. After countless experiments he hit upon the idea of treating nitrocellulose with fusel oil, amyl acetate, and camphor. The result was a clear and grainless negative base. Cut into long strips, it was just the film Thomas Edison needed to make his motion picture machine successful (page 432).

Daylight-loading film was introduced in 1891. Soon spool rolls could be bought and developed almost anywhere. Other Eastman innovations followed fast: 1895, the Pocket Kodak; 1900, the \$1 Brownie camera; 1903, noncurling film; 1908, safety (noninflammable) film, later much improved by the company.

Each 20th-century year has brought new photographic advances, not only from Eastman Kodak but from its many astute and resourceful competitors. Today there is scarcely any field of human endeavor in which photography does not play a role. Industry, science, government, entertainment, the armed services, medicine, education—all employ the camera. Estimates of the number of cameras in the United States alone range as high as 60 million.

As for the amateurs, half the Nation's families take still pictures each year, while about 2 million screen their own home movies.

United States Treasury

A Memorial Stamp Honors the Father of Popular Photography

On July 12, 1954, 100th anniversary of Eastman's birth, he joined a company of great Americans whose achievements have been commemorated with postage stamps. Educators and representatives of the photographic industry joined in first-day-of-issue ceremonies at Rochester on the centenary date.

George Eastman, the man most responsible for this outburst of shutter snapping, became a millionaire many times over—and then gave his money back to the people. While alive, he distributed $80,000,000, chiefly to educational institutions, and his will provided an additional $20,000,000 in public bequests.

On a single day in 1924 he signed away $30,000,000. Then, turning to witnesses, he declared with a smile, "Now I feel better."

Rochester's first citizen never married. He lived with his mother until her death in 1907, just two years after they had moved into a new 50-room Georgian-style mansion. There Eastman entertained many of the prominent people of his day.

He was an excellent cook, and on his frequent camping trips he often would let no one else prepare the food.

Invitations to his Sunday-evening musicales were a coveted honor. He employed the finest artists for his string quartet. Though he himself could not play a note, he installed an organ in his home so he could have Wagner with breakfast.

In his later years Eastman became a big-game hunter and made two expeditions to Africa (page 430). An expert shot, he often worried his guides by his utter fearlessness.

On one occasion he stalked a huge bull elephant successfully, only to find that it had but a single tusk. Companions urged him to pass up the imperfect trophy, but Eastman let it charge and downed it with a single shot in typical last-minute fashion.

"Imperfect?" he shrugged. "I'll have another tusk made."

And he did, so expertly fashioned that no one to this day can tell the real from the imitation. The trophy hangs in his home.

Eastman died at 77 and left his mansion to the University of Rochester. Since 1948 it has been open to the public as a museum of photography, the George Eastman House (pages 434, 437).

In this museum friends have preserved many of the photographic pioneer's early inventions, papers, and possessions.

"But the scope of our exhibits is as broad as photography itself," said O. N. Solbert, museum director and a colleague of Eastman. "All manufacturers in the industry have contributed to our collection."

In 1953 more than 250,000 people young and old made the pilgrimage to Eastman House. Like them, I wandered entranced for hours through exhibits of antique cameras, historic photographs, dioramas illustrating old processes, and galleries where up-to-the-minute applications of color and black-and-white photography were displayed.

Photographic History on Film

At one exhibit schoolboys pressed a button, in the best Eastman tradition, and an old 3-color projector went to work. A recording explained the process. Push-button devices also activated other displays.

Later I browsed among some of the 3,000 volumes on photography in the museum's Boyer Library and attended a public showing of historic and modern movies in spacious Dryden Theater, an addition to the museum.

Recently several anonymous friends purchased the 1½-story frame house in Waterville, New York, where George Eastman was born. Sliced into half a dozen pieces, the house was brought on trailers to Rochester, then reassembled on the grounds of Eastman House.

Restored and furnished, this little dwelling will stand in the shadow of the great mansion, testimony to the alpha and omega of the man who brought photography to everyone.

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To carry out the purposes for which it was founded sixty-six years ago, the National Geographic Society publishes the National Geographic Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

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In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus. By dating the ruins of vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for 300 years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest dated work of man in the Americas. This stone is engraved, in Mayan characters, November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything else dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, the stratosphere flight of the world's largest balloon, *Explorer II*, sponsored by The Society and the U. S. Army Air Corps, reached a world-record altitude of 72,395 feet. Capts. Albert W. Stevens and Orvil A. Anderson took aloft a ton of scientific instruments and obtained results of extraordinary value.

A notable undertaking in the history of astronomy was launched in 1949 by The Society and Palomar Observatory of the California Institute of Technology. This project will photograph the vast reaches of space and provide for observatories all over the world the most extensive sky atlas yet made.

In 1948 The Society sent seven expeditions to study the sun's eclipse on a 5,320-mile arc from Burma to the Aleutians.

A Greek cargo ship sunk in the Mediterranean 2,200 years ago was found and investigated in 1952–54 by the National Geographic Society–Calypso Marine Archeological Expedition led by Capt. J.-Y. Cousteau of the French Navy.

The National Geographic Society and the Royal Ontario Museum in 1951 explored and measured newly found Chubb meteor crater, 11,200 feet in diameter, in northern Quebec.

The Society and individual members contributed $100,000 to help preserve for the American people the finest of California's sequoias, the Giant Forest in Sequoia National Park.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration in 1938.

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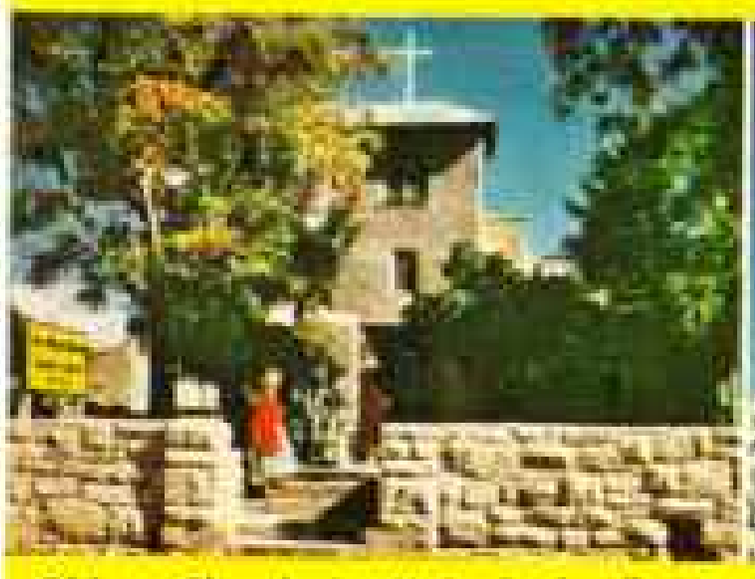

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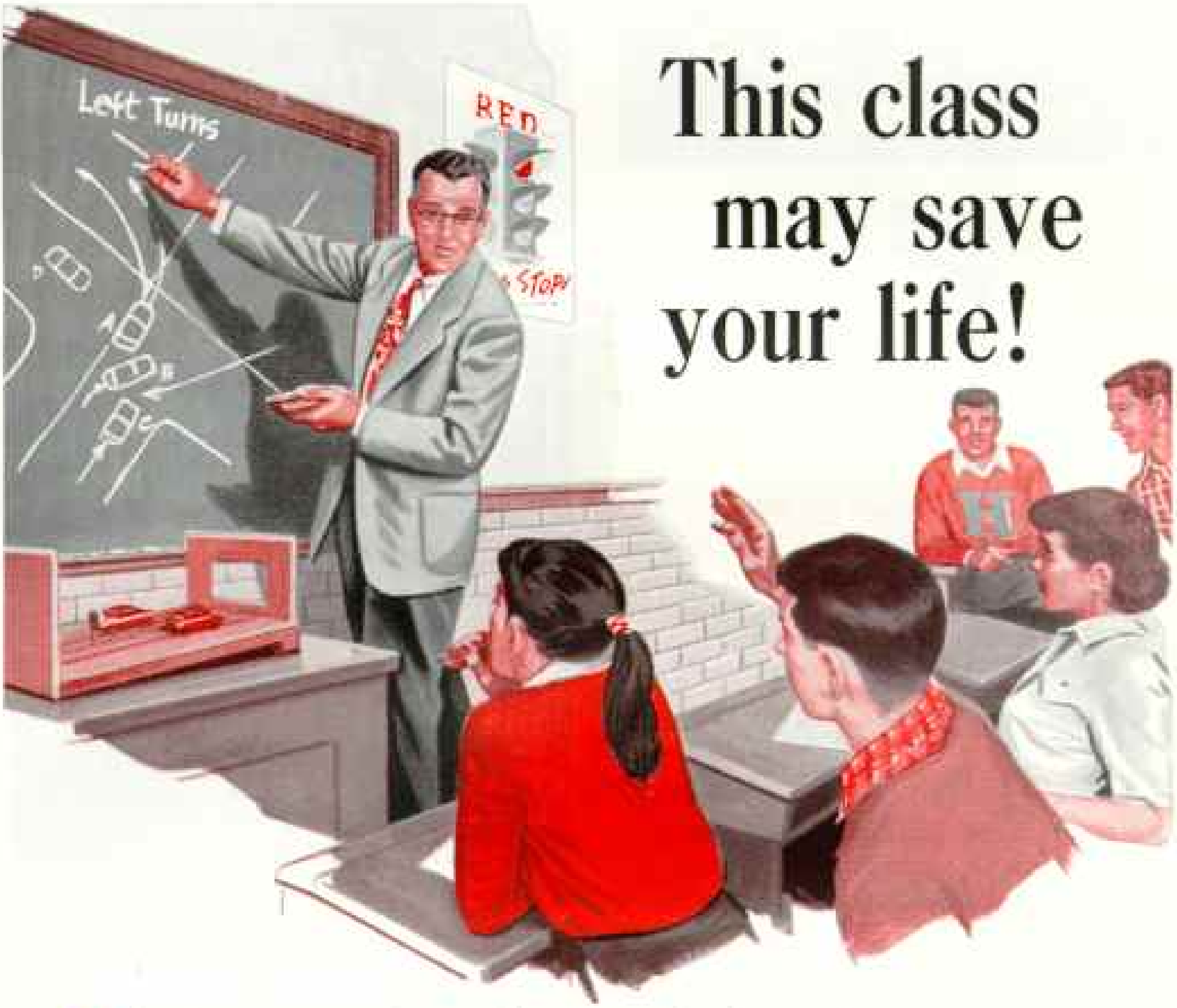

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TRAVEL QUIZ (FOR SEPTEMBER)

Where are penguins not found?

☐ *So. America* ☐ *No. Pole* ☐ *So. Africa*

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Which is our second largest national park?

☐ *Mt. McKinley* ☐ *Yosemite* ☐ *Everglades*

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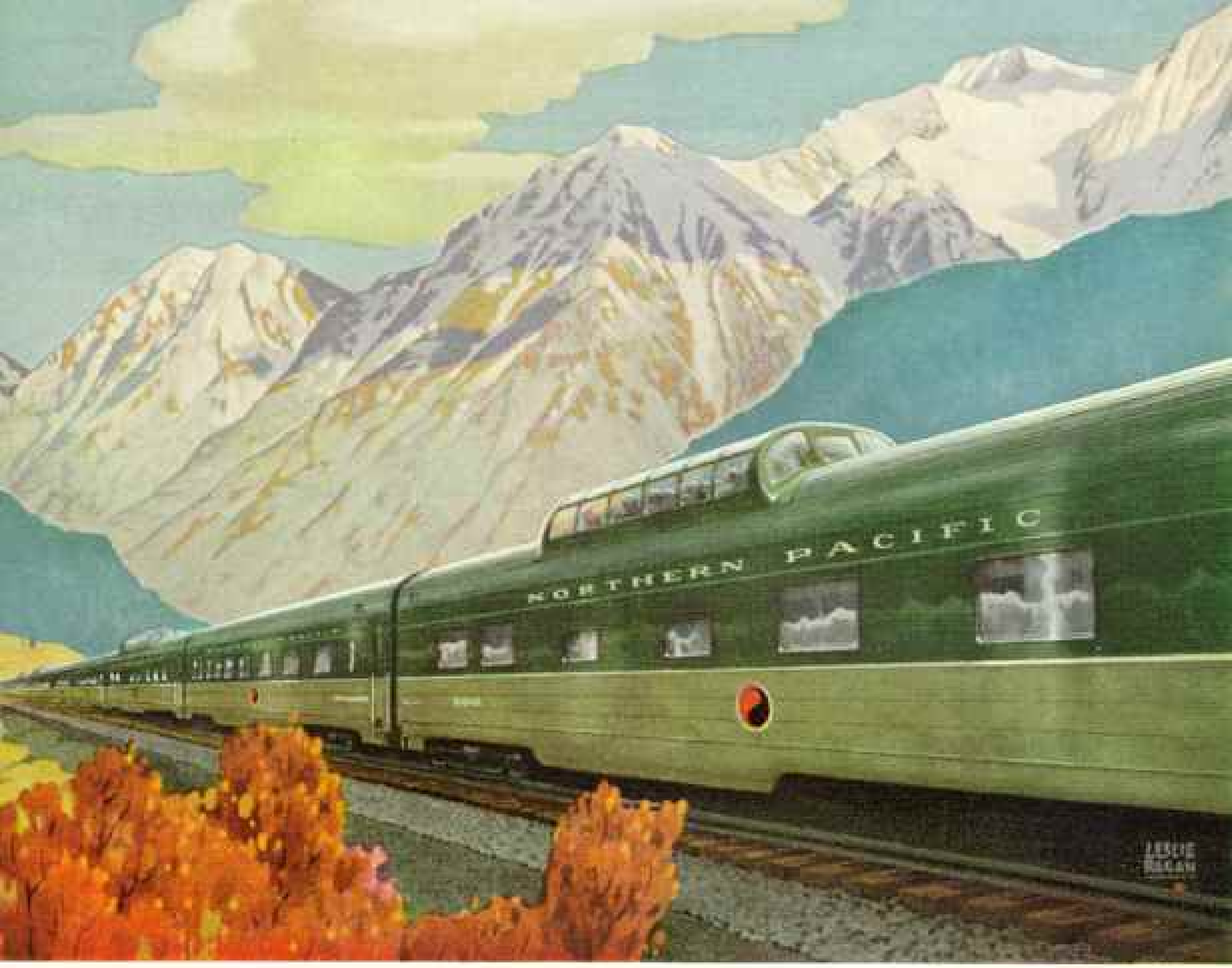

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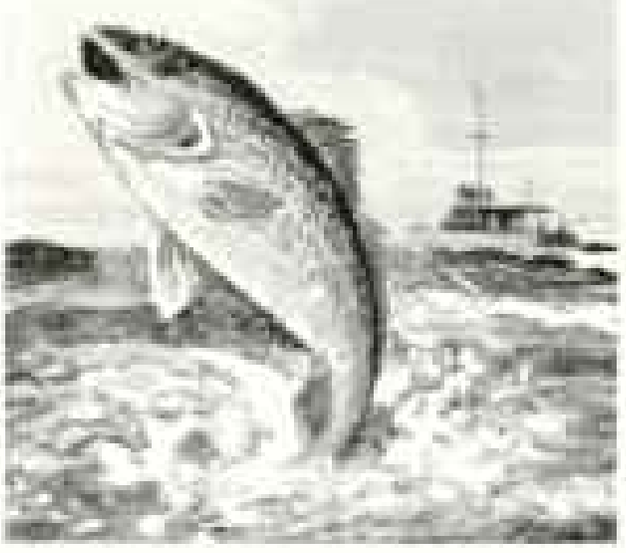

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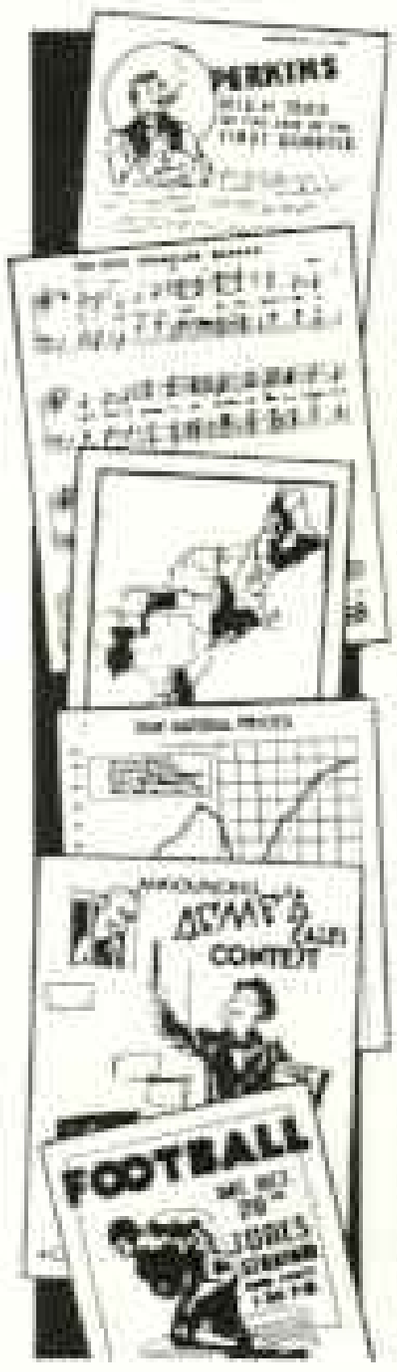

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In tracking down clues to this case, it was discovered that outside the patient's bedroom was a vine in which many sparrows nested. When the vine was cut down and the sparrows departed—so did the patient's asthma!

Allergies may be caused by an almost endless number of substances which, to the average person, are entirely harmless. The person sensitive to one or more of them may develop skin rashes, sneezing attacks, digestive disturbances and other allergic reactions.

Most allergies are mild, and only occasional attacks occur. However, people highly sensitive to such substances as feathers, pollens, or dusts may have attacks so severe and persistent that both physical and mental health are affected. Whether the allergy is mild or severe, it is important to find the cause of the trouble.

Allergies due to an obscure cause—or more than one cause—generally require detailed diagnostic studies, including simple skin tests. These usually reveal the cause of the allergic condition. Once found, complete relief may follow simply by avoiding the offending substance.

If treatment is necessary, the doctor will prescribe in accordance with the nature of the patient's sensitivities. Generally, a series of immunizing inoculations are given. These may greatly relieve allergic symptoms in over 4 out of 5 of the cases *provided patients maintain close and continued cooperation with the doctor.*

Whenever recurring and unexplained attacks of sneezing, itching eyes, skin eruptions, digestive upsets, headache, or "wheezy" breathing occur, medical attention should not be delayed. For early treatment brings best results—especially for "hay fever" and other seasonal allergies.

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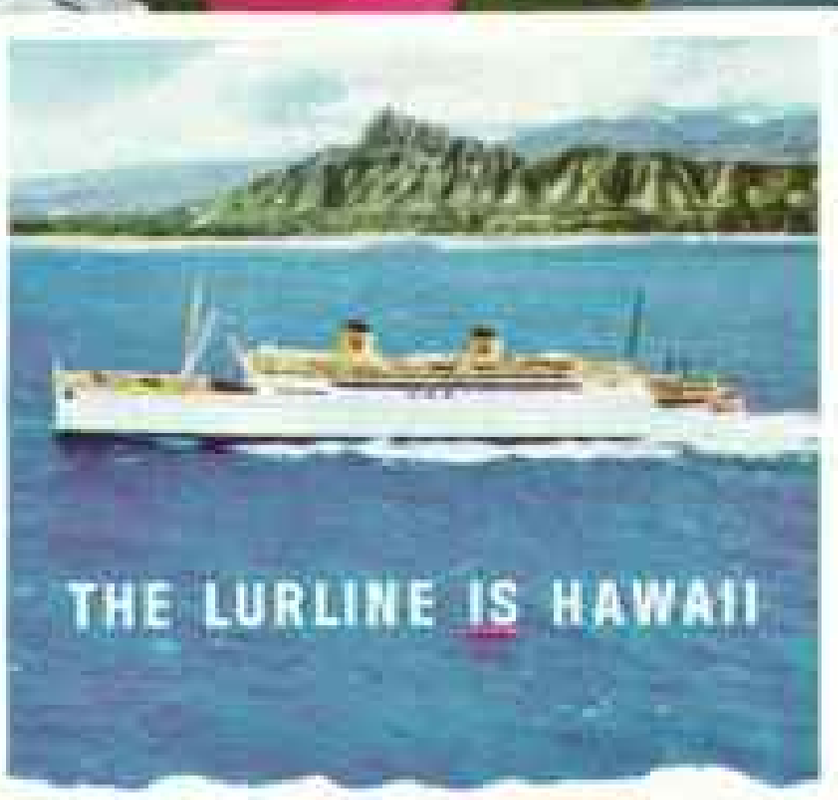

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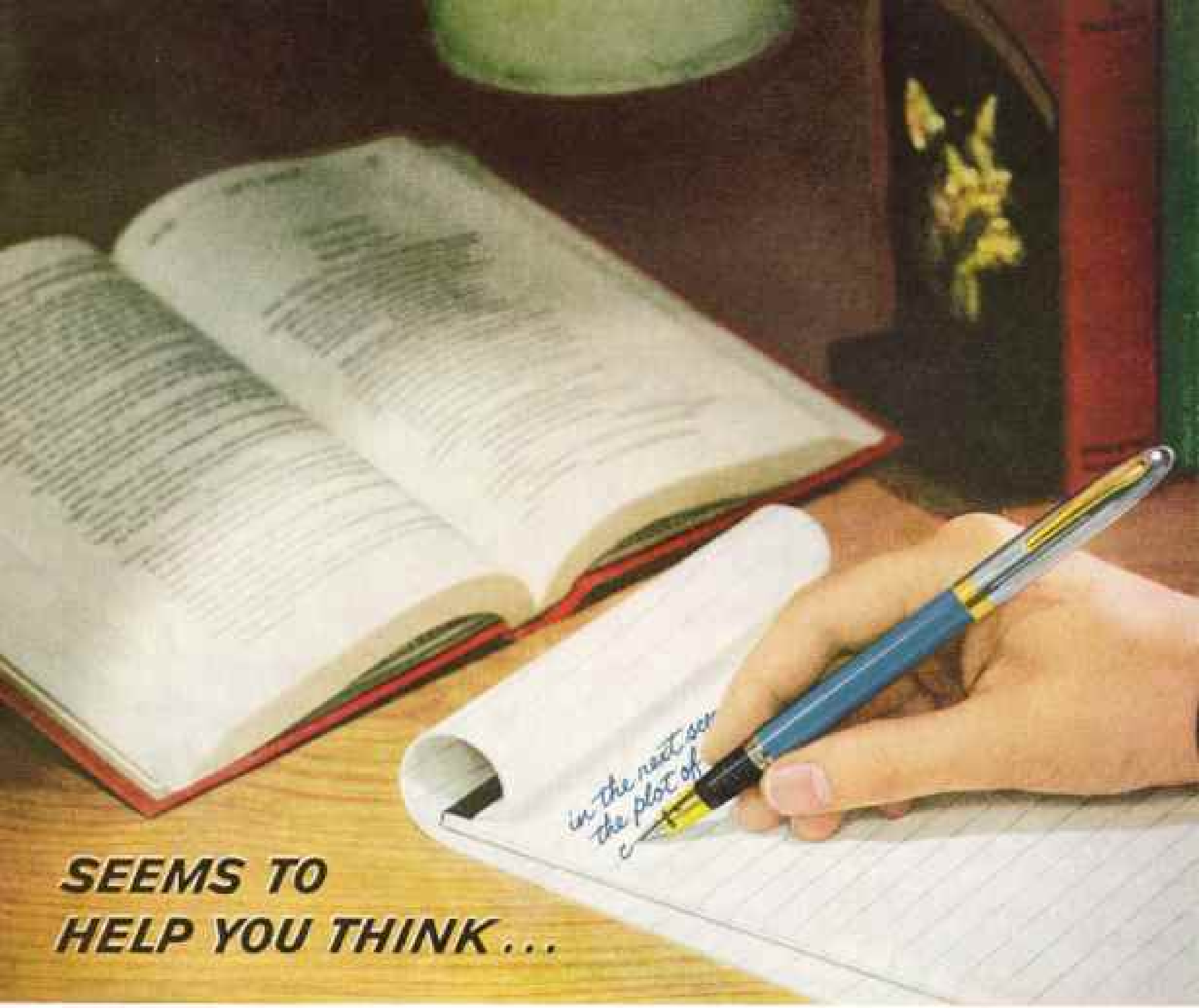

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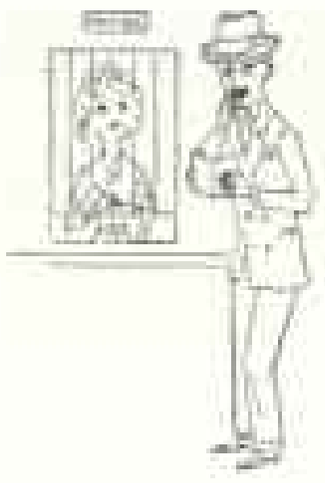

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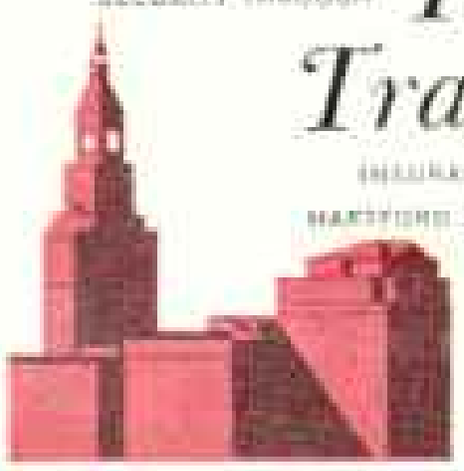

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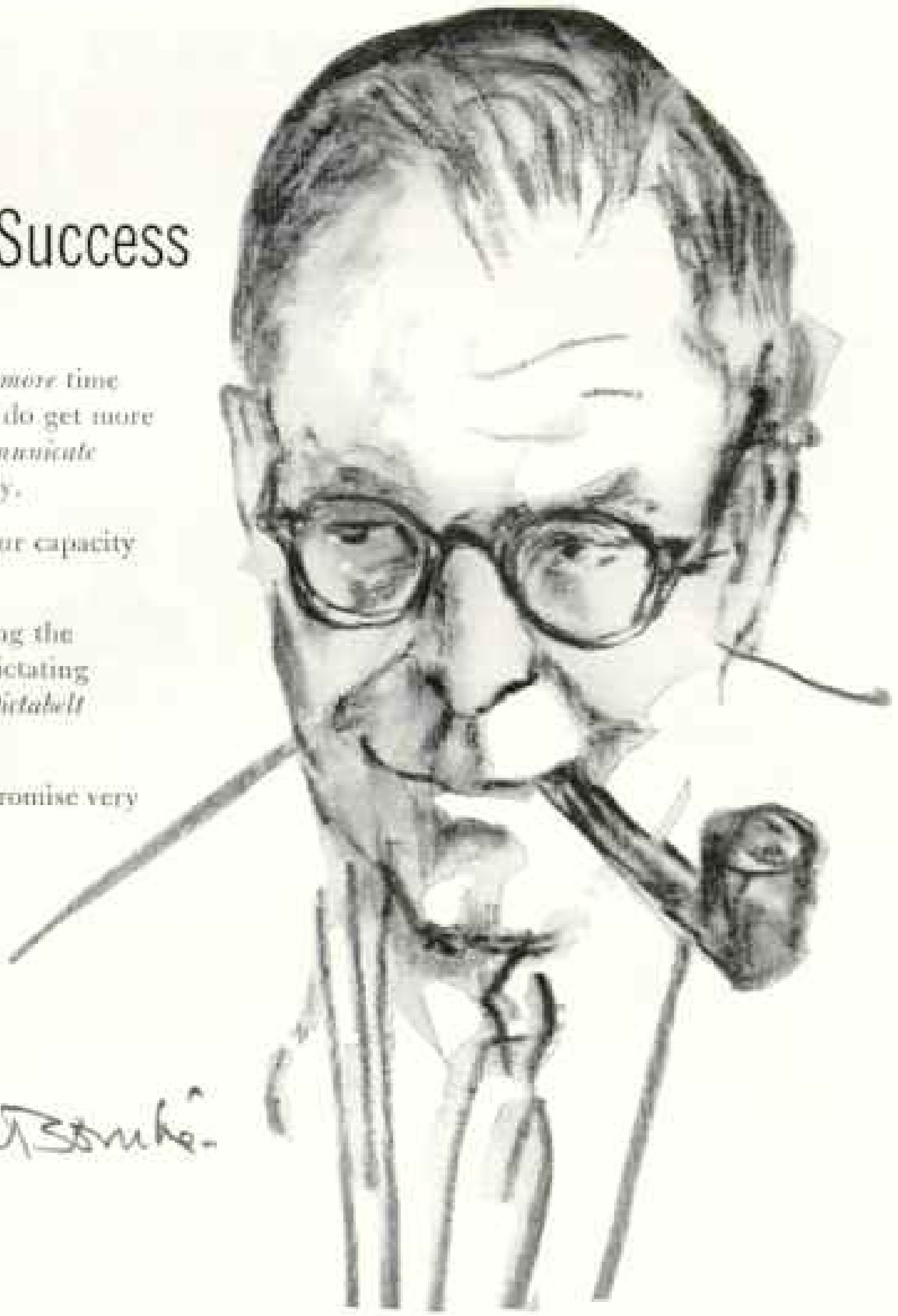

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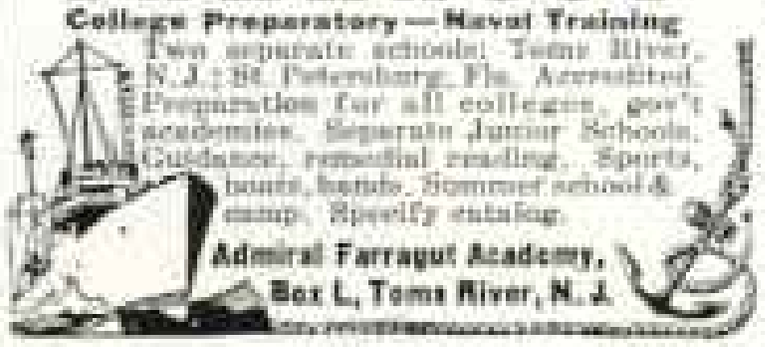

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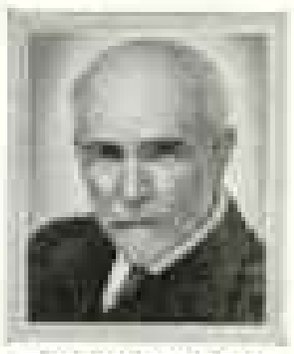

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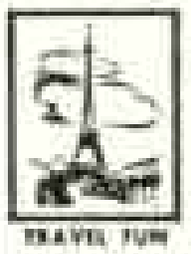

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9-54

Out of the Night Came a Call for Help

Quick action of alert telephone operator helps save man with heart attack

AWARDED VAIL MEDAL. Mrs. Carolyn F. Gross, night telephone operator in Berlin, N. J., was awarded the prized Vail Medal for her "initiative and resourcefulness" in answering an emergency call.

It was about two o'clock of an August morning when the call flashed on the switchboard. A woman, in an excited voice, asked to be connected with a doctor.

Mrs. Carolyn F. Gross, the night operator, rang the doctor's home immediately but he was unavailable. Sensing a critical emergency, she asked if she could be of help in getting another doctor.

"Oh, please do everything you can," implored the caller. "My husband has had a heart attack and is very ill."

Mrs. Gross rang a doctor who had helped in a previous emergency. Then, realizing he was new in the area, she arranged to have the State Police meet him at a certain point and lead him to the house.

Shortly after, the subscriber's daughter called to ask for oxygen.

"It's on the way," said Mrs. Gross. "I thought you might need it so I telephoned the emergency ambulance service. They ought to be there any minute."

Just before she went off duty, Mrs. Gross called to ask how the sick man was doing and if there was anything else she could do.

"You've already done so much," said a grateful voice. "The doctor says that it's only because of your help that my husband is alive."

POLICE ESCORT. To help the doctor get there faster, the operator arranged for the State Police to escort him to the sick man's home.

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