

VOLUME LXXVI

NUMBER TWO

THE NATIONAL GEOGRAPHIC MAGAZINE

AUGUST, 1939

Forty Pages of Illustrations in Full Color

Iowa, Abiding Place of Plenty

With 15 Illustrations and Map

LEO A. BORAH

Corn and Color in the Hawkeye State

20 Natural Color Photographs

J. BAYLOR ROBERTS

Discovering the New World's Oldest

Dated Work of Man

With 41 Illustrations

MATTHEW W. STIRLING

Flower Pageant of the Midwest

With 1 Illustration

E. S. and F. E. CLEMENTS

Floral Garlands of Prairie, Plain, and Woodland

125 Flower Paintings

EDITH S. CLEMENTS

Australia's Patchwork Creature, the Platypus

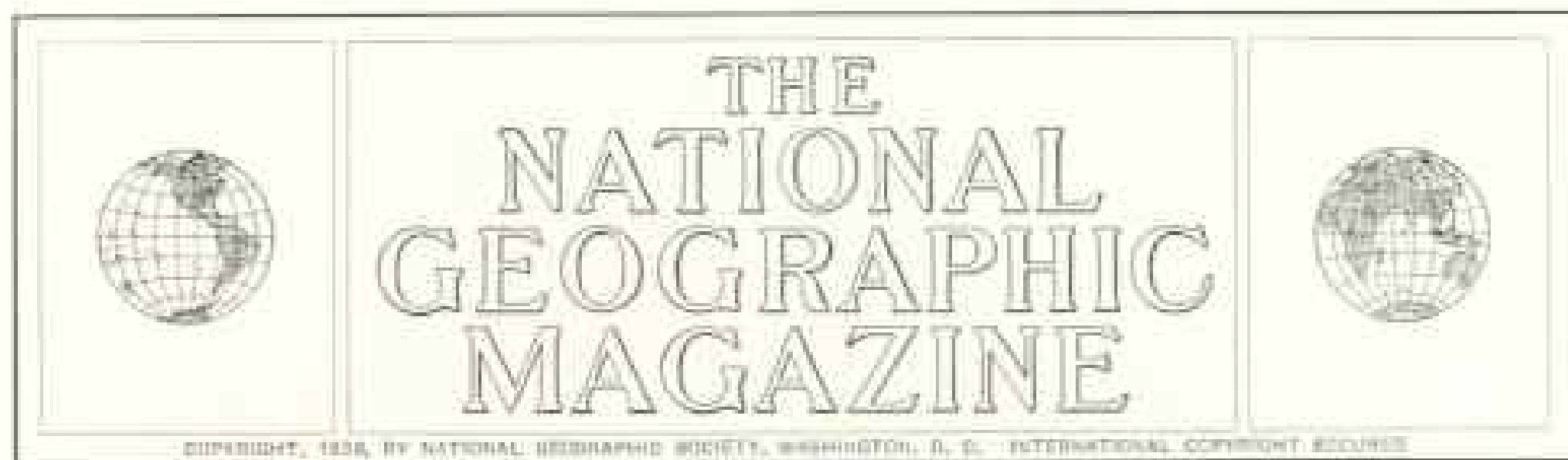
With 13 Illustrations

CHARLES H. HOLMES

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY



IOWA, ABIDING PLACE OF PLENTY

The State Where the Tall Corn Grows Provides the Nation with a Tenth of Its Food Supply

BY LEO A. BORAH

“AND surely it floweth with milk and honey.”

With a fourth of the grade A farm land in the United States, with soil yielding in some years more wealth than all the gold mines of the world, Iowa is a modern Promised Land.

It is first among the States in the production of corn, oats, hogs, and horses; in the number of fat corn-fed cattle; and in the total value of grain crops, of livestock, of poultry, and of all farm property and implements. As for “milk and honey” specifically, it ranks next to Minnesota in output of creamery butter and fourth among the States in quantity of honey produced.

A HUNDRED-MILE FURROW

Its incredibly fertile rolling prairies are so arable that in 1839 Lyman Dillon plowed with ox teams a single road-marking furrow from the newly established Territorial Capital at Iowa City to Dubuque, nearly a hundred miles! Of its 56,147 square miles—561 in lakes and streams and the rest in land—more than 96 per cent is in farms, of which almost three-fifths is under cultivation and about a third in pasture.

Not only does the State lead the Nation in crops and in percentage of land in farms; it is first also in literacy, with a record of 99.2 per cent. It is the only State west of the Mississippi River distinguished as the birthplace of a President. Herbert Hoover was born at West Branch (map, pp. 146-7).

To the United States Department of Agriculture Iowa has contributed four secretaries: James (“Tama Jim”) Wilson, 1897-1913; Edwin T. Meredith, 1920-21; Henry C. Wallace, 1921-24; and Henry A. Wallace, 1933-. The State has produced Cabinet members besides these, but the agricultural leaders are mentioned as showing the prominence of Iowa in national farm affairs.

Statistics might go on and on, but to the native son long absent from his home State, Iowa means much more than a list of “firsts.” There is greater reality for him in memory pictures of the scenes of his childhood. He has only to close his eyes to hear again the meadowlark singing its spring-matutinal or the mourning dove its evensong; to catch the glint of an eastern goldfinch, oriole, dickcissel, or tanager flitting through the trees; to feel the hot road dust between his bare toes as he trudged toward the “crick” with fish pole on shoulder; to thresh noisily in the high-piled carpet of bright autumn leaves in search of nuts and scare up a covey of quail; to flounder schoolward knee-deep in snow whirled into wildly shifting drifts before a boisterous wind.

If he is a descendant of Iowa pioneers, he remembers how his youthful fancy peopled woodland shadows with stealthy savages conjured from his grandparents’ stories of the Spirit Lake massacre (Plate X). The hostile Sioux, the poor Ioway, the



Photograph by J. Baylor Roberts

"IT'S YOUR MOVE, SON"

An old-timer registers satisfaction in the checker tournament at the State Fair in Des Moines. Thirty-one experts compete for the State championship, each playing two games with every opponent. A victory counts two points, a draw one; and the high score at the end of the week wins the prize.

friendly Sac and Fox, the wary Winnebago, the proud Potawatami—his imagination brought back all the vanished Indians and made of the quiet countryside a place of romantic adventure.

Vividly he envisages the cornfield steaming under a glaring sun after a rain, heat waves shimmering in the close air. With what rebellion in his soul he grasped his hoe and moved down the rows, hacking half-heartedly at "glory vines" and "pusley." Wild sweet williams in the wood lot were much more alluring than the "o'n'ry" weeds, but there was to be a Fourth of July

celebration in town, and if he got the patch hoed in time he would have money to spend.

Of such homely things is the background of Iowa, for 60 per cent of the two and a half million people of the State live on farms or in small towns, and even the largest cities—there are 16 with populations greater than 15,000—are a part of the rural scene, deriving their prosperity and most of their dwellers from the farms.

It was with recollections such as these that I went back to Iowa after an absence, save for a few brief visits, of more than 20 years. Aboard the streamlined Rocket train, which speeds from Chicago to Des Moines in about six hours, I thought of the creeping caravans

of prairie schooners bringing the first white settlers to the new land west of the Mississippi little more than a century ago.

Two streams of colonists, one from the North, the other from the South, poured into Iowa, there to mingle and form a society with traditions of both sections of the country. Many an Iowan has one parent of New England ancestry, the other sprung from Dixie.

In *Vandemark's Folly*, Herbert Quick, Iowa lawyer-novelist, described dramatically the early rush for land, when hundreds of covered wagons drawn by horses,

oxen, and even cows waited their turn to cross the ferries to McGregor, Dubuque, Clinton, Buffalo, Davenport, Muscatine, Burlington, Fort Madison, and Keokuk.

Many of the newcomers, always having lived in timber country, shunned the open prairies as worthless for farming, and established homesteads in wooded areas where they had to chop down trees and grub out stumps before they could plant crops!

From Rock Island, Illinois, my train rumbled across the Mississippi River to Davenport, first Iowa community to have railway service. In 1854, when a company began construction of a railroad bridge here, steamboat men, who called the river "a navigable waterway consecrated by Nature" for boat traffic, put up heated opposition. The structure was completed in 1856, however, and trains began to go through from Chicago to Iowa City, then the end of the line later extended to Council Bluffs.

LINCOLN AN IOWA LANDOWNER

When a St. Paul-bound steamer struck one of the piers, caught fire, and burned to the water line, the shipowners went to court with a damage suit and a plea that the railroads be required not only to remove the obstruction to river traffic but to refrain forever from bridging the Mississippi!



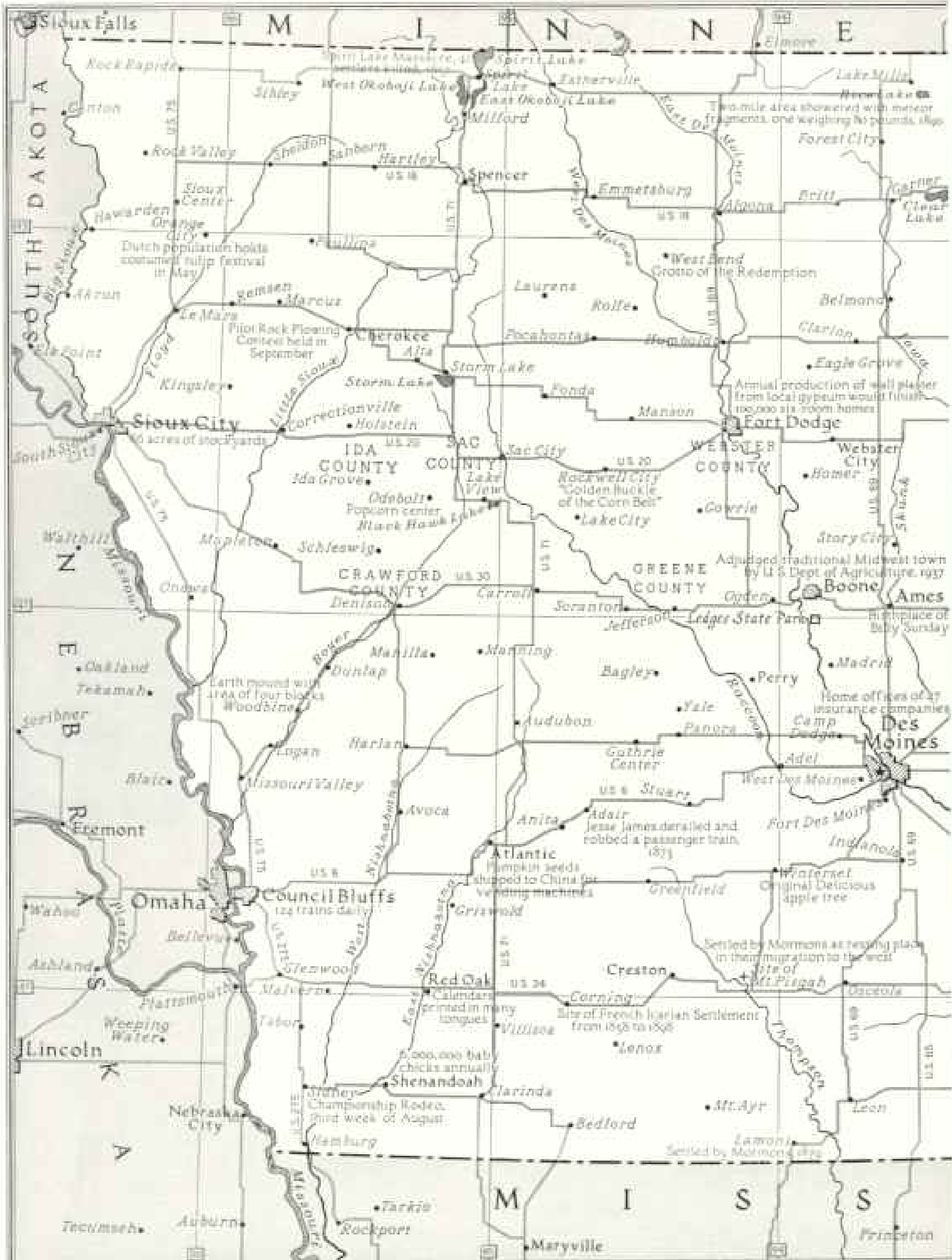
Photograph by J. Taylor Roberts

12-INCH EARS OF HYBRID CORN ARE SYMBOLS OF PLENTY

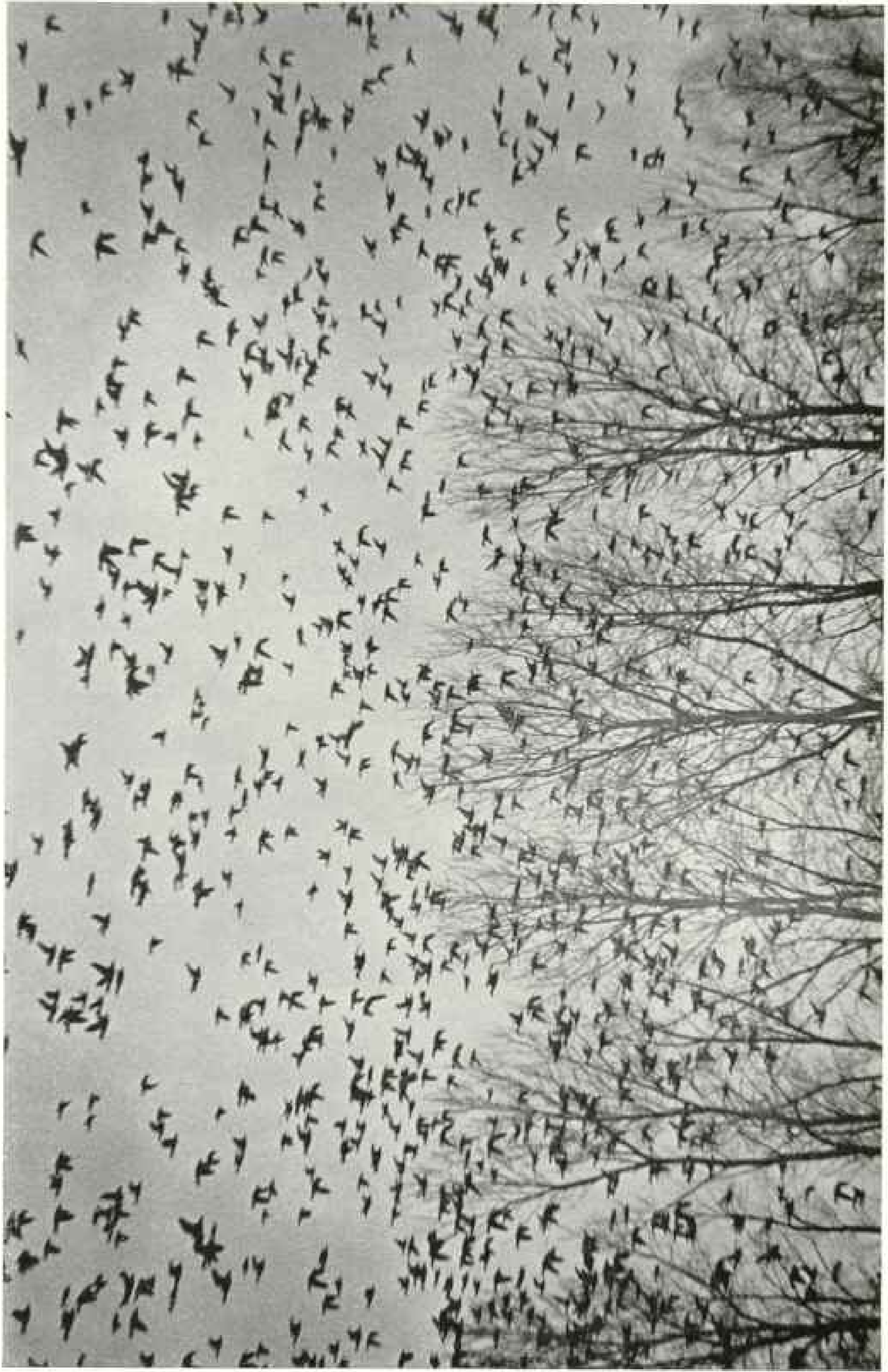
On this field of 165 acres near Bagley, Dr. J. A. Pringle will grow an average of 90 or more bushels to the acre, double the normal crop from ordinary seed (pages 130, 139, and Color Plates II and VIII).

Among those representing the railroads at the trial in 1857 was Abraham Lincoln, then only a modestly successful lawyer. He had, as he had declaimed in a fun-poking speech in Congress in 1848, "fought, bled (from mosquito bites), and come away" in the Illinois Black Hawk War which had opened to white settlers in 1833 the strip of Iowa known as the Black Hawk Purchase, but he had never visited the State until his trip to Davenport to inspect the scene of the accident.

In recognition of his service as a captain of militia, he had been granted Tama County, Iowa, land which he never saw.



OUR LIBERTIES WE PRIZE AND OUR RIGHTS



Photograph from Dan Moines Hogdeter & Trilouise

DUCKS DARKEN THE SKY OVER MISSISSIPPI VALLEY LOWLANDS

Lying as it does between two great rivers, Iowa abounds in mallards and other species, but partly because of increasing civilization in their breeding grounds, international protection is necessary to maintain the stock. In early days passenger pigeons were more numerous than wild fowl are today (page 176).



Chicago Aerial Survey

SET IN A 70-ACRE PARK, THE GOLD-DOMED CAPITOL AT DES MOINES OVERLOOKS THE ENTIRE CITY AND THE VALLEYS OF TWO RIVERS

The State Historical, Memorial and Art Building rises in right foreground. At left is the tall Soldiers and Sailors Monument designed by Harriet A. Ketchum of Mount Pleasant. In the background the gray stone buildings of the Civic Center are grouped on both sides of the Des Moines River above its junction with the Raccoon (p. 150).

He neglected to file the warrant because he feared he would be too poor to pay the taxes. More than two years after his death, a second warrant, issued to him in 1860 by President James Buchanan, was recorded in Crawford County for title to a 120-acre tract near the site of the present town of Schleswig.

The Davenport bridge case was never settled, for the jury disagreed. However, rail traffic continued, building up trade for Chicago despite the grumbling of the rivermen.

THE CAPITAL A FARM CITY

It would be difficult to find a capital more typical of its State than Des Moines. Most of the 150,000 people are still close to the soil. Their talk is of crops and cattle, of farm prices and the weather.

Spread over the valley of the Des Moines and Raccoon Rivers, the city has the roominess of wide-open spaces. Hundreds of homes are set on lots large enough not only for wide lawns and flower beds but for kitchen gardens as well. A 60-acre cornfield is tilled within the corporate limits.

The gold-domed capitol, standing in a hilltop park, commands a view of the whole valley to the wooded horizons (page 149).

Four Milan arch bridges cross the river, which, flowing from north to south, bisects the city. It was down this stream in 1894 that "Kelly's Army" of nearly 1,000 unemployed men en route from Omaha to Washington to tell their troubles to President Cleveland floated to Keokuk in flatboats contributed by a populace eager to be rid of them.

Farther west is the main business district where in their home offices function most of the 47 insurance companies which make Des Moines the "Hartford of the West." There also are many publishing houses, printing nationally circulated farm and home magazines, fraternal and commercial papers, and other journals—57 regular publications in all.

The Des Moines Register, together with the *Tribune*, serves all Iowa, having 77,000 farm subscribers and going by carriers to some 45,000 farm homes each day. Its daily circulation numbers more than twice the total population of Des Moines, and it has the largest direct-mail delivery in the United States. How closely it is knit with Iowa is shown by the fact that only one per cent. of its readers reside outside the

State. Contrary to usual newspaper practice, its owners go after circulation primarily and let advertising follow.

Most of the manufacturing plants in Des Moines are in outlying areas well segregated from residential neighborhoods. Through the packing plants some of the Iowa corn crop "goes to market on the hoof," but meat packing is by no means the only industry. Hosiery; woolen goods; and fur, leather, foundry, grain, dairy, clay, and cement products are turned out by more than 400 factories. Several nationally known companies make cosmetics.

When I visited Iowa State College of Agriculture and Mechanic Arts at Ames, Dr. O. R. Sweeney, head of the Chemical Engineering Department, led me through laboratories where his assistants and students were turning cornstalks into paper, insulating material, and "wood," ranging from a substance softer than cork to boards harder and denser than teak and three times as strong as iron.

From oat hulls he makes furfural, an exceedingly cheap but satisfactory substitute for formaldehyde, and from corncobs, "mazolith," a corn stone that the layman cannot distinguish from marble. Soybeans, introduced into Iowa to build up the soil, and now an important crop, have been put to so many uses that the list staggers the imagination.

UNTOLD WEALTH FROM FARM WASTE

"In the United States," said Dr. Sweeney, "there are a billion tons of straw, stalks, hulls, shells, roots, and other agricultural by-products—the largest annual output of raw material in the world. Out of this despised stuff we can make almost any commodity we want, put our people to work, and perhaps solve the problem of farm economics."

Going about the campus, I realized ever more fully what remarkable service Iowa State College renders to the Commonwealth and how closely it is linked with agricultural interests. It maintains nine experimental farms in the State, and by scientific operation of them shows thousands of land tillers how best to cultivate and at the same time safeguard the soil.

Twenty years ago farmers depended for their seed corn upon the best ears selected from regular crops, and soft or inferior corn from one harvest meant a poor yield the next season. Nowadays they are using more

CORN AND COLOR IN THE HAWKEYE STATE

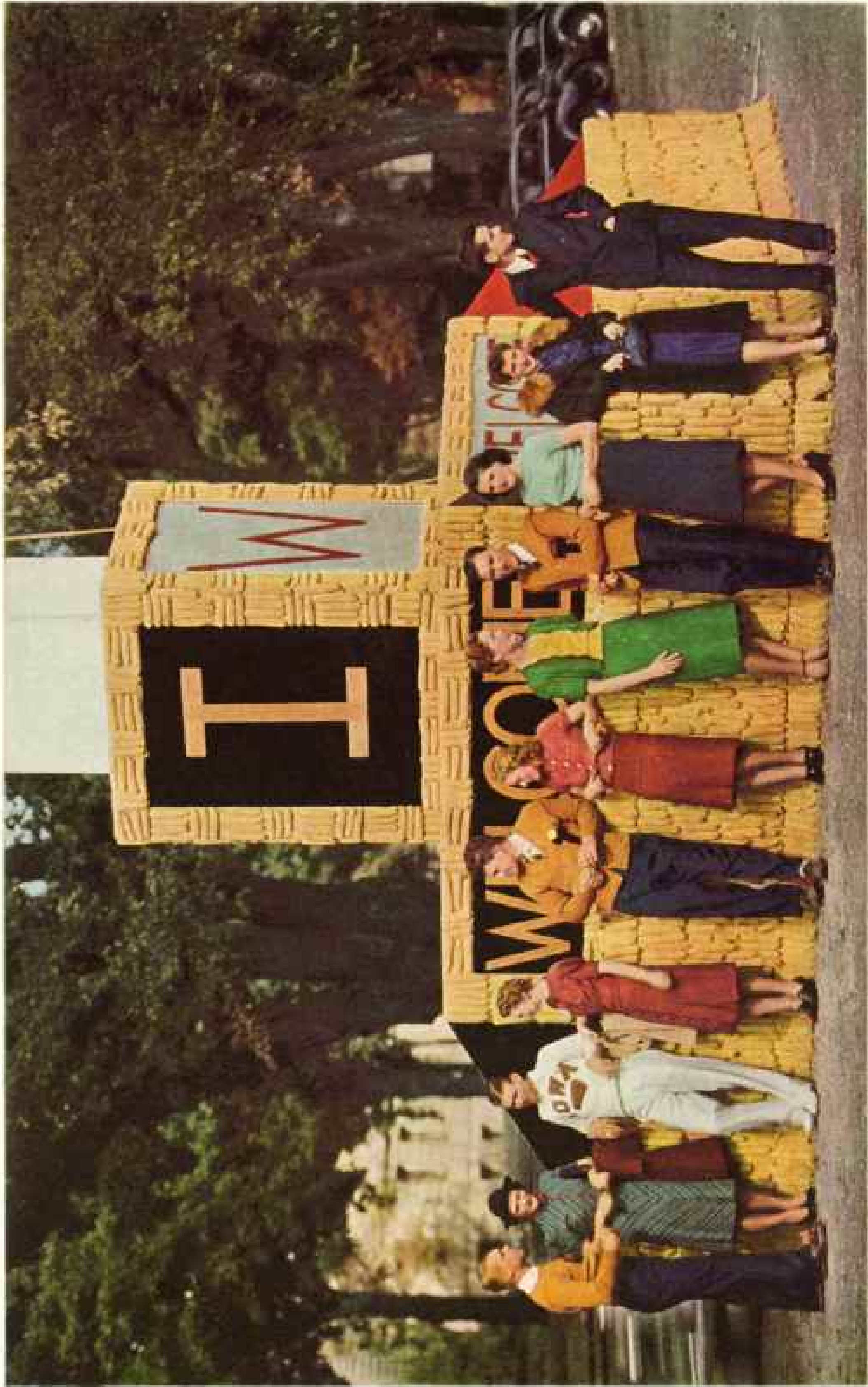


© National Geographic Society

Designed by J. Baylon Roberts

OUT OF WILDERNESS SPRANG THE OLD CAPITOL, PRIDE OF IOWA UNIVERSITY

The classic Administration Building crowns a low hill near the rock-walled Iowa River, which divides the campus at Iowa City. Erected in virgin forest nearly a century ago to house the Territorial Government, it became school property in 1857 when the State offices were removed to Des Moines.

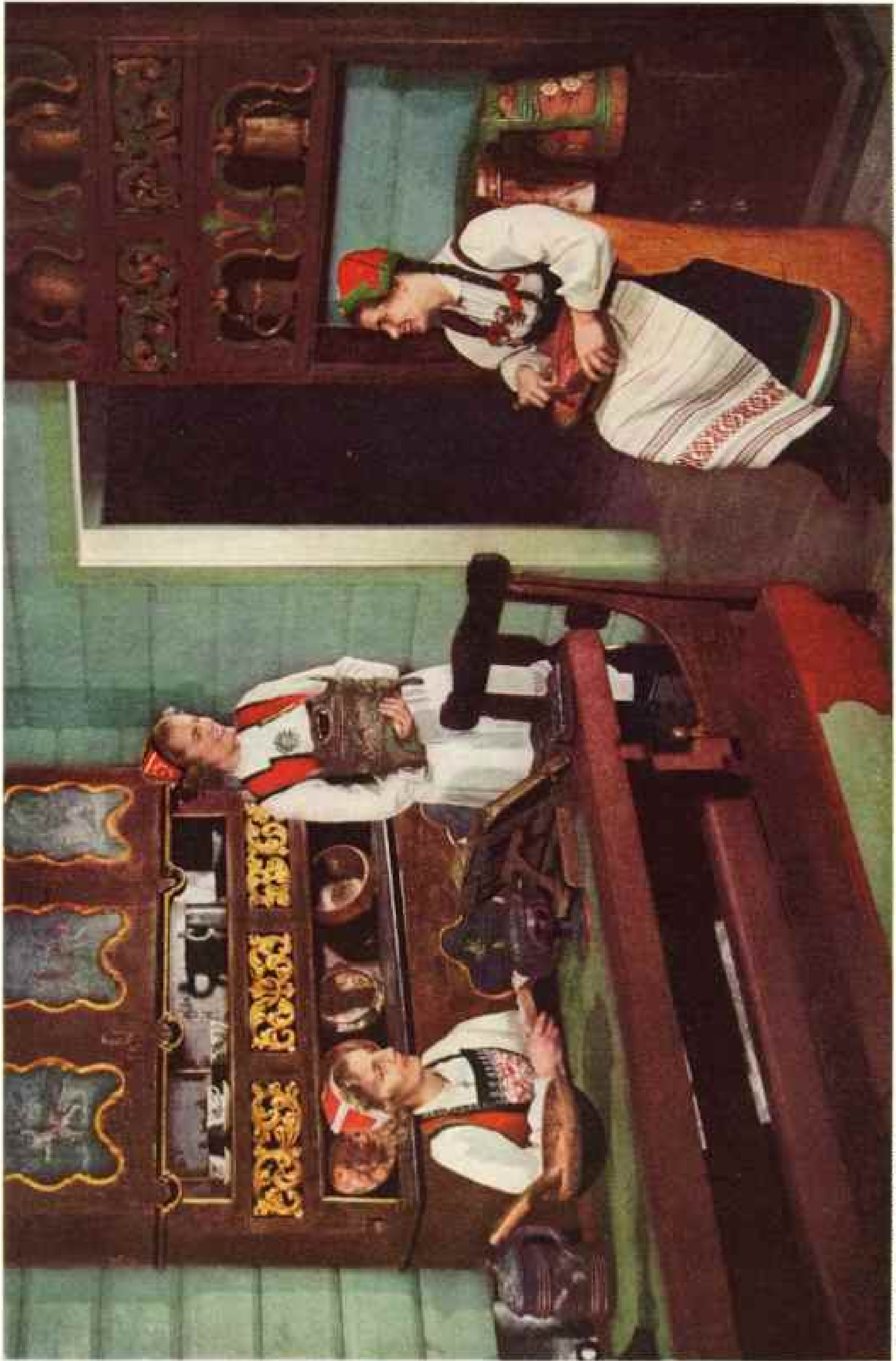


© National Geographic Society

Dufaycolor by J. Taylor Roberts

IS ATHLETICS AS IN AGRICULTURE CORN STANDS FOR IOWA POWER

Students of the State University at Iowa City erected this monument in honor of the 1938 Home-coming and a Big Ten football game with Wisconsin. The idea recalled the Gay Nineties when Sioux City held annual festival in a domed and spiced corn palace covered with the yellow ears.

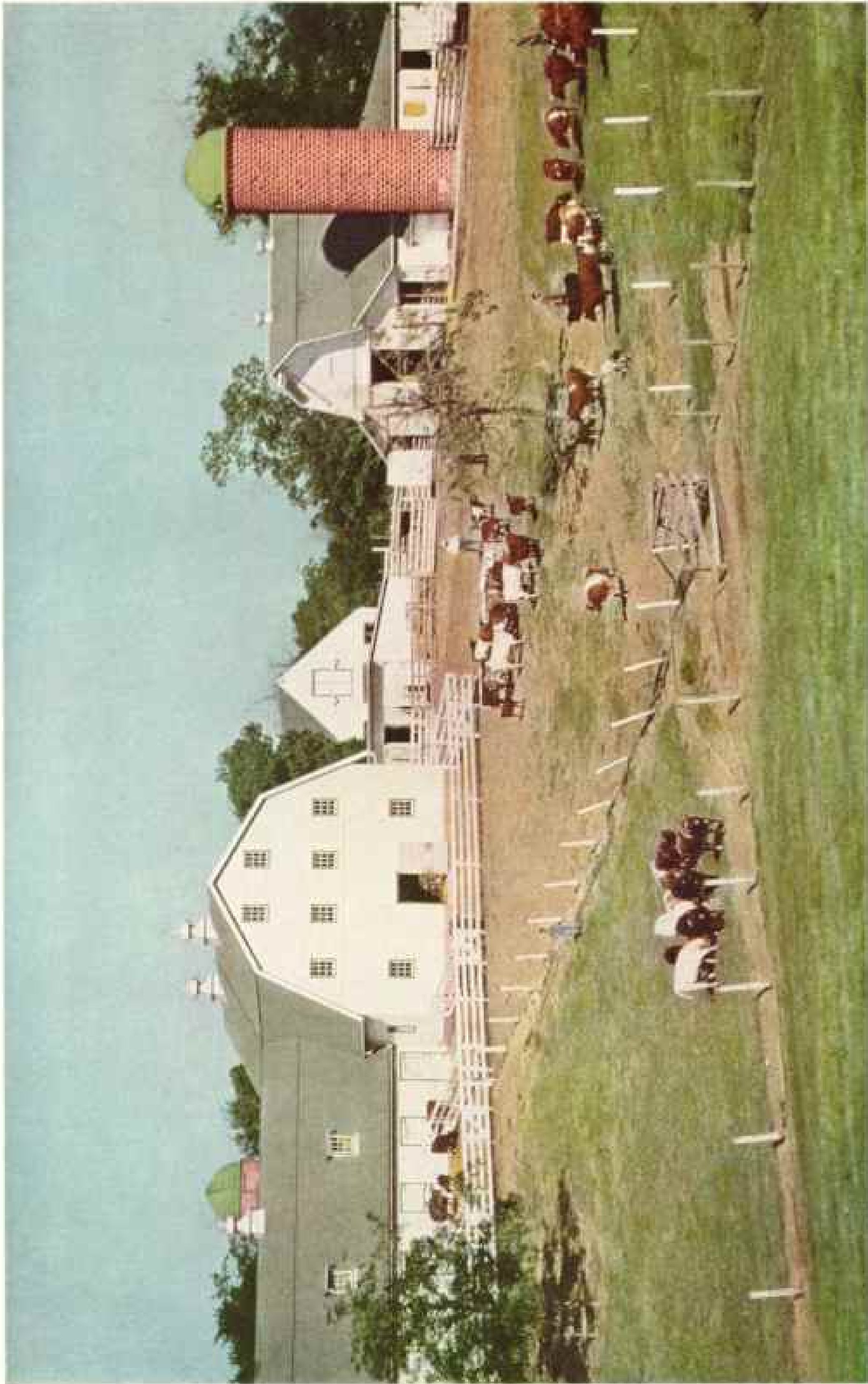


© National Geographic Society

A BIT OF OLD NORWAY HAS COME TO IOWA IN THE NORWEGIAN-AMERICAN MUSEUM AT DECORAH

Photographed by J. Baylar Roberts

On the Luther College campus descendants of the immigrants who began to come to the United States in 1850 have preserved relics of the culture of their homeland and of their pioneer days in Iowa. Center of the exhibits is a four-room home completely furnished with treasures brought from overseas.



© National Geographic Society

FANCY BEEF CATTLE LIVE IN LUXURY ON PROSPEROUS IOWA FARMS

Enlargement by J. Haylor Roberts

No expense is spared in the housing and fattening of blooded aristocrats of the livestock world; and there is keen rivalry among breeders, who constantly seek means of improving their herds. The perfectly kept "hip-roofed" barns and stables, and the tile silos on this short-horn ranch near Des Moines are typical of the best establishments in the State.



Photographer by J. Bayler Roberts

A DUTCH MAID OFFERS DUTCH-MADE IDEAS

In Pella, virtually all the people are of Netherland ancestry; shops specialize in bakery goods and in delicious, highly seasoned sausages prepared after treasured old-country recipes.



Photographer by J. Bayler Roberts

LITTLE CHESTER WHIRL VOICES INDIGNATION

It is bad enough to be scrubbed and displayed at the Spenser Fair, largest county exposition in Iowa, but to be fondled by a girl is an insult that no pig can endure in silence.



© National Geographic Society

THUNDERING HOOPS BEAT OUT A MARTIAL CADENCE AT CAMP DODGE

Kodachrome by J. Daylor-Roberts

During the World War this cantonment 12 miles north of Des Moines housed 40,000 soldiers in training. It is now used only for the summer encampment of the Iowa National Guard. At the Governor's Day Review, which is the climax of the annual program, the guardsmen conduct both cavalry and infantry maneuvers before a throng of spectators from all parts of the State.

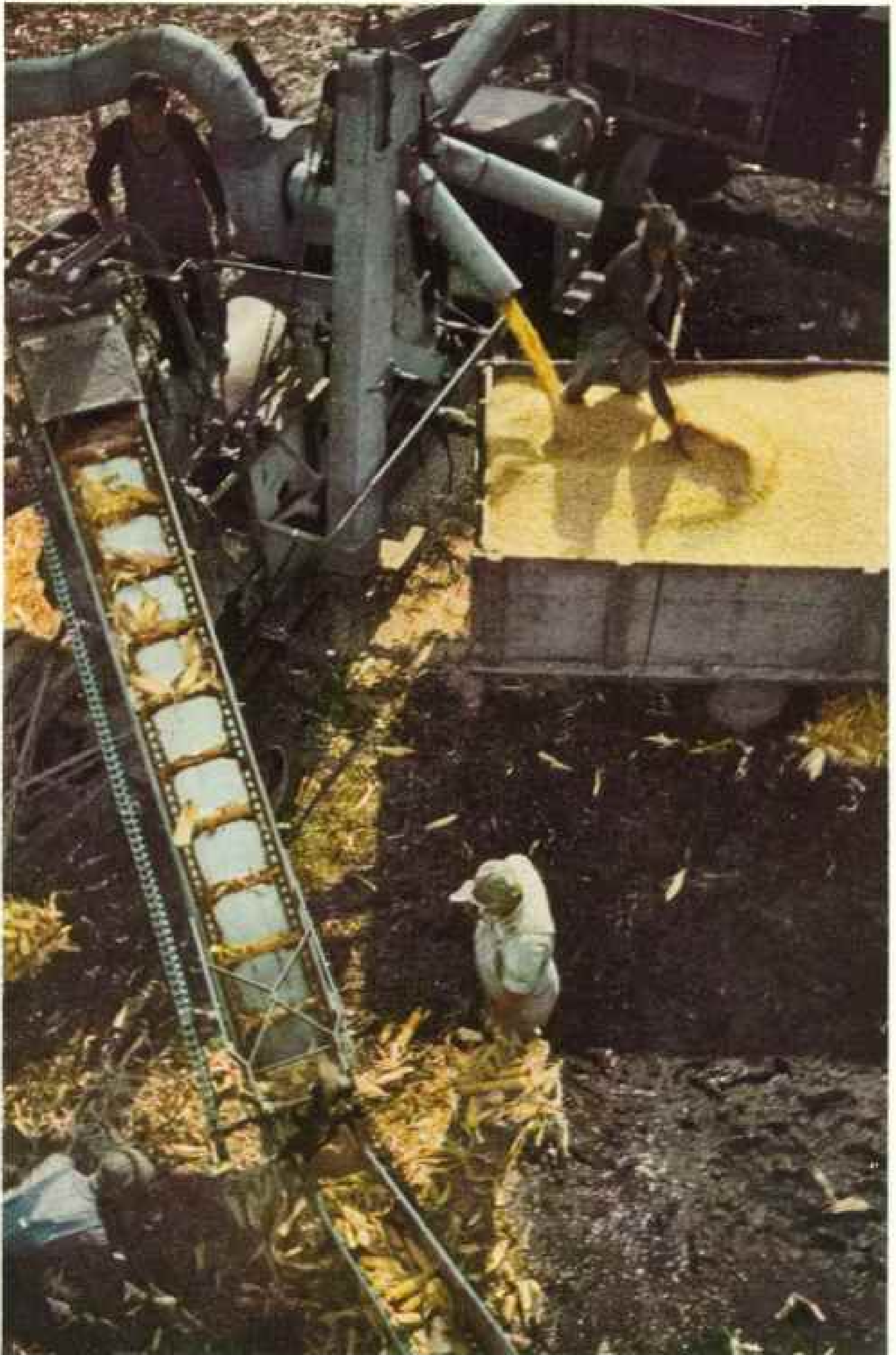


© National Geographic Society

STREAMBOATING ON THE MISSISSIPPI HAS COME BACK IN SPLENDOR AT DUBUQUE

Through the lock of a roller dam built to raise the channel from the normal six feet to a nine-foot level, towboats push long trains of barges, laden with Iowa corn bound for New Orleans. The Federal Barge Line Terminal and Harbor, completed in 1928, about a mile below this point (right), has made inland Dubuque an important port for river traffic from late March until early November. The dam is one of 26 constructed across the river at strategic points to control the flow for navigation.

Illustration by J. Bayler Roberts



© National Geographic Society

Kodachrome by J. Baylor Roberts

GOLD OF THE FERTILE FIELDS IS Poured OUT IN CONSTANT STREAM

Wagonloads of corn hauled from Greene County farms keep this gigantic sheller humming throughout the husking season. At top speed it has a capacity of 2,000 bushels an hour.

and more seed from hybrid corn, the result of crossing the best strains in isolated fields.

No attempt is made to perpetuate this hybrid corn beyond the first season; a fresh supply is grown each year by commercial seed companies using methods developed on State College experimental farms. Its merits are that it is drought- and blight-resistant, and that it greatly increases acre production. Yields of 90 bushels to the acre—about double the amount from ordinary seed—are not unusual; and J. H. Greiner of Keota won the *Des Moines Register and Tribune* cup in 1938 by growing an average of 135.18 bushels to the acre on a 10-acre tract (page 145).

MORE CORN ON FEWER ACRES

In fields where the hybrid seed is grown, alternate rows of the chosen varieties are planted. As soon as the tassels appear, all those on plants of one kind are pulled off, those of the other sort permitted to develop. The pollen from the undisturbed tassels fertilizes the silk on the ear shoots of the denuded plants, and these produce seed containing in even balance the characteristics of both parents.

What hybrid corn means to Iowa is easily understood. If for any reason a farmer must let half of a field lie idle, he can offset some of the loss by planting the other half with the more productive seed!

When I was a boy in Odebolt, only the chief thoroughfares of the larger cities were paved, and small towns lost much of their farm trade in wet seasons. Well do I remember how our village streets would be cut into a jumble of wagon ruts and ridges during a January thaw and then frozen to such iron hardness that the pedestrian who wandered off a crossing felt the need of spiked boots and an alpenstock.

The Iowa State Highway Commission at Ames has banished such conditions. Today Iowa has more than 102,500 miles of good highways—nearly 6,000 miles paved, about 3,000 miles graveled, and the rest graded.

A Des Moines man and I motored about the entire State during several weeks following my visit to Ames.

Corn planting had been delayed by heavy rains, and few farmers were at work in the fields; but fine cattle and horses were browsing in green pastures, hundreds of little pigs were scampering about, and the whole countryside held joyous promise.

Most of the farmyards and feeding lots were as clear of litter as if they had been swept. While waiting to begin seeding, the owners had made everything tidy. I have seen places of far more spectacular beauty than the rolling prairie farms of Iowa, but nothing to surpass them in appearance of prosperity and contentment (Plate IV).

Near the coal-mining town of Colfax, we saw two men in uniform talking to the driver of a halted automobile.

"The police must have caught him speeding," I remarked.

"No," my companion replied, "he probably ran out of gas or had engine trouble, and those boys of the State Highway Safety Patrol are on hand to help him. There are 150 of them, all trained in a special school. If you violate a regulation, they'll warn you or report you; but they'll also give you emergency service, from supplying a gallon of gas to towing you to the nearest garage."

At Newton, "the city that washes the clothes of the world," factory smoke hangs over the rich farmlands. Here F. L. Maytag, a farm boy who had been a junior partner in a hand cutter and self-feeder company, began in 1907 to make hand-power washing machines designed by Howard Snyder. Four years later the two men introduced electric motors to operate the machines, which soon were selling throughout the United States; and Mr. Maytag became the "Washing Machine King."

GRINNELL TOOK GREELEY'S ADVICE

It was to a New York Congregationalist minister, Josiah Bushnell Grinnell, that Horace Greeley gave the memorable advice, "Go west, young man, go west and grow up with the country." Grinnell and two friends followed instructions and in 1854 started the Iowa prairie settlement that became Grinnell. Ardent abolitionists, they maintained a station of the Underground Railroad in their log home.

They set aside land for a college campus and sold building lots with the stipulation that any on which liquor should ever be sold would revert to Grinnell or his estate. Grinnell College opened its doors in 1855, and in 1859 absorbed Iowa College, which had been founded eleven years earlier at Davenport by twelve Andover Theological Seminary graduates known as the "Iowa Band." Among Grinnell alumni are the writers James Norman Hall and Ruth Suckow, and the actor Gary Cooper.



Photograph by J. Baylor Roberts

WHAT A DIET OF IOWA CORN DOES TO A HOG!

This giant on a Sac County farm weighs 1,300 pounds, about six times as much as the correct weight for market nowadays. When feed was cheap and lard high, the animals were kept until they attained enormous proportions, but in recent years they go to the packers earlier. Of all the pork raised in the United States, the Hawkeye State produces 18 per cent.

We had driven little more than an hour eastward from the college city through typical Iowa countryside and cozy small towns when abruptly the scene changed and we found ourselves in a bit of the Old World, the home of the Amana Society. Here are West Amana, Upper and Lower South Amana, Middle Amana, High Amana, Homestead, East Amana, and Amana—seven exotic villages, established more than 75 years ago by German immigrants seeking freedom of worship.

They grow upon their own land walnut timber from which their skilled craftsmen fashion hand-carved furniture; sheep pastured in their fields supply wool for the distinctive blankets they weave on hand looms; their baked products, made of flour and meal ground in a venerable gristmill, are cooked in old-fashioned stone or brick ovens; and their smoked meats are from stock raised on their farms. Formerly they wore homespun clothing of uniform color,

but now they dress in modern fashion.

Though a rapidly growing industrial center of nearly 60,000 population, Cedar Rapids impresses the visitor as primarily a home and college city.

The Civic Center, comprising a seven-story World War Memorial building and municipal auditorium and the Linn County Courthouse, is on a walled and landscaped island in the channel of the Cedar River. Until 1851 this island was the rendezvous of the Shepherd gang, troublesome squatters who were "persuaded to sell out their rights" for \$7.50. The city paid \$105,000 for it little more than a half century later.

Coe, a distinguished liberal arts college, is the largest of four coeducational schools established in Iowa by the Presbyterian Church. Others are Parsons College at Fairfield, Buena Vista at Storm Lake, and the University of Dubuque.

Christian colleges unselfishly devoted to the welfare of students of modest means



Photograph by A. M. Wittach.

THOUGH IOWA IS TRACTOR-MINDED, THE MULE STILL HAS HIS PLACE

This sturdy colt, only three months old, shows by his size, build, light muzzle, and tufted ears that he is one of which his owner, Pearl Spurgeons of Davis County, may be proud. The largest corn farm in Iowa, a 6,400-acre tract in Sac County, has elaborate machine equipment but is mule-operated except in emergency (page 179).

have played an important part in the development of Iowa. The Methodist Church has founded or assisted six: Iowa Wesleyan at Mount Pleasant; Cornell at Mount Vernon; Morningside at Sioux City; Upper Iowa at Fayette; Simpson at Indianola, and John Fletcher at University Park in Oskaloosa. Opened in 1844, Iowa Wesleyan is the oldest college in the State.

Columbia, for men, and Clarke, for women, in Dubuque and St. Ambrose in Davenport are Catholic colleges of excellent standing. At Pella is Central College, built by Baptists in 1853 but now under the auspices of the Dutch Reformed Church. The Society of Friends maintains William Penn College at Oskaloosa, the Disciples of Christ sponsored Drake University in Des Moines, the Lutheran Church has Luther College at Decorah, and the Evangelical Church conducts Western Union at Le Mars. Although now nonsectarian, Grinnell has a Congregationalist background.

Missionaries graduated from these schools have carried Iowa culture to the far places of the world, and there is hardly an outpost of civilization that has not felt the influence of earnest Christians from the "Bible Belt."

Grant Wood, Iowa artist best known for his *American Gothic* and *Dinner for Threshers*, has done much of his work in Cedar Rapids. In the dining room of our hotel we saw several of his murals, and in the Memorial Building a stained-glass window he designed. Thirty of his early canvases are permanently hung in the reception room of a mortuary at the rear of which is Turner Alley, the hayloft workshop where he painted them.

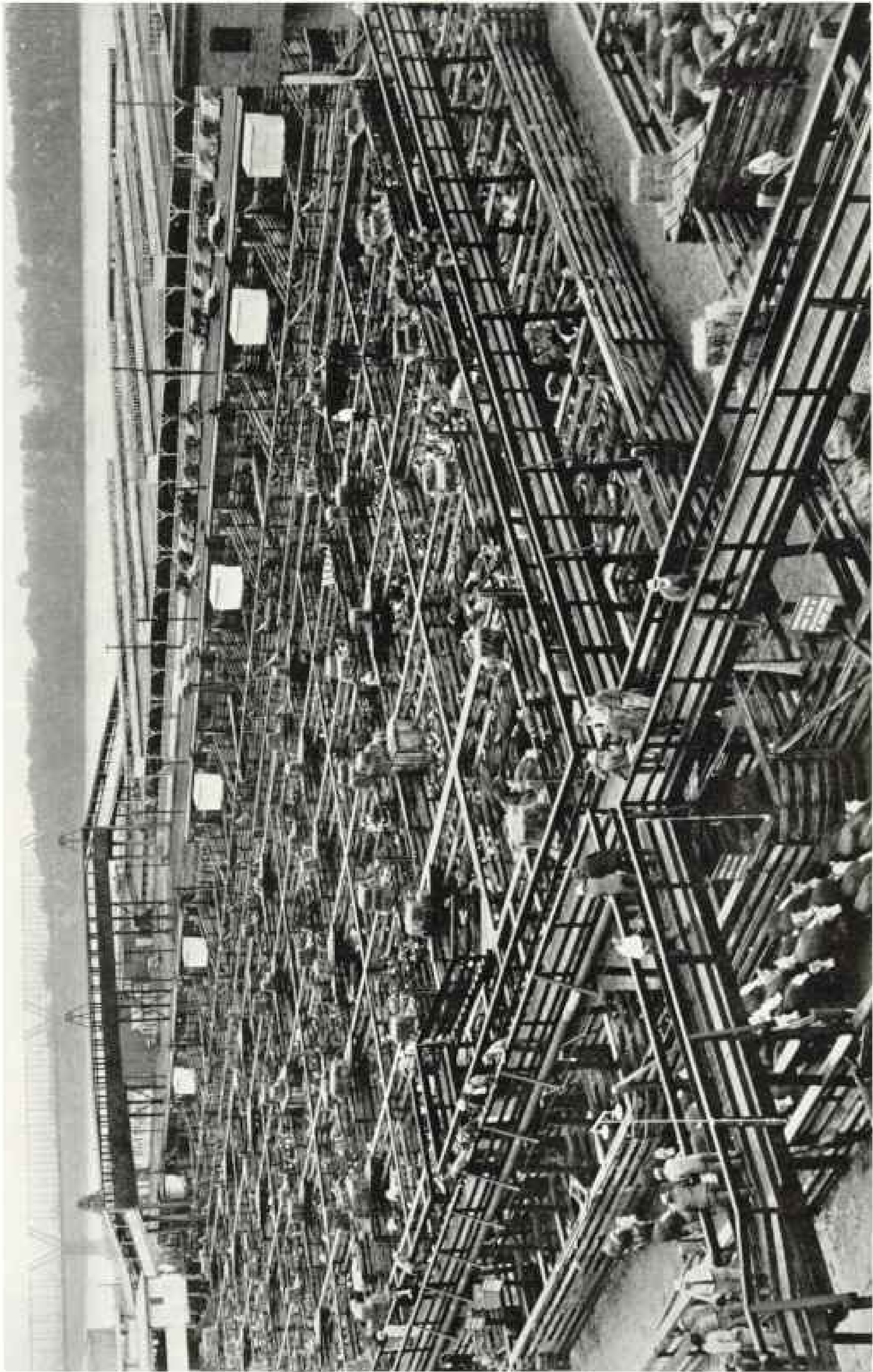
The Quaker Oats plant, one of the largest cereal mills in the world, has seven concrete elevators with a total storage capacity of 9,500,000 bushels. After being weighed, sorted, and cleaned, the oats are hulled, treated with violet rays, passed through steam chests, crushed to flakes by slowly



Photograph courtesy Dan Maloney Chamber of Commerce

MASSED BANDS PLAY THE CLOSING NUMBERS OF THE STATE HIGH SCHOOL MUSIC FESTIVAL

Each summer the University at Iowa City (Plate 1) is host to more than 6,500 finalists from district high school music contests. These young people, representing some 550 schools, compete in solo and ensemble work, both instrumental and vocal. In May, Cornell College, in the little town of Mount Vernon, presents the Chicago Symphony Orchestra. Oskaloosa is the birthplace of the composer Frederic Knight Logan (*Missouri Waltz*) and Thurlow Lawrence (*By the Waters of Minnesota*).



Photograph by J. Bayler Roberts

CATTLE FROM EIGHT STATES BAWL IN THE SIOUX CITY STOCKYARDS

From as far west as Montana, Wyoming, and Colorado, and from the Dakotas, Nebraska, Minnesota, and Iowa, livestock rumbles by truck and train into this shipping center (page 183). Monday is the big selling time. Cowboys with Wild West lariats rope recalcitrant animals and "baze" them into the loading chutes. In the 86 acres of yards, reinforced concrete buildings with modern feeding, water, and cleaning facilities are provided.

turning rollers, and put up in packages. The hulls are used by a factory producing Dr. Sweeney's fufural (page 150).

IOWA CITY, THE FIRST CAPITAL

From Cedar Rapids we turned south to Iowa City, first capital of the State, and seat of the State University, which opened in 1855.

When the first Iowa territorial legislative assembly met in Burlington on January 21, 1839, it appointed three commissioners, one from each judicial district, to select a site in Johnson County for a new territorial capital. The founding act stipulated that at least two of these commissioners should be present at Napoleon, the county seat, not later than May 1, to agree on a site.

On the day appointed for the ceremony, only one commissioner was on hand. At noon he dispatched a messenger to bring in the nearer of the absentees, who lived 35 miles away. The 70-mile cross-country horseback race against time seemed hopeless. However, the second commissioner came in with his escort five minutes before midnight—by his colleague's watch!

A tract of 640 acres in a wild valley rising to a hilltop overlooking the Iowa River was selected, and the town was plotted. On this land was erected (1840-42) the Old Capitol, considered by critics the finest example of architecture in Iowa (Color Plate I). It was used as a state-house from 1846 until 1857 when the government was removed to Des Moines. Since then it has been the University's Administration Building.

Like the State College at Ames, the University, with its nine colleges, serves all Iowa. An outstanding feature is the hospital, which under an act of the legislature is authorized to minister without charge to all sufferers in the State who are unable to pay for medical care. About 22,000 persons, the majority of them nonpaying, are treated every year.

In the University's history department I learned about the "Honey War," a boundary dispute between Missouri and Iowa that nearly resulted in bloodshed. A survey in 1816 had fixed as the northern boundary of Missouri the Sullivan Line, run to the "rapids of the River Des Moines." Iowans believed the statement referred to the Des Moines Rapids in the Mississippi; but in 1837 Missouri had a new line surveyed to some riffles in the Des Moines

River about 13 miles farther north. If the new line was recognized, the area that was to become Iowa territory would be lessened by about 2,600 square miles.

Trouble was started in 1839, the year after Iowa became a territory, by a Missouri man who came into the disputed strip, cut down three bee trees, and carried the honey home. Since the settlers in those days depended on honey for "sweetenin'," this was a serious offense, and when a Missouri sheriff "added insult to injury" by twice trying to collect taxes north of the Sullivan Line, the Iowa Territorial Governor, Robert Lucas, ordered him arrested.

PITCHFORK ARMY IN "HONEY WAR"

The Missouri Governor promptly called out militia, and an army of more than a thousand assembled at Waterloo, Missouri. Nothing daunted, Governor Lucas summoned his forces to Farmington, Iowa. The 500 Iowa soldiers, who provided their own uniforms and weapons ranging from rifles to pitchforks, were probably as unmilitary looking as the Dutch army in Irving's *Knickerbocker's History of New York*. In one county the commander loaded five of his six supply wagons with whisky "to keep up the spirits of the men."

The armies, though "spoiling for a fight" and only a few miles apart, never came to blows, for both generals sent peace commissions to suggest friendly settlement.

Ten years later the Sullivan Line boundary was approved, and in 1851 it was marked plainly by a 200-mile row of iron stakes. Historians report that one woman who owned property in the "no man's land" expressed joy that her farm had not been put into Missouri, where she understood the climate was too poor for good crops.

At Iowa City met two constitutional conventions. Iowa refused statehood in 1844 because the people did not like parts of the proposed constitution, but accepted it in 1846, by a vote of 9,492 to 9,038, under a revision which was written in 15 days!

After a chat with "Steamboat Bill," a young member of the history faculty who is an authority on lore of the Mississippi, my companion and I drove down through the Honey War country to Keokuk to begin a trip beside "Old Man River" up the eastern border of Iowa.

Keokuk, named for the Indian orator whom the United States recognized as chief of the Sac tribe after the defeat of Black



Photograph by J. Baylor Roberts

"HE WAS NOTHING BUT A BIG FAKE"

In 1868 two enterprising young men bought a huge slab of gypsum at Fort Dodge, shipped it to Chicago, and engaged stonemasons to make of it a 3,000-pound "prehistoric man" ten feet long, two and a half feet wide. They sent it secretly to Cardiff, New York, where it was buried on a farm and later "discovered." Exhibited throughout the country, it attracted throngs and earned its exploiters a fortune. People believed it to be a relic of the days when giants roamed the earth; but Oliver Wendell Holmes exploded the theory by boring a hole into the solid "skull." Barnum's offer of \$150,000 for the Cardiff Giant was refused. Today the "greatest hoax of the 19th century" reposes in the recreation room of the Des Moines home of Gardner Cowles, Jr.

Hawk, was the "Gate City" and outfitting point for early expeditions to the West and Northwest. Here once lived and worked Samuel Clemens, "Mark Twain."

The public library treasures a copy of the first city directory, most of which was hand-set by the humorist when he was working in his brother Orion Clemens' job printing shop. He listed himself as an antiquarian. On being questioned about this, he replied that every town should have one antiquarian, and since no one else was available, he volunteered for the position.

The Keokuk Dam, built into the hard limestone of the Mississippi River bed, backs up the Father of Waters nearly 65 miles to form a lake of 100 square miles. In a hydroelectric plant giant turbines generate 200,000 horsepower. It was a young army lieutenant, Robert E. Lee, who in 1837 first suggested obtaining power from the Des Moines Rapids of the Mississippi.

Fort Madison, which was established in 1808 as a Government trading post, was burned by its defenders five years later when it was about to be taken by Black Hawk and his warriors. The present city grew up around a chimney left standing after the fire.

On the spot where the old fort stood, we saw the six modern buildings of the W. A. Sheaffer Pen Plant, climax of a 20th-century industrial romance. W. A. Sheaffer, a young retail jeweler, began to manufacture fountain pens in the back room of his store in 1912. He was by no means the first to make fountain pens, but four years earlier he had hit upon an idea which was to revolutionize the trade. He had obtained a patent on the first practicable lever filler!

Up to that time fountain pens had been filled by medicine droppers. Money was subscribed by his friends and neighbors,

and the company started with \$35,000 capital. Today, only 26 years from the date of its organization, the Sheaffer concern is the leader of the industry in the United States, with the largest dollar volume of business in this country.

Though the lever filler was the nucleus of the success, other innovations by Sheaffer helped it grow. Among these are the screw cap, which, when it replaced the old slip-type cap, was marked with the word "Turn" to warn the user against trying to pull it free. The propel-repel-expel pencil, "Scrip, Successor to Ink," the ball pocket clip which does not fray the clothing, and numerous other library supplies such as leads and "Para-Lastik" paste are now popular Sheaffer products.

BURLINGTON, OLD WISCONSIN CAPITAL

Before Iowa Territory was set apart, and while a capitol was being erected at Madison, Burlington was host to the second legislature of the Territory of Wisconsin. The building put up to house the assembly burned down, and Old Zion Church, the site of which is now occupied by a theater, became the legislative hall. Here also met the Iowa assemblies from 1838 to 1841.

Nowadays Burlington, attractively situated on four shady hills, is a railway and manufacturing center. Old Front Street, however, still retains the atmosphere of steamboat days, paddle-wheelers unloading produce of all sorts at the wharves.

For the *Hawk-Eye*, now the *Hawk-Eye Gazette* (established 1836), oldest Iowa newspaper in continuous publication, Bob Burdette began in the 1880's to write the sketches which brought him fame as a humorist. The paper's name, Hawk-Eye, became a nickname for citizens of the State.

Both Burlington and Muscatine, next important river city to the north, did a thriving lumber business in the latter half of the nineteenth century, timber being floated down to the sawmills from the north woods; but that trade is gone, the last raft of logs having passed in 1915.

Manufacture of pearl buttons from Mississippi River clam shells began to replace the lumber business in Muscatine about 1891 and grew so rapidly that two decades later the annual output exceeded 17 million gross. Because of the decrease of fresh-water mussels, many of the button companies have moved away, but there are still 50 employing about 4,000 workers (p. 176).

Intimately associated with the city was the native son Ellis Parker Butler, author of *Pigs Is Pigs*. He said that when he came back to his home town after his first literary success and looked around for some memorial to himself, the only thing of the sort he could find was a large sign "I-C-E." This he interpreted to mean "In commemoration of Ellis." Thereafter the high school from which he was graduated was known as the I. C. E.

Through the gathering dusk of an April evening my companion and I drove out of Muscatine on the river road to Davenport. The Mississippi was quiet and mysterious as if "it must know somethin'" it would not tell about the days when it was the pulsing trade artery of a new world. Off to our left as we passed Montpelier lay the dark forest of pine and oak that is Wild Cat Den State Park, with its Steamboat Rock and other fantastic figures carved by wind and rain.

The moon swung clear of the trees on the Illinois side of the river, making a path of gold on the shimmering water. Far out in the shadows lights of two steamers twinkled, and I tried to visualize the racing stern-wheelers of Mark Twain's time, the wood fires under their risky boilers set roaring with oil, lard, or fat pork, and negroes perched on the safety cocks to press the last measure of speed from the precious steam. The Father of Waters still carries thousands of tons of freight, but the high adventures of old are only romantic memories.

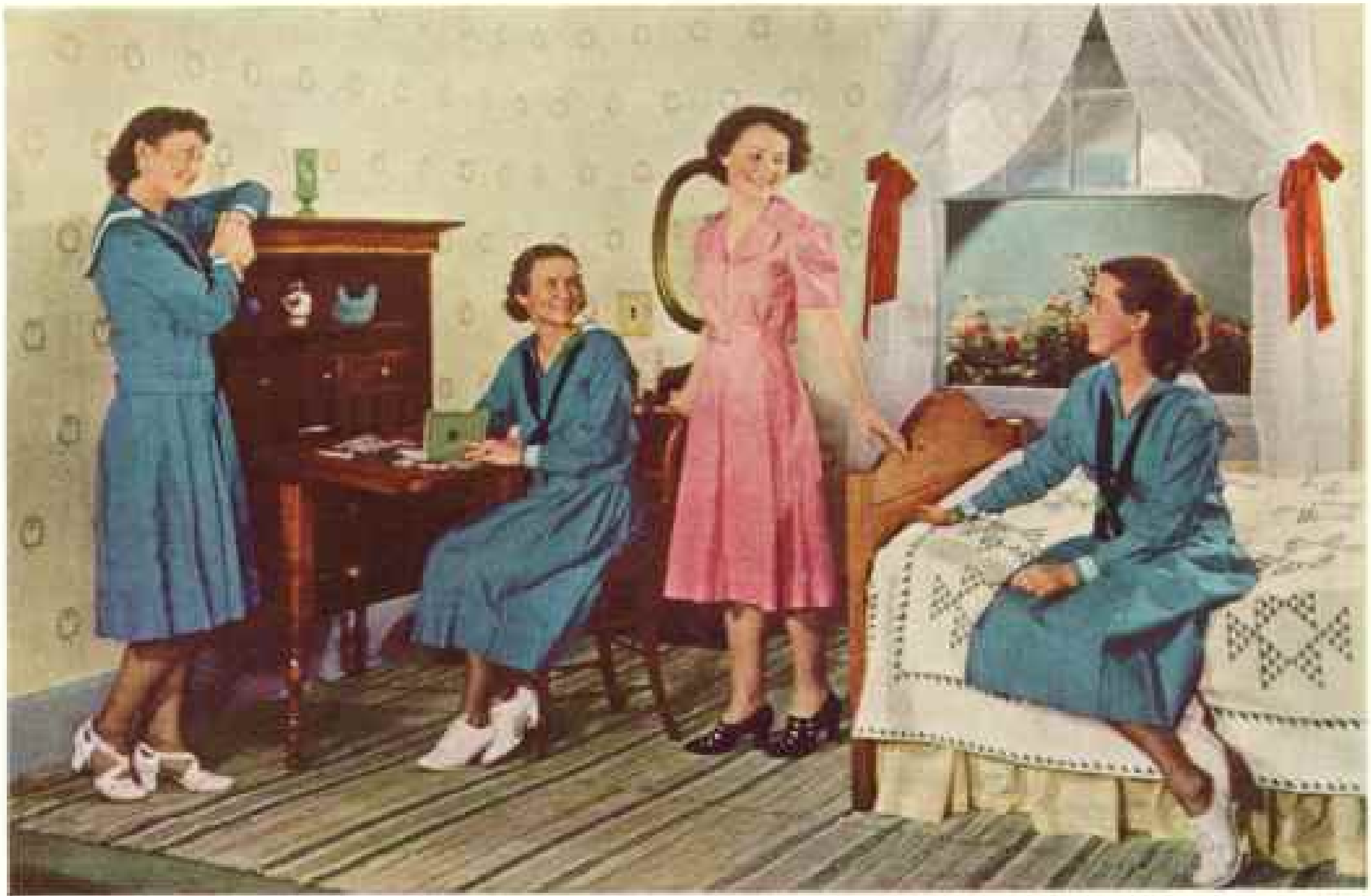
Davenport, with a population of 61,000, largest of the Tri-City group which includes Rock Island and Moline, has a more metropolitan air than most other Iowa cities. It serves a vast Iowa agricultural area, however, and many of its finest homes, built on the high bluffs overlooking the Mississippi, are owned by retired farmers.

DRED SCOTT LIVED IN DAVENPORT

It was upon residence in a pre-emption shack in Davenport for his master, Dr. John Emerson, that the negro Dred Scott based his plea for freedom in the case considered by historians one of the important events leading to the Civil War; and on the Fourth of July, 1857, John Brown bought supplies here for the Kansas expedition that preceded his raid at Harpers Ferry.

Still standing is the home of one of the founders of the original settlement, Antoine Le Claire, the French half-breed whose

CORN AND COLOR IN THE HAWKEYE STATE



IOWA 4-H CLUBS SEND THEIR CHAMPIONS TO THE STATE FAIR AT DES MOINES.

Misses "Heart," "Head," and "Health" show true feminine interest in the first prize dress designed and made by Miss "Hands." As their titles suggest, they are respectively winners of awards for personality, scholarship, physical fitness, and skill at household arts.

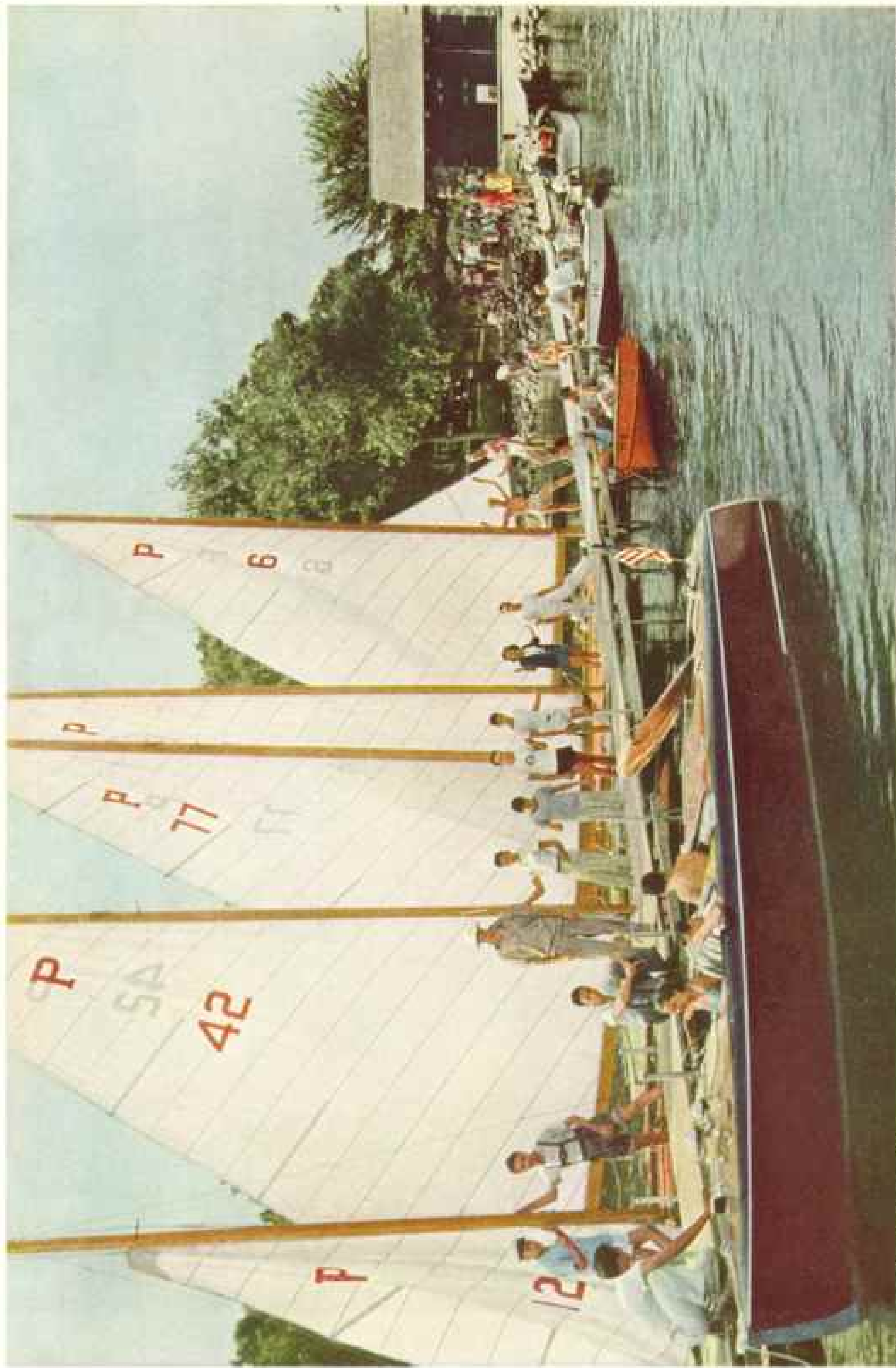


© National Geographic Society

Dufaycolor by J. Baylor Roberts

AT ORANGE CITY THE WOODEN SHOE MAKER IS KEPT BUSY

Netherlanders, who founded both this town and Pella (Color Plates V and XV), like to don old-country costumes for their annual tulip festivals.



© National Geographic Society

SAILB. FLUTTERING. BOATS ARE SET FOR A RACE WHERE SKILLFULLY SAVAGES ONCE PADDLED WAR CANOES

(Published by J. Bapst, Dubuque)

There is nothing nowadays at Gull Point, West Okoboji, to remind vacationers that the whole region of the 19 lakes in northwestern Iowa was once a place of terror; yet not far from this spot the renegade Sioux Inkpaditah and his treacherous band murdered 42 white settlers in the Spirit Lake Massacre of 1857.



© National Geographic Society

Kodachrome by J. Baylor Roberts

EXOTIC AS THE LOTUS THE CHILDREN GATHER ARE THE AMANA COMMUNITIES

German immigrants, living according to the tenets of a religious faith, have created in Iowa a bit of the Old World. When the traveler turns off the main highway to their seven quaint villages, he finds himself suddenly transported out of modern scenes into a medieval setting.



© National Geographic Society

SHENANDOAH RAISES FLOWERS, EVEN ON ITS LIGHT POSTS. Instead of oil for the lamps, the young lady brings water for the hanging baskets. This city is the nursery center of the State (Plate XIV).



Delacolors by J. Bayler Roberts

TERRA COTTA COWS DRINK FROM AN AMES FOUNTAIN. One of the restful nooks on the Iowa State College campus is the cool court of the Dairy-Industries Building.



© National Geographic Society

Dulycolor by J. Baylor Roberts

SYMBOLIC OF THE SETTLING OF IOWA IS THE 52-FOOT MURAL, "WESTWARD" OVER THE MAIN STAIRWAY IN THE CAPITOL.

The artist, Edwin H. Blashfield of New York, caught the courageous and hopeful spirit of the pioneers and told the story of the winning of the West in this dramatic painting of dreams and an ox-drawn "prairie schooner."

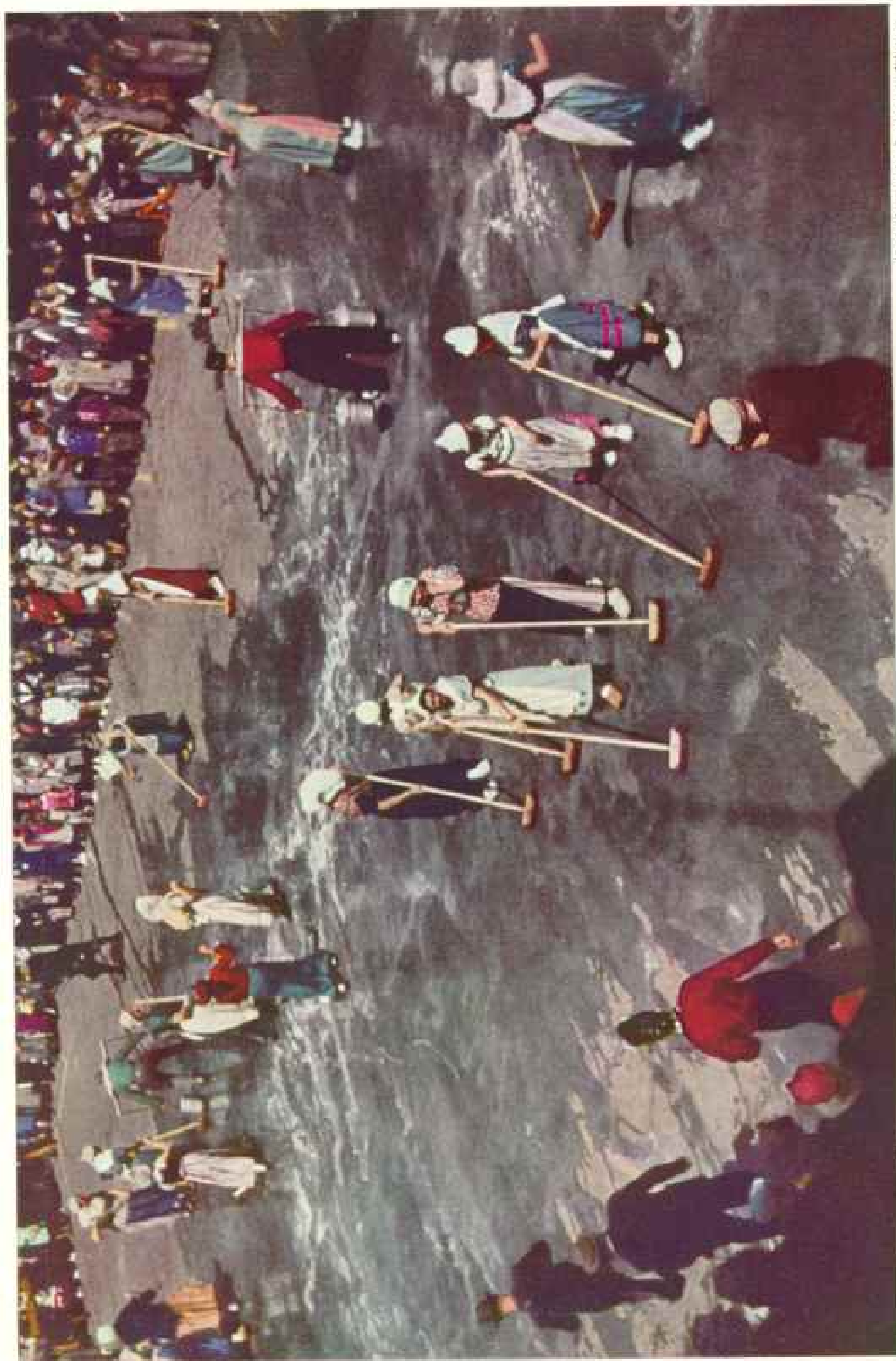


© National Geographic Society

Kodachrome by J. Basil Roberts

MILES OF FIELDS MAKE SUMMERTIME GLADIOLUS NEAR SIENANDOGAI

Though Iowa is known as "the State where the tall corn grows," its rich soil is productive of many other crops. The southwestern part is an area of nurseries and flower-seed gardens. Extensive vineyards flourish in the country around Council Bluffs.

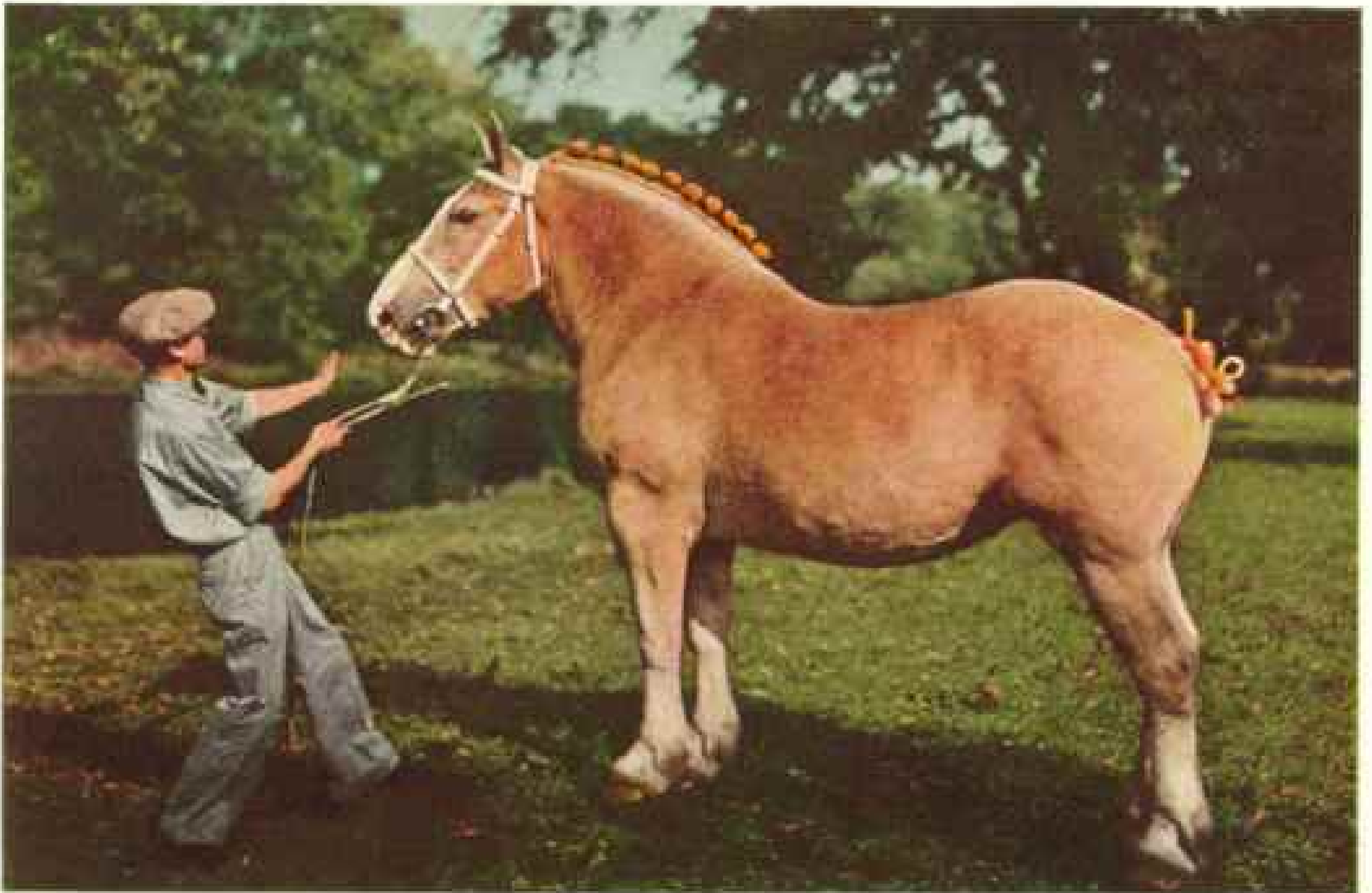


© National Geographic Society

Kodachrome by Lawrence Likens

PELLA DUTCH IN FULL COSTUME SHOW VISITORS HOW THEY TIDY UP "THE CLEANEST CITY IN TOWA"

In keeping with a custom of their Netherland ancestors is the annual tulip festival. More than 1,200,000 fancy bulbs imported from the Netherlands and planted around lawn edges and parking strips, bloom simultaneously at the beginning of the April celebration.



Dufayesche by J. Baylor Roberts.

EVERY INCH A QUEEN IS BEAUTY DE BERGHES

This mare, raised at Ogden, in the central part of the State, won a blue ribbon in the National Belgian Horse Show conducted at Waterloo, Iowa, in connection with the Dairy Cattle Congress.



© National Geographic Society

Kodachrome by J. Baylor Roberts

NOT CORN BUT A KIND OF SUGAR CANE, SORGHUM IS GROWN FOR SILAGE

Though of little value for making molasses, it has become a profitable forage crop popular among breeders of cattle, for the sweet juice makes it a quick fattener.

services as an interpreter aided United States Army officers in establishing the forts and trading posts so necessary to the winning of the West. The building was the first railway station in Davenport.

From the Palmer School of Chiropractic, founded before 1900 by D. D. Palmer, originator of the method of treatment, and developed by his son, have been graduated more than half the practitioners of this profession in the United States. Hundreds of visitors are attracted to the school grounds to see "A Little Bit of Heaven," a museum containing art and curios collected from all over the world by B. J. Palmer.

Not only is Davenport a prosperous and fast-growing industrial city; it is also outstanding for its cultural development. Matthais Rholfs, who brought a piano here from Germany in 1847 and gave the first concert before a crowd of amazed Indians, would revel today in the brilliant audiences that enthusiastically support several German singing groups, a philharmonic society, and other musical organizations of far more than local renown.

Between Davenport and Clinton we passed through Le Claire, boyhood home of Col. William F. Cody, "Buffalo Bill." The famous Indian fighter and showman was born on a farm near the town. A short distance from the highway stands a huge elm tree once known as the "Green Tree Hotel," and now marked with a monument to Buffalo Bill.

Antoine Le Claire, soon after the War of 1812, held conferences with the Indians under the shelter of this tree, and river roustabouts who had squandered their wages in the frontier saloons were wont to camp there while waiting for a steamboat on which they might obtain new jobs.

WHERE CORN BECOMES SYRUP

We found elm-shaded Clinton in a state of excitement over the prospect of a new Cellophane industry. Besides extensive railroad yards and shops, it has numerous factories, the largest of them a corn syrup and by-products plant which has equipment to grind 30,000 bushels of corn a day.

The city was recognized in the early eighties as one of the world's leading lumber producers, so much timber being sawed in its mills that sloughs and creeks were filled with sawdust and whole residential districts built over them; but that trade

dwindled and died with the cessation of log rafting from the north.

Of historic interest is a huge natural stone face on a limestone cliff in Eagle Point Park. The Indians of early days believed the face an emissary sent by the Great Spirit to guard fish and game.

The highway to Dubuque passes over parts of the old Military Road that superseded the trail marked by Lyman Dillon's hundred-mile furrow (page 143).

DUBUQUE SET A RIVER AFIRE

First white man to establish a permanent home in Iowa land, a French Canadian, Julien Dubuque, began in 1788 to take lead ore from "the Mines of Spain" in the Mississippi River bluffs at Catfish Creek. He obtained the concession from the Spanish governor of Louisiana. Thus began the city of Dubuque (Plate VII).

The adventurous miner was a genius at getting along with the Indians. They called him their brother "Little Night," and at his death vied with one another for the privilege of carrying him to the grave.

Once when the Fox refused to grant a request of his, Dubuque threatened to burn the whole Mississippi River, but the chiefs merely scoffed at him. He invited them to a powwow around a council fire on the bank of Catfish Creek. At a signal one of his helpers secretly poured a barrel of oil on the water above the meeting place, and Dubuque suddenly paused in his oration, seized a brand from the fire, and tossed it into the creek. The resulting conflagration so frightened the Indians that they yielded the argument at once, beseeching him to quench the flames. Most graciously he consented—as the last oil was consumed.

An amusing story is told of the first schoolteacher in Dubuque. He was captured by the Indians in the Black Hawk War, and later sold to a trader for a plug of tobacco because he was too bald-headed to be scalped.

After the lead deposits had been worked out, Dubuque, like its river neighbors, became a sawmill city and, when that business ended, turned its attention to wood-working. Some of the largest sash and door mills in the world are located here. Of particular interest to me was the big maize-wood plant where cornstalk lumber of several kinds is manufactured commercially after Dr. Sweeney's formulae (page 150).



Photograph by J. Baylor Roberts

BUTTON, BUTTON, MUSCATINE HAS THE BUTTONS

Round "blanks," cut from mussel shells taken from the Mississippi River, are run through this grinding machine to remove the barklike outside surface and to bring them to the proper thickness. Next, thread holes will be drilled and the edges trimmed. The disks are then submerged in acid, washed, dried in sawdust, and sorted (page 166).

In northeastern Iowa the scenery is more rugged than in most other parts of the State. Limestone cliffs crowned with forest growth border rivers and creeks, and many of the farms are hilly.

White Pine Hollow Preserve, between Dubuque and Guttenberg, contains all that is left of the once magnificent forest which helped feed sawmills of the river cities.

In early times migrating passenger pigeons flew over this woodland in such numbers that they darkened the sky for days. Slaughter of thousands of them by the settlers seemed not to diminish the flocks, but in 1871 the main body went north and never returned. A few of this now extinct species were seen in Iowa as late as 1876.

We saw from the river road north of McGregor and Marquette thousands of migrating wild ducks and geese resting on the rippling surface of the Mississippi. Instinctively they seemed to sense that no one would harm them, for some were paddling about unconcernedly among small craft anchored on the Wisconsin side.

The country southwest of Decorah

abounds in historic interest. At the Bohemian (Czech) town of Spillville, Antonin Dvořák lived during the summer of 1893 while he was composing some of his major musical works, probably portions of his *New World Symphony*.

Whisky Grove near Calmar was so named because it was the lurking place of an Indian who, paradoxically, sold liquor to Fort Atkinson soldiers in territorial days.

Built in 1840 to protect, not white settlers from the Indians, but the Winnebago Indians from the Sac and Fox and the Sioux, Fort Atkinson was a United States Army post of unique purpose. Part of it has been restored, and the tract on which it stands is a State park.

BIRTHPLACE OF THE WORD "TRACTOR"

In Charles City around the turn of the century Charles W. Hart and Charles H. Parr began to build stationary gas engines and to experiment with traction motors for use in agriculture. Their advertising manager coined the word "tractor" to describe the machine destined to revolu-



Photograph by J. Baylor Roberts

IOWA LEADS THE NATION IN NUMBER OF CHICKENS ON FARMS

In the old days of horse and mule agriculture, they scratched for a living around stables and barnyards, but now fowls of better quality are raised for the market. This girl on a poultry ranch near Yale is feeding a lusty flock in which barred Plymouth Rocks predominate.

tionize farming. Today the Hart-Parr Company has agents in 37 foreign countries and in its busiest seasons makes daily shipments of trainloads of tractors.

Iowa did not give its women the right to vote until the 19th Amendment was added to the Constitution of the United States; yet the State was the home of two of the best-known leaders in the struggle for women's rights. As a girl, Carrie Lane Chapman Catt lived on a farm near Charles City and at the peak of her career made her home in the town. Amelia Jenks Bloomer, 1818-1894, pioneer campaigner for woman suffrage and dress reform—"bloomers" were named for her—is buried at Council Bluffs.

Largest town in northern Iowa, Mason City is the trading center for a broad district of fertile farms. Two Portland cement factories here produce five per cent of the total output in the United States, and the brick and tile plants make in a prosperous year more than 200,000 tons of clayware.

Though burning kilns and factory chimneys can be seen on all sides, they do not spoil the peaceful farm scene. The good

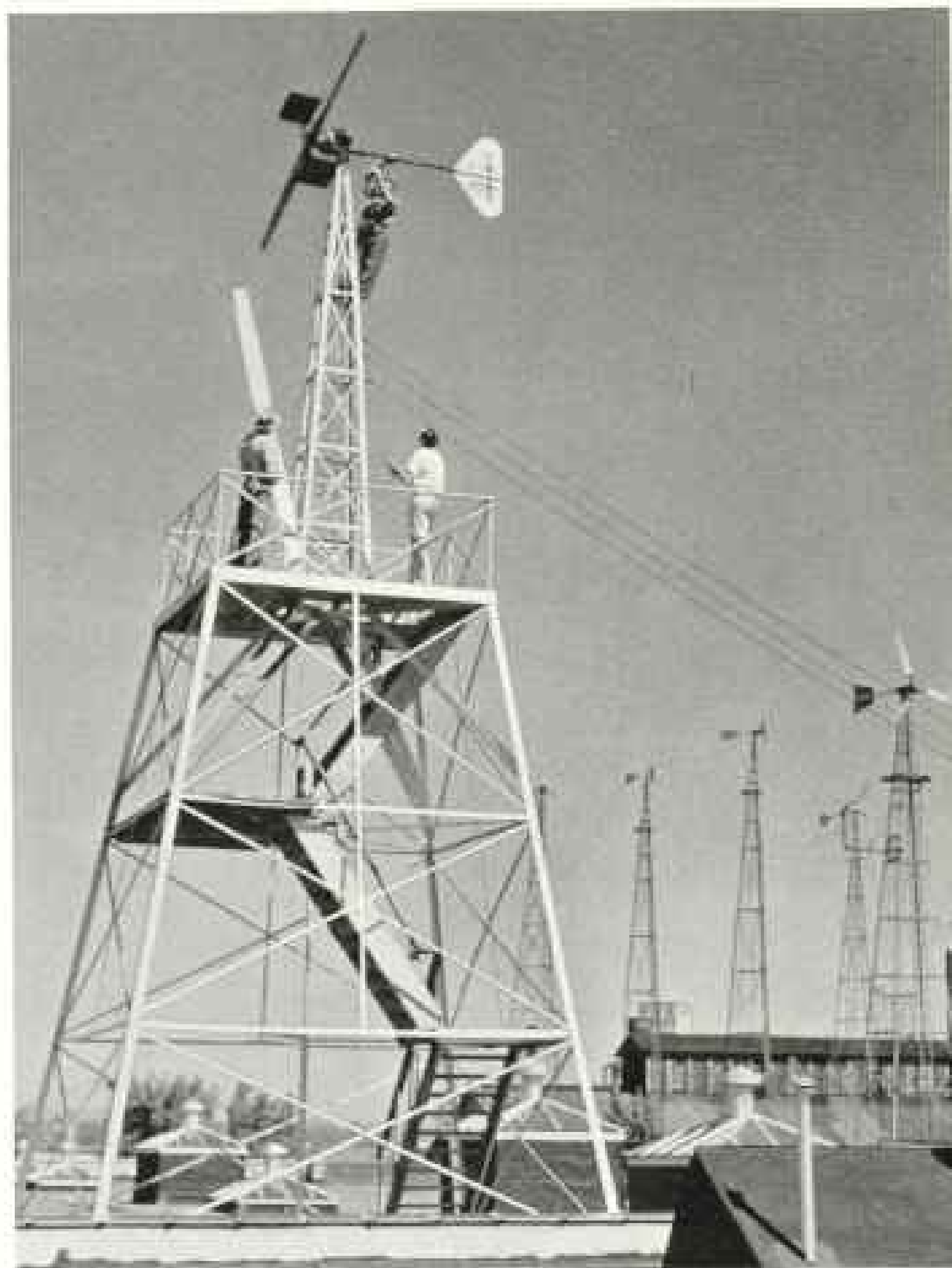
earth continues to produce its quota of food crops in the shadow of industry.

On our way down to Waterloo we paused near Nashua to see the "Little Brown Church in the Vale," built three quarters of a century ago, and subject of the familiar hymn. The village of Bradford where it stands is now almost deserted, but services continue, and couples come from near and far to be married there.

Home of the Dairy Cattle Congress and Allied Exposition and the National Belgian Horse Show, Waterloo is host for a week each year to stockbreeders from all parts of the United States (Plate XVI).

Here are the Rath Packing Plant, which handles more than a million and a half animals annually; the John Deere Tractor Plant, making 13 types of tractors as well as stationary and portable engines from two to 42 horsepower; and the Galloway Plant, manufacturers of farm machinery marketed through mail orders. Waterloo, population less than 50,000, produces one-fifth of the United States total of farm-type gasoline engines!

At Cedar Falls we visited Iowa State



Photograph by J. Baylor Roberts

TWO IOWA FARM BOYS HARNESSSED THE WIND FOR ELECTRICITY

Because no other power was available, they hitched a windmill propeller to an automobile generator to operate the family radio. A factory in Sioux City now manufactures equipment by which electricity is generated by the breezes and stored in wet-cell batteries for rural use. Installations have been made in 119 countries.

Teachers' College, the only normal school maintained by the State. Its graduates have done yeoman service in the grade and secondary schools.

There is a restaurant in Marshalltown "under the viaduct 'down by the winegar works'" that I unhesitatingly recommend to the traveler who wishes to savor old-fashioned Iowa cooking. On the menu are such homely items as pig's feet, spareribs, and stuffed beef heart, prepared in true country style. One might wax poetic over the chiffon pie.

If I were asked to select a characteristic Iowa town, tree-bowered Marshalltown

would be among the first to come to mind. Its 18,000 people are 91 per cent native white, even the workers in the fifty-odd factories being recruited from the farms near by. Everybody seems to know everybody else, and there is an atmosphere of hearty friendliness that makes the stranger feel at home. Here is the Iowa Soldiers' Home, established more than a half century ago for Civil War veterans.

A short drive east of Marshalltown is Tama, where about 400 Sac and Fox Indians, pathetic remnant of the tribes that once possessed all of Iowa, own a 3,300-acre "reservation," renting enough of their land to white farmers to pay their taxes.

Gentle, soft-voiced Horace Poweshiek, descendant of chieftains, told me how their forefathers, banished to Kansas by Government order in 1842, became

homesick and wandered back to Iowa to purchase this loved land with funds saved from their allotments. Though "their arrows are broken . . . and their council fires have long since died out," they cling proudly to the traditions of their race.

OTTUMWA, "RIPPLING WATERS"

I could envisage as we went south from Tama to Ottumwa—"rippling waters" of Indian legend—the rush of white settlers who dispossessed the red men of their favorite hunting grounds. At midnight of April 30, 1843, representatives of the United States Government gave a signal

that started a race for land and brought into Wapello County in a few days about 2,000 men, women, and children. Ottumwa, now a city of almost 29,000 population, sprang up like magic. Little wonder that Edna Ferber, who lived here in her childhood, had the background to write vividly of a land rush in her Oklahoma novel *Cimarron*, or that the native daughter, Honoré Willis Morrow, should know the characters of western pioneers.

The packing plant of John Morrell and Company is the leading industry in Ottumwa. Attracted by the name of the town, an English provisioner established a half century ago the organization which is today the largest independent pork processing business in the world.

Mining of vast deposits of bituminous coal, which underlie about 19,000 square miles of the Des Moines River Valley, has made possible the development of manufacturing in Ottumwa as in other southern and central Iowa cities; yet agriculture remains the basis of prosperity. While the miners work in the deep shafts, farmers grow bountiful crops above them.

Knoxville, through which we passed on our way back to Des Moines, was the scene of a land race similar to that in Wapello County, but two years later. Moving ever westward, strip by strip, the pioneers ousted the Indians from Iowa.

Near the coal-mining and railroad city of Boone, north of Des Moines, is Ledges State Park, one of 72 recreation areas acquired by the State since 1919 and developed rapidly in the last decade under the Twenty-five-Year Plan, which furthers conservation of natural resources.

In a Fort Dodge hotel we enjoyed a real Iowa chicken and dumpling Sunday dinner. What memories it brought back of hot afternoons long ago when, torpid from just such food, I lounged drowsily on the front porch and hoped I should not have to go to church in the evening.

One of the largest deposits of gypsum in the United States, a bed of 30 square miles, enables Fort Dodge to turn out about 170,000 tons of plaster and allied products annually.

A WRESTLER WINS A COUNTY SEAT

How Fort Dodge became the seat of Webster County is a story old-timers tell with relish. "An engine in pants" by the name of John F. Duncombe decided soon

after his arrival in the town in 1855 that he would take the county seat away from the larger town of Homer. In the election the following year Fort Dodge was announced the winner.

John Maxwell, who had conducted the contest for Homer, charged that Duncombe had cheated. At the suggestion of citizens of both towns, the two leaders fought out the issue in a wrestling match in the Homer town square. Duncombe, though the smaller of the two, won the fall, and the county records were moved to Fort Dodge. Today Homer is a tiny village and Fort Dodge a city of nearly 25,000.

TRACTOR VERSUS HORSE AND MULE

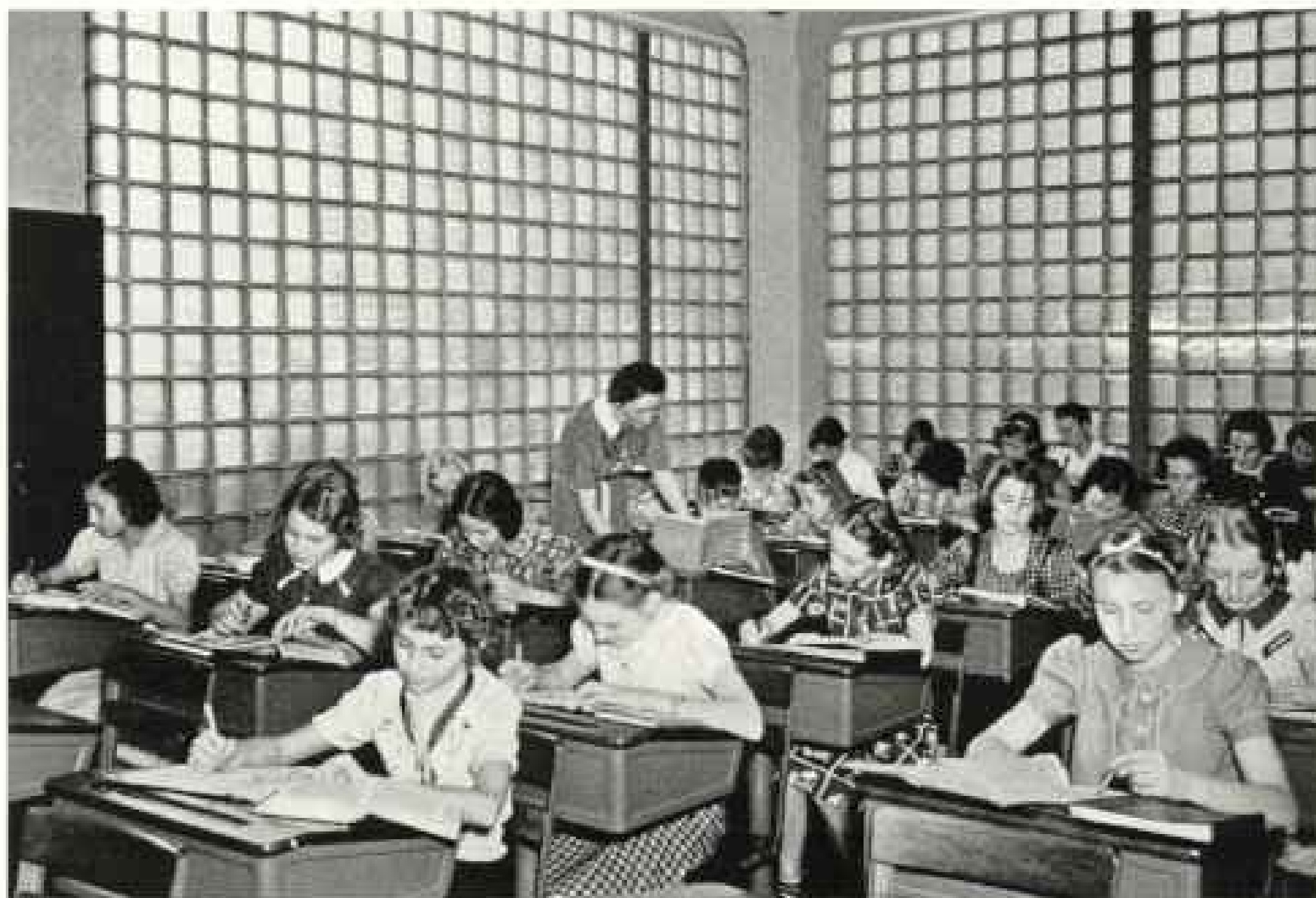
The countryside became increasingly familiar to me as we drove westward from Fort Dodge into the scenes of my boyhood; yet I felt that something was changed. Suddenly I realized what I had been missing. Men were working in the fields with tractors instead of horses and mules.

Since my departure from Iowa, agriculture has been mechanized to an amazing extent. The modern machines, particularly tractors and corn pickers, have lightened the farmers' toil and at the same time driven many laborers to seek employment in the cities. In interviews with farmers, I soon discovered that opinion is divided.

One man was emphatically against the modern idea. "I stick to my horses and mules," he said. "They work on the oats I grow on the place instead of gasoline; the manure from their stables keeps my land rich and protects it from sheet erosion; they cost less than the machines, and last longer; and I don't have to be a mechanic to operate them. Of course my boys and I all have to work from sunup to sundown and we hire five or six extra men; but I'm glad, because the work holds the boys with me on the farm."

The man across the road declared in favor of complete mechanization: "Before we had tractors and corn pickers, Mary and I never got a vacation. Now we have time to go places. Of course we have to buy fertilizer to put on our land, but we save the cost of it by not having to hire a lot of extra help for Mary to cook for."

Iowa has been for many years the Nation's leading producer of popcorn, and Sac and Ida counties yield more than any other part of the State. In the old days our village editor delighted in telling how



Photograph by J. Baylor Roberts

ELKADER CHILDREN GO TO SCHOOL IN A GLASS HOUSE

Built of hollow glass blocks eight inches square and four inches thick, this edifice admits a maximum of natural light without glare, shuts out noise, and insulates against heat and cold. Desks and chairs are of hard rubber, and floors of asphalt tiling and metal lath. From the third grade through high school 500 pupils are accommodated. The ultramodern structure is a far cry from the several thousand little white rural schoolhouses which for decades have done yeoman service in making Iowa the most literate State in the Union (page 143).

big a heap of white kernels could be popped from the thousands of wagonloads shipped each fall from Odebolt, "the popcorn center of the world."

WEATHER MEANS EVERYTHING IN IOWA

In August of 1936, when one of the worst droughts on record was cutting the value of Iowa crops almost in half, and the western part of the State was particularly unfortunate, I visited in Ida Grove. A little lad at a filling station, seeing the District of Columbia license on my car, asked politely, "How is the weather out in Columbia?" To him as to his elders, that was the most important topic of conversation.

The weather at the time of my latest visit was much kinder to growing things, but as unpredictable as I remembered it from my youth. I had sweltered under a broiling sun at the Drake Relays on April 29, and two weeks later I rode from Ida Grove to Des Moines through a snowstorm!

In the northwestern counties are the largest lakes in Iowa. I was saddened to find

Black Hawk Lake at Lake View, vacation spot of fond memory, so silted up that State-operated dredges were at work digging a channel in the center of it to save a small portion for recreation purposes. Storm Lake, however, had apparently escaped serious silting, and the Iowa Great Lakes, Spirit and the two Okobojis, near the Minnesota border, were more attractive than my recollections of them (Plate X).

From the lake region we swung southwest through the Dutch town of Orange City (Color Plate IX), to Le Mars where in early days a colony of wealthy young Englishmen, living in the style of British country gentlemen, raised fancy cattle for a livelihood and sought amusement by riding to hounds or playing polo and cricket. The colony, like the French Icarian community established near Corning in 1858 and abandoned forty years later, was not a permanent success. Nowadays, only old settlers in Le Mars remember the "Johnny Bulls who used to dress up in boiled shirts to eat at night what they called 'dinner.'"



Photograph by J. Bayler Roberts

A BROOKLYN, IOWA, GIRL LEADS HER PET AYRSHIRE HEIFER TO THE SHOW RING

On the elaborately equipped State Fair Grounds at Des Moines a tent city housing thousands of exhibitors and their families springs up the last week of every August. For six eventful days rural Iowa goes on parade with harness races, displays of the blue bloods of the stock world, exhibits of the finest products of the soil, and activities of 4-H Club boys and girls (Plate IX).

Sioux City, second metropolis of Iowa with its more than 80,000 people, is a river town, but differs as much from the cities on the eastern border as the turbid Missouri, which flows past it, differs from the traffic-bearing Mississippi. By the expenditure of enormous sums, the Federal Government is seeking to make the Missouri navigable again, but some Iowans say they have seen the "Big Muddy" change its course too often to believe mere man can tame it.

"When the river goes on a rampage," one man told me, "it often moves over a mile or two and makes a new bed where there were fine farms. A man who owns a place on its bank never knows when his land will be under the middle of the current or reduced to sand banks on the Nebraska side."

SIoux CITY PACKING STARTED BY ACCIDENT

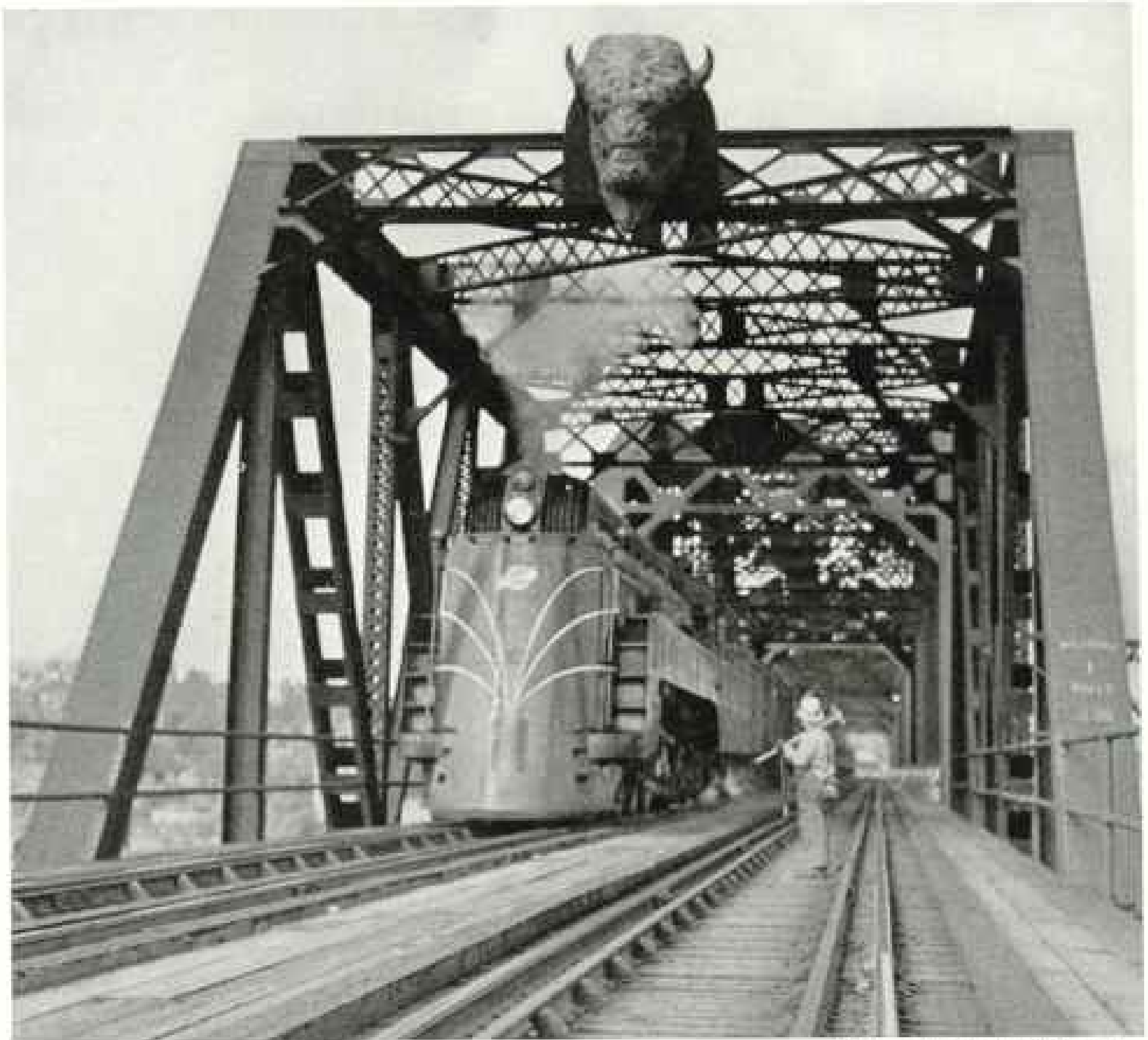
Through a whim of the Missouri River were started the packing industries and stockyards which have made Sioux City one of the leading livestock markets in the United States. A boatload of wheat sank

or was grounded on a sand bar opposite the town in the middle eighties, and James E. Booge bought and salvaged the cargo. Because the water-soaked grain was worthless for any purpose but feeding, he began to purchase and fatten hogs. There was little market for live animals; therefore the pioneer built a small packing plant.

Today the Sioux City stockyards accommodate at capacity 45,000 hogs, 25,000 cattle, 25,000 sheep, and 1,000 horses and mules (page 163); and plants of several of the largest packing companies in the country are operated near by.

Leaving the Missouri River for a time, we zigzagged down into the famous nursery district in the southwestern part of the State (Color Plates XII and XIV). Past fields brilliant with phlox and through miles of vineyard country, we drove to historic Council Bluffs, important railway and mail transfer point on the Missouri. Lewis and Clark camped on the site in 1804, and 23 years later an agent of the American Fur Company set up there a permanent trading post known as Hart's Bluff.

When the Mormons were making their



Photograph by J. Bayler Roberts

AT COUNCIL BLUFFS A MIGHTY BRIDGE BIDS WELCOME TO BUFFALO LAND

Vast herds of the animals roamed the plains in 1863 when Abraham Lincoln chose the city as the eastern terminus of the continent-crossing Union Pacific. Today 63 passenger trains of eight systems serve the division point. Fittingly, the span connecting Iowa with Omaha, Nebraska, is adorned with a 7-foot bronze bison head.

long trek to Utah in 1846, a large band of them came to Hart's Bluff and, finding the country to their liking, decided to remain for a time. They built homes, obtained from Albia permission to organize a township government, and took part in the congressional election of 1848. Soon they changed the name of the community to Miller's Hollow and later to Kaneshville.

Kaneshville was a boisterous frontier town during the California gold rush, desperadoes, gamblers, and other unsavory characters flocking there to prey on the forty-niners. Aroused citizens organized vigilance committees, and lynchings were frequent.

In 1852 Brigham Young called all his followers to Utah, and nearly 8,000 left Kaneshville. The thousand non-Mormon

settlers changed the name to Council Bluffs.

There is little nowadays in this busy city of more than 43,000 to recall its dramatic past. Surrounded by thousands of acres of vineyards, some of which reach into the corporate limits, it is, outside its business section, a peaceful farm community.

"A peaceful farm community"—those words may be applied to all of Iowa. As we rolled over the bridge from Council Bluffs to Omaha, Nebraska, bits of the State song came back to my mind:

See yonder fields of tasseled corn,
Iowa, in Iowa,
Where Plenty fills her golden horn,
Iowa, in Iowa.

Truly it is "a good land and a large, a land flowing with milk and honey."

DISCOVERING THE NEW WORLD'S OLDEST DATED WORK OF MAN

A Maya Monument Inscribed 291 B. C. is Unearthed Near a Huge Stone Head by a Geographic- Smithsonian Expedition in Mexico

BY MATTHEW W. STIRLING

LEADER OF THE NATIONAL GEOGRAPHIC SOCIETY-SMITHSONIAN INSTITUTION EXPEDITION TO VERA CRUZ

With Illustrations from Photographs by Richard H. Stewart

DOWN in the jungle of southeastern Mexico an expedition jointly sponsored by the National Geographic Society and the Smithsonian Institution has just brought to light a Maya monument bearing the earliest date yet discovered in the Western Hemisphere.

The date, corresponding to November 4, 291 B. C.,* is carved in delicate Maya symbols which were preserved from destruction by time and weather through a remarkable combination of circumstances.

Almost as significant as the date itself is the fact that this and other evidences of the culture usually considered characteristic of the Maya Indians have been unearthed well outside the supposed limits of the vanished Maya civilization.

Since the carving appears on a slab of stone too heavy to be transported far, it proves that the Maya inhabited this region in the present Mexican State of Vera Cruz. It thus extends westward by about 150 miles the previously known limit of Mayan settlements and cities (map, page 184).

A COLOSSAL HEAD GIVES CLUE

How we found the telltale monument is a long and absorbing story. It rightly begins in 1858 when a native workman, clearing a virgin patch of jungle growth in the State of Vera Cruz, encountered, embedded in the heavy black soil, what he thought to be the bottom of an enormous inverted kettle.

Excitedly he reported his discovery to the proprietor of the near-by hacienda of Hueyapa. With visions of buried treasure, the proprietor brought a crew of men to excavate the "kettle."

* This is according to the H. J. Spinden correlation. If the J. E. Thompson correlation, which carries the calendar forward 260 years, is used, the reading becomes 31 B. C.

As the digging progressed, the object was revealed to be the upper part of an enormous head skillfully carved from a great block of basalt, which had become blackened from exposure. Disappointed in the treasure search, the investigators proceeded no farther.

Nature and the process of erosion soon reburied the giant piece of sculpture, but the tradition of the Colossal Head of Hueyapa lingered on in the region and on at least two occasions subsequently attracted the attention of scientifically minded travelers in the vicinity. In spite of its spectacular nature, it never came to general public notice and was virtually forgotten.

TUXTLA STATUETTE, 2,000 YEARS OLD, PORTRAYS A FAT, JOLLY PRIEST

Forty years later, around the beginning of the present century, another native near the old town of San Andrés Tuxtla, about 15 miles from Hueyapa, was working in a tobacco field when his eye chanced to spot a piece of shining pale-green stone.

Clearing the object with his fingers, he picked up a small jadeite figurine. About eight inches in height, it represented a fat and apparently bald-headed Indian priest with wide-open eyes that seemed full of good humor. Over the lower portion of the face was a mask in the form of a duck's bill, and draped over the shoulders was a feather robe representing the folded wings of a bird. Decorating the front of the figure were some curious-looking incised characters and arranged in a column down the middle was a row of simple bars and dots (page 188).

The obscure native was likely never to know it, but he was holding in his hand what was destined to become probably the most famous archeological object found in the New World. Eventually the little duck-



Drawn by Newman Bamstead

IN THE STATE OF VERA CRUZ, MEXICO, A GEOGRAPHIC-SMITHSONIAN EXPEDITION DISCOVERS A NEW CENTER OF MAYA CULTURE

The circle marks the farthest-west area in which have been found evidences of these "Greeks of the New World." For four months in the winter and spring of 1939 the expedition conducted excavations here in the Canton of the Tuxtlas. Comalcalco, in the State of Tabasco, is the nearest known Mayan site.

billed figure found its way to the United States National Museum, where it was discovered that the column of bars and dots recorded a date in the Maya calendar corresponding to a day almost a hundred years before the time of Christ. Known as the "Tuxtla Statuette," it now constitutes one of the most interesting objects in the National Museum.

As time went on, it became the subject of much discussion. The form of the glyphs and the style of carving were archaic and quite different from the characters carved

on the dated monuments in the Maya area to the east. In addition to this, the nearest known Maya site was Comalcalco, about 150 miles away. Chichen Itzá, center of the extensive excavations carried on since 1924 by the Carnegie Institution of Washington, was 475 miles distant.*

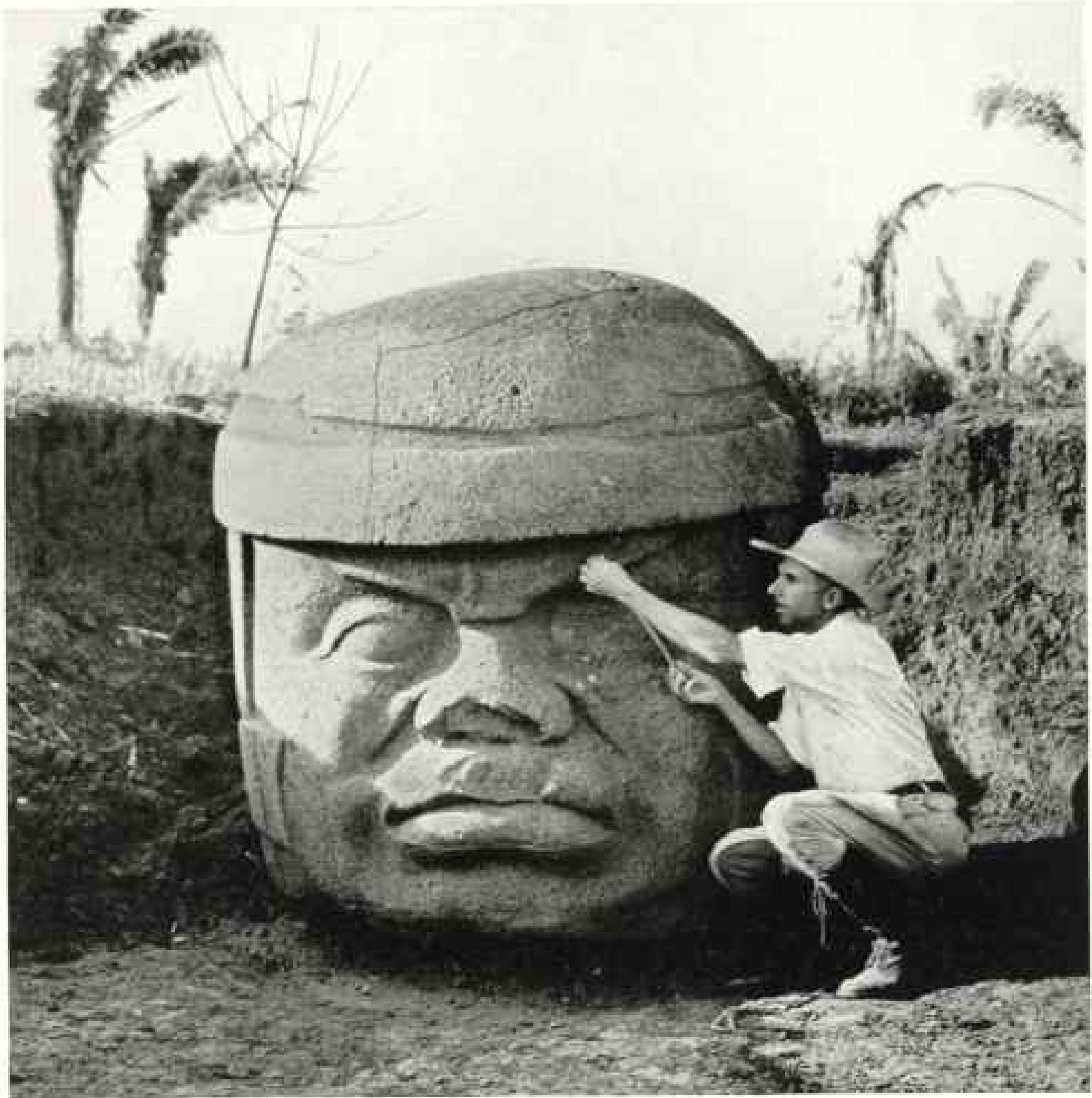
Being small, the Tuxtla Statuette could easily have been carried any distance. Thus many questions came to mind. Was the date carved at the same time the figure was made or had it been put on at a later time by a different people? Did the date represent a contemporaneous period or did it refer to some earlier event, as we might erect a monument to George Washington in 1939 and

put on it the date of 1776?

If the date was contemporary, was it placed there by the early Maya or did some other group living in this region invent the calendar and later pass it on to the Maya?

Northwest of this area, around the Pánuco River, live the Huastec Indians, who

* See "Unearthing America's Ancient History" and "Yucatán, Home of the Gifted Maya," both by Sylvanus Griswold Morley, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1931, and November, 1936, respectively.



FIRST PRIZE FOR THE EXPEDITION'S SHOVELS WAS THIS PREHISTORIC "DOUGHBOY"

The Colossal Head, being measured by Matthew W. Stirling, leader of the National Geographic Society-Smithsonian Institution Expedition, is about 6 feet high and 18 feet in circumference. Carved from a single massive block of basalt, it is remarkable for its lifelike appearance entirely different from any other known American Indian sculpture (pages 183, 187, and 307). Its partly exposed "helmet" led the expedition to the Tres Zapotes area.

speaking a language closely related to Maya but whose culture otherwise is quite different. Did the ancestors of both the Maya and the Huastec formerly live in southern Vera Cruz?

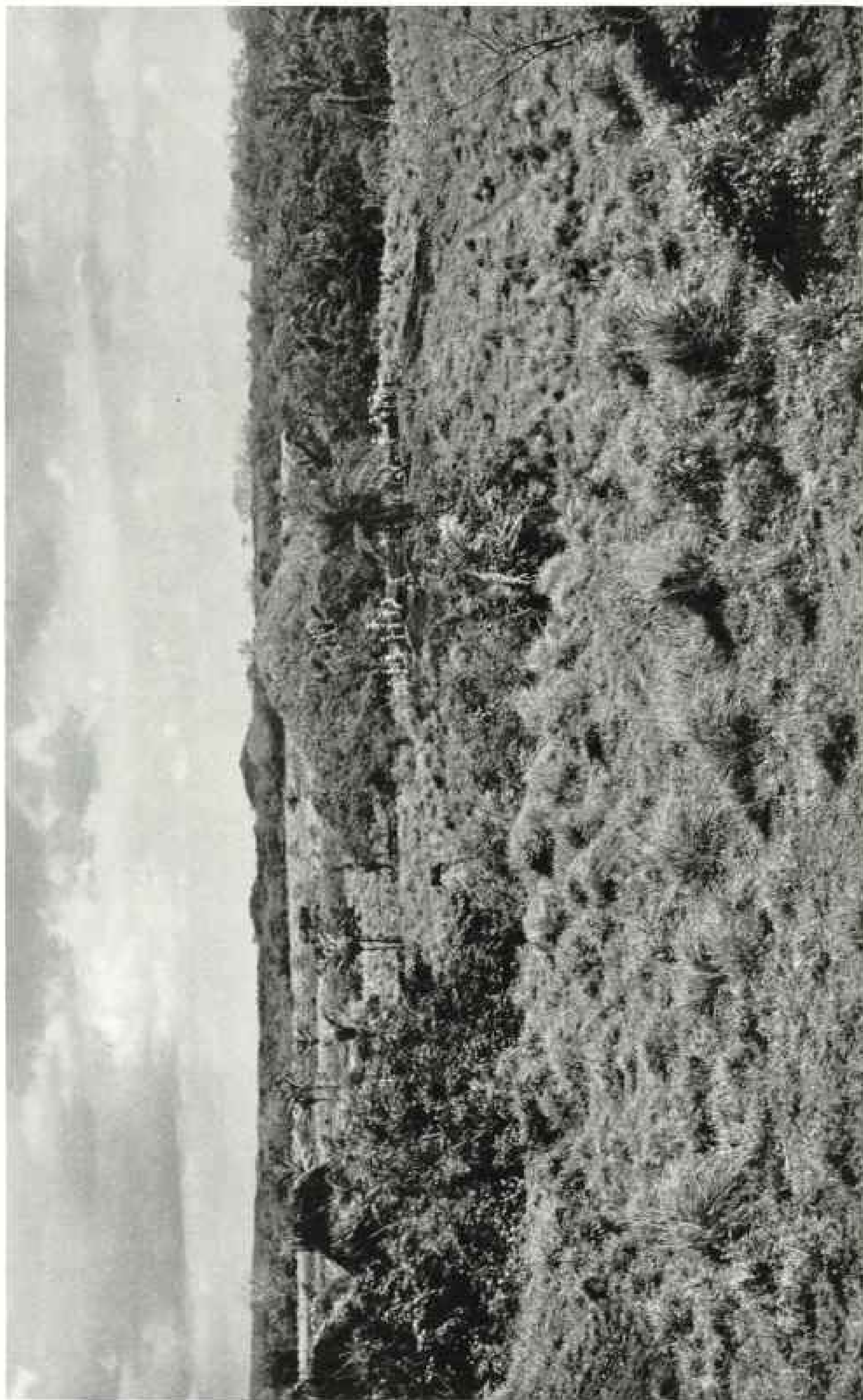
GIANT HEAD BURIED TO ITS BROW

In the hope of discovering some new information that might assist in answering these questions, I took the opportunity, when in Vera Cruz early in 1938, to visit the Colossal Head. After an eight-hour horseback ride from Tlacotalpan to Hueyapa, I learned that the head was located

not at Hueyapa but within a mile of the village of Tres Zapotes.

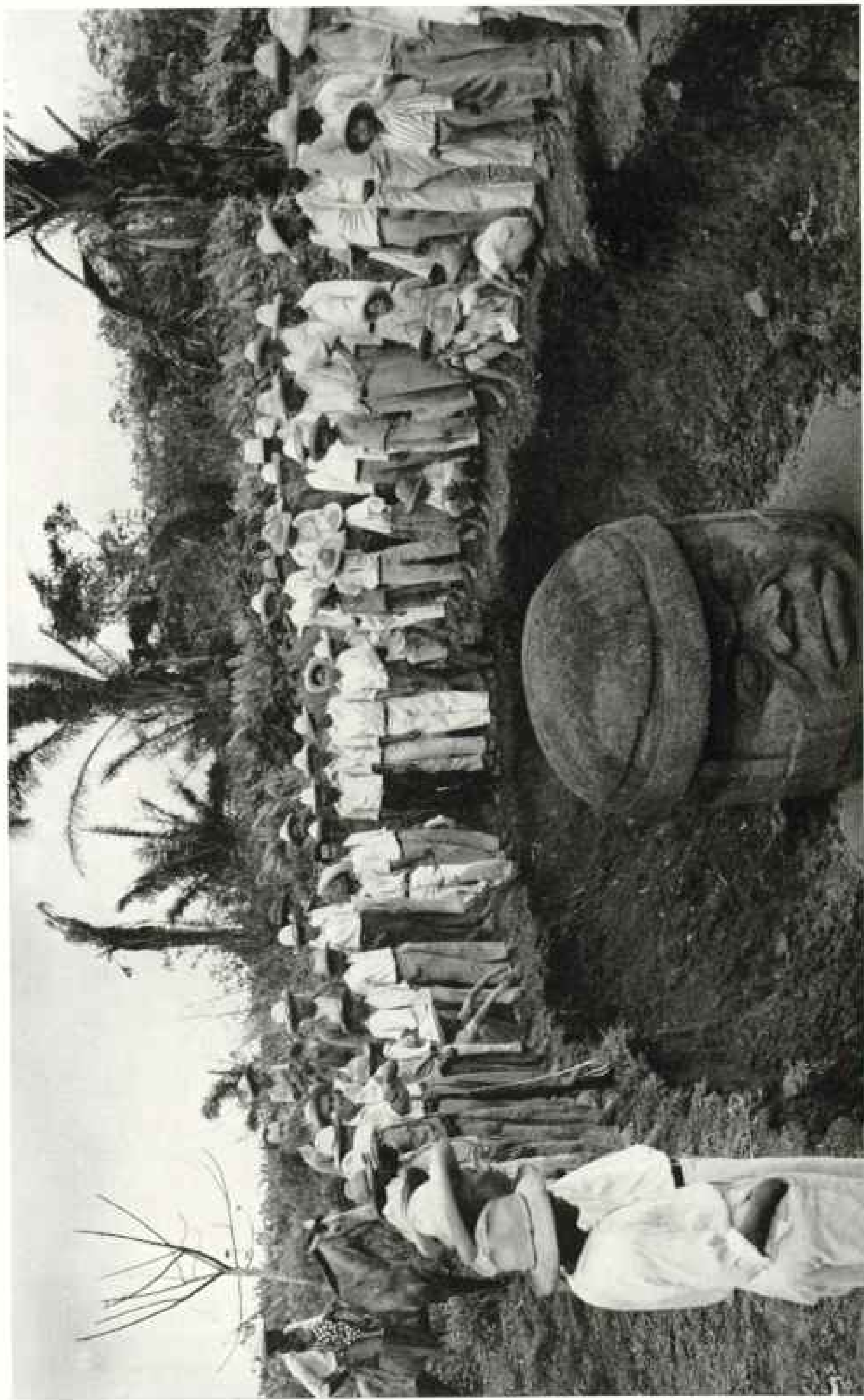
Buried to its forehead, I found the object of my quest standing in a plaza formed by four mounds. I cleared away the earth from the face and took photographs.

Investigating the neighborhood further, I found that somewhat to the east of this plaza was another group of very large mounds, one of which was almost 450 feet in length. Beyond these, on an elevated piece of land, was a third group, the central feature of which was another plaza surrounded by four large mounds.



WHEN ROME WAS IN ITS HEYDAY, SOME TWO THOUSAND YEARS AGO, A CITY OF THATCHED HOMES AND TEMPLES FLOURISHED HERE

Workmen, in the center, are excavating a low mound which was originally a platform for a temple or ceremonial house. The larger hills mark the city's civic center. Jungle growth has long hidden the earth platforms, religious statues, and monuments. Between the temples extended spacious plazas where the people congregated for ceremonies. Because of the lack of stone in the vicinity, no masonry structures are found at Tres Zapotes.



THE COLOSSAL HEAD DREW CROWDS OF NATIVE SIGHTSEERS EVERY SUNDAY

The rounded top of the figure and part of the circular groove had protruded from the soil for many years; but no one had taken the trouble to investigate the real character of the monument. When the earth was removed it was found that the head terminates at the neck, resting on a foundation of unworked stones. The sculpture was located in a depression impossible to drain. Although the expedition operated in the dry season, unscheduled rains often occurred. The pit was bailed three times in a week and to empty it each time was a two-day job (pages 183, 185).



Photograph by Willard R. Colver

THIS CHEERFUL DUCK-BILLED GODLET BORE THE OLDEST AMERICAN DATE BEFORE THE NATIONAL GEOGRAPHIC EXPEDITION

The Tuxtla Statuette, plowed up in a field near San Andrés Tuxtla, Vera Cruz State, in 1902, only 15 miles from the dated stela (page 185), is a prized possession of the National Museum in Washington. Maya bar and dot characters on the figure's stomach indicate the date 98 B. C.

Upon my return to Washington, some of the staff members of the National Geographic Society saw the photographs of the Colossal Head and realized the potential importance of the site. Accordingly, an expedition was organized as a co-operative endeavor of the National Geographic Society and the Smithsonian Institution. Permission for the work was readily granted by the Department of Prehispanic Monuments of the Mexican Government's Department of Public Education, which generously gave us every assistance.

Thus we finally found ourselves at the little port of Alvarado on our way to the Canton of the Tuxtlas, where we were to conduct our investigations (map, page 184).

UPSTREAM IN ALVARADO'S WAKE

As we left Alvarado in our venerable river launch to ascend the Papaloapan River, we could not help but think of that day, some 420 years before, when the dashing Pedro de Alvarado sailed through the narrow entrance to the bay which now bears his name, to make exactly the same trip we were about to undertake.

Bernal Diaz del Castillo, chronicler of the Grijalva expedition, forerunner of the famous voyage of conquest of Cortez, left this brief statement concerning the discovery of the Papaloapan River:

“As we followed along the coast, the Captain, Pedro de Alvarado, went ahead with his ship and entered a river which the Indians call Papaloapan, and which we then called the Rio de Alvarado, because Alvarado was the first to enter it. There some Indian fishermen, natives of a town called Tlacotalpa, gave him some fish.

“We waited at the mouth of the river with the other three ships until Alvarado came out, and the General was very angry with

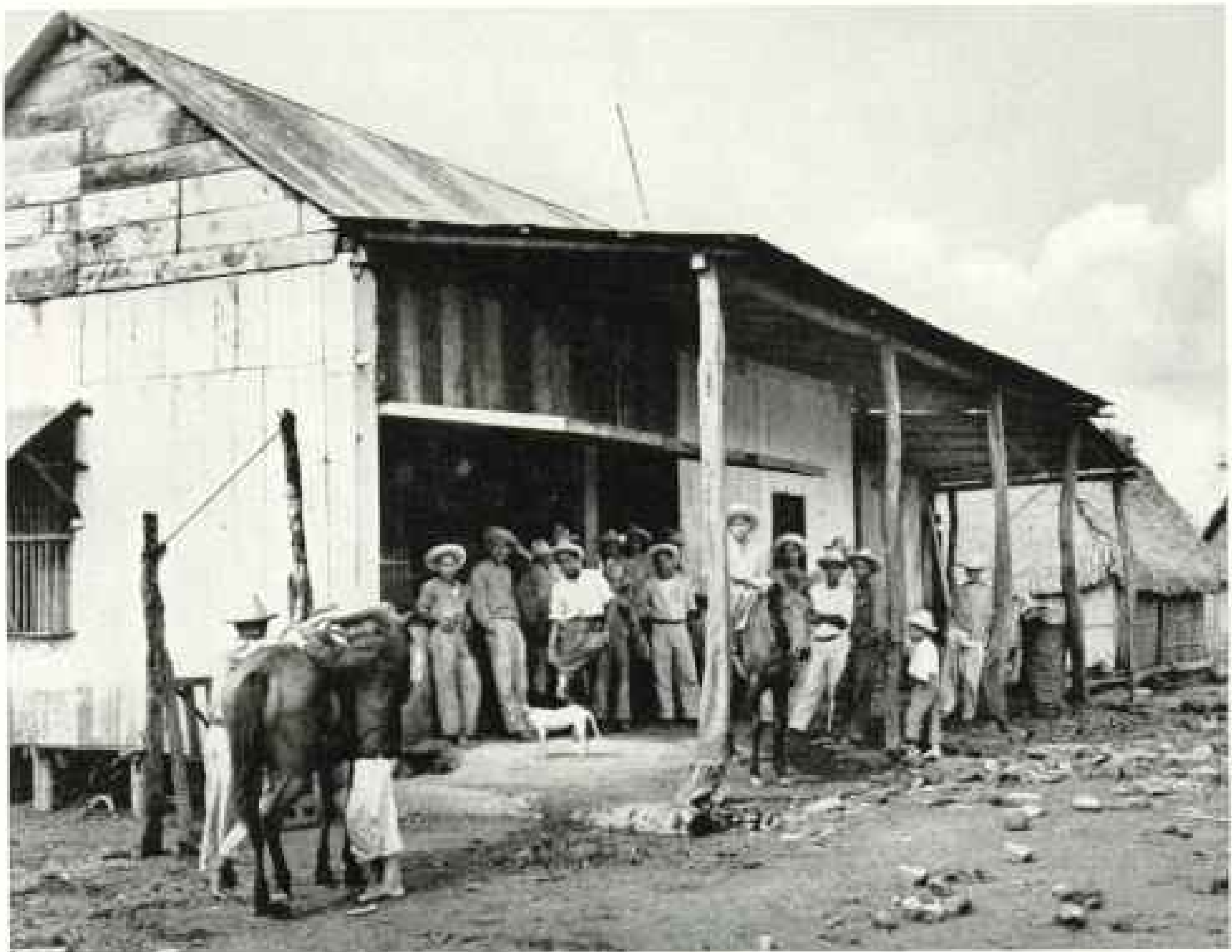
“We waited at the mouth of the river with the other three ships until Alvarado came out, and the General was very angry with



Photograph by Alexander Wetmore

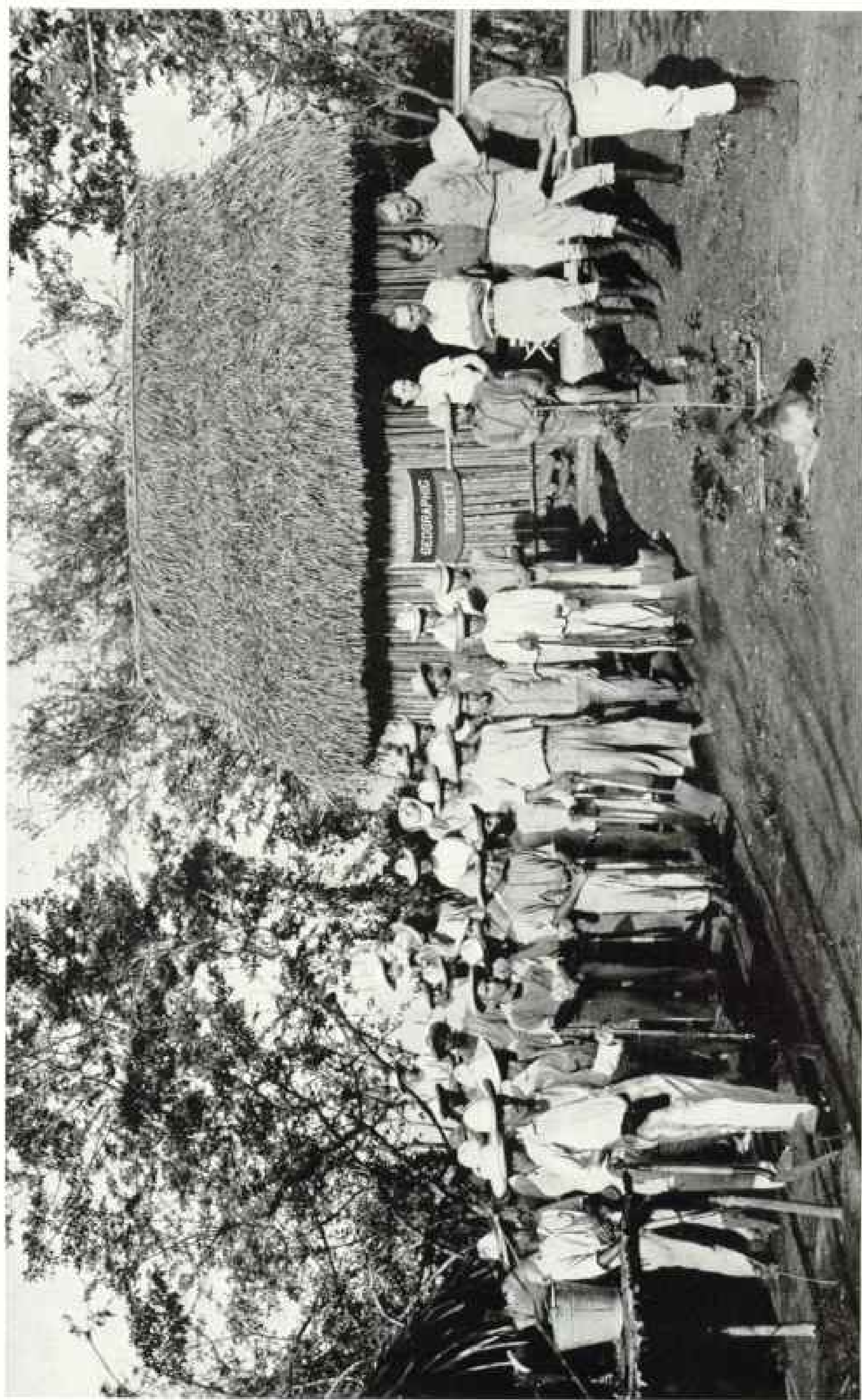
RAILS END AT ALVARADO

This little town lying on a sand spit near the city of Veracruz bears the name of Pedro de Alvarado, who first explored the region in 1518. The expedition journeyed from here by waterways and trails to Tres Zapótes.



"CURB SERVICE" IN TRES ZAPOTES

Customers on horseback may ride onto the dirt-floored porch to make their purchases. In this "department" store the natives buy almost any commodity from clothing, harness, and canned soup to liquors and cigars. It serves as the village social center because of its radio.



THEIR PICKS AND SHOVELS ARE BRINGING TO LIGHT NEW CHAPTERS IN AMERICA'S PRE-HISTORY

This is one of the three shifts of local workers who dug among the Tres Zapotes mounds. Each crew of 30 men worked three days consecutively. Standing to the right of The Society's flag are Mrs. Matthew W. Stirling, Mr. Stirling, Mrs. C. W. Weiant, Dr. Alexander Wetmore, and Dr. Weiant. The laborers have assembled for roll call. Men carrying rifles are part of the local police force.



AN ANCIENT OWL PEERS WIDE-EYED AT THE 20TH CENTURY

Carved by some skillful craftsman centuries ago, it probably adorned a temple. The owl was a favorite subject for artists of the Maya and neighboring tribes.



NATURE FURNISHES THE UMBRELLAS IN TREES ZAPOTECAS

Natives often protect themselves from the rain by holding overhead gigantic leaves of the elephant's ear, which grows abundantly in the swampy jungles.



VAQUERO SINCE BABYHOOD

This handsome young rider is the son of one of the leading citizens of Tria Zapotes, where the excavations were conducted. Small boys whose parents own horses ride as soon as they can walk.

him for going up the river without his permission, and ordered him never to go ahead of the other ships again, lest an accident should happen when we could not give him help."

At the time of the conquest, this remote section of Mexico had already come under the domination of the great Aztec ruler, Montezuma, and fresh fish were carried in relays over the rugged mountain barriers to the Valley of Mexico by a chain of swift runners, in order that the table of the Emperor might be supplied with seafood.

Today an ice plant operates in Tlacotalpan and now, almost half a millennium

later, fresh fish from the "River of Butterflies" are still carried, by more modern methods of transportation, across the same mountains to the Valley of Mexico, where, as in the days of Montezuma, the city dwellers and the travelers may enjoy this luxury; for fishing is still the leading industry of the picturesque town of Tlacotalpan.

HAZY PEAKS MARK GOAL

The red-tiled roofs of Alvarado receded behind us as our launch crossed the shallow bay and entered the river. As we chugged between mangrove-covered banks, close on our left hand rose the great sand hills which lie behind the sea-coast. Across the vast level plain to the west loomed the pale-blue range of the sierras and, towering over all, hung ghostlike the snow-covered cone of Orizaba (Citlaltepetl), principal landmark for Cortez.

Our hearts beat a little faster when first we distinguished to the eastward the hazy volcanic peaks of the Tuxtla mountains, at the base of which lay our goal.

What were we destined to encounter there? One thing was certain—the Colossal Head! Would we find it reposing in lonely grandeur, or would we discover the remains of a great city, worthy of such an ambitious work of art?

What would be revealed by the complete excavation of the head? Was it attached to a body? If so, what would be its position—crouching, seated, or standing?

Before we had much time to discuss such

questions, the white walls and red-tiled roofs of Tlacotalpan appeared ahead and we were soon busy transferring our baggage to the pretty little Hotel Cuauhtemoc.

Our launch next morning left the main river and entered a maze of winding channels often choked with masses of water hyacinths. They looked like millions of orchids in pale purple bloom.

NEWS BY "UNDERGROUND TELEGRAPH"

As we progressed, the mountains loomed closer, the banks of the streams became higher, and the scenery more picturesque. At times our launch passed through channels so narrow that we could touch either bank with our hands.

At infrequent intervals we passed a solitary ranch house with its accompanying cattle corrals, and now and then mounted vaqueros rode to the bank of the stream to watch us pass and to exchange news with the crew of the launch. We were later to learn that this sort of thing was part of a highly efficient and purely voluntary "underground telegraph" which spread news with amazing rapidity.

When other members of our party came from Tlacotalpan by launch, we always learned of it in a most casual way from our workmen, who also reported whether the

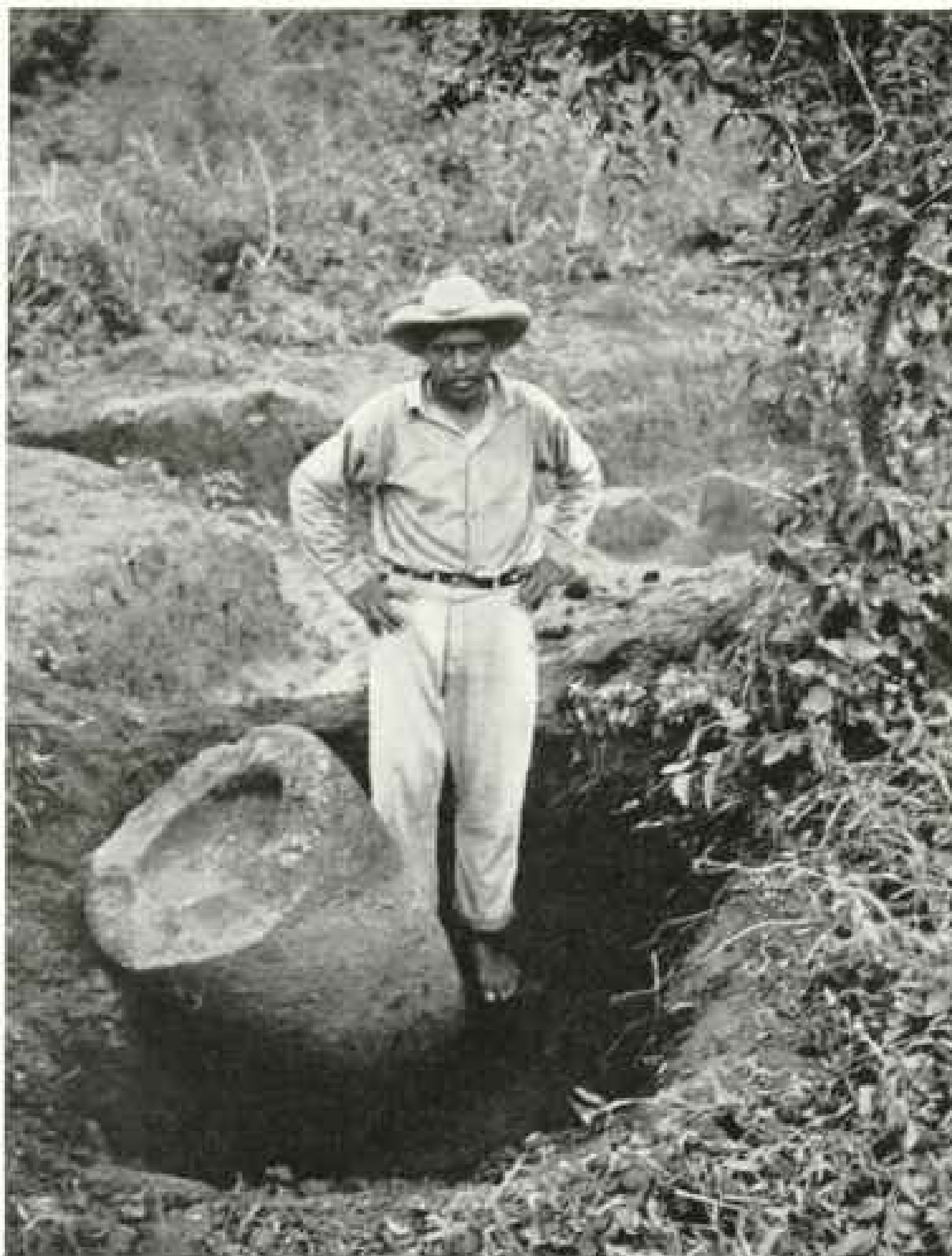


HE WILL PART WITH HIS PET FOR A PRICE

When it became known that Dr. Alexander Wetmore was making a collection of bird skins for scientific purposes, children began bringing in specimens which they had killed, even their pets. Since Dr. Wetmore wished to discourage indiscriminate destruction of birds, he purchased none from the natives.

visitor was sick or well, what he was bringing with him of interest, and the approximate time he should arrive. In a manner that always seemed to us little short of miraculous, we invariably received such details a few hours before the newcomer appeared, usually to the great astonishment of the visitor, who found all preparations made for his arrival.

Occasionally our progress would be stopped as our propeller became fouled with the water hyacinths. At such times an amiable and well-nigh amphibious member of our crew of three would jump overboard



Photograph by Matthew W. Stirling

A TELLTALE DEPRESSION MARKS THE STONE FOR HUMAN SACRIFICE

The block was dug up near the carved stone box, visible in the background. On this stone the hearts of the human victims were torn out. Blood collected in the shallow basin was transferred to the storage box as an offering to the gods (opposite and page 196).

and, remaining under water a surprising length of time, would clear away the offending vegetation.

As we approached the higher land toward the foot of the mountains, the vegetation became more dense and more tropical in appearance. Groups of parrots flew noisily over head and now and then we spotted a big iguana, looking like some prehistoric monster, sunning itself on the vine-covered jungle wall bordering the stream.

Birds were so numerous and so varied that we felt confident Dr. Alexander Wet-

more would find this an unusually rich field for collecting when he joined us later in the season (193).

Just before dark we entered the San Augustin River and shortly after found ourselves at Boca San Miguel. "La Boca," as it is called locally, consists of three small palm-thatched houses built in a clearing. Here under the direction of Ricardo Gutiérrez, the storekeeper of Tres Zapotes, mules were rounded up for us while we occupied ourselves in eating a meal of rice, beans, and cold tamales.

By the time our packs were on the mules and we ourselves were mounted, the sun had set and the quick darkness of the Tropics had descended on us. In spite of this, Ricardo started out with us up the trail, which

we could not see at all; so we merely hunched down as low as possible in our saddles and put our complete faith in the mules. After riding for an hour and a half, we reached Tres Zapotes and then our camp.

ONCE HOME OF A NUMEROUS PEOPLE

Along the high ground at the base of the Tuxtla mountains and on the level plains below, there lived and prospered centuries ago a numerous and industrious people. The bulwark of the mountains



Photograph by Matthew W. Stirling

THE FINEST ART OBJECT FOUND BY THE EXPEDITION

The receptacle was probably used for holding the sacrificial blood (opposite and page 196). It is one of the most intricate and beautiful examples of stone carving ever uncovered in Mexico.



IN THESE CARVINGS GODS OR HEROES ENGAGE IN COSMIC COMBAT

Here is shown the remaining portion of one side of the decorated stone box. Each of the four sides had been completely covered with elaborate markings. The designs are highly symbolic; their exact significance is unknown.



A THICK-WALLED STONE BOX EMERGES FROM THE EARTH

Because of the beauty of its carvings, extreme care was taken in the excavation. The container was evidently broken in ancient times, as no fragments were found in its vicinity (pages 194 and 195).



Photograph by Matthew W. Stirling

THE BATH HOUR FOR CLAY BABIES

Mrs. Stirling and Mrs. Weiant are washing specimens in an all-purpose basin brought from Mexico City. In the foreground are empty gasoline tins, water "jugs" on frontiers the world round.

sheltered them from Gulf-born hurricanes: the fertile alluvial soil, lying in the tropical rain belt, supplied them with abundant food. The dry season here extends from December to June, during which time they planted and harvested their crops.

Detached from regular lanes of travel, this hinterland today constitutes a sort of backwash which makes it one of the most isolated sections of Mexico. On the lower San Juan and along the Papaloapan near Tlacotalpan, sugar cane is grown in the deep, rich soil, but the Canton of the Tuxtlas has long been famous for its excellent tobacco.

The Conquistadores were not long in learning of the productivity of this region and in the middle

of the 16th century, when the choice land grants were being distributed, this area was given to a nephew of Cortez. It was discovered that when the jungle was cleared the resulting grassland furnished excellent grazing for stock and, until the revolution in the time of President Carranza, the area between the San Juan River and the Arroyo Hueyapa constituted an immense cattle range.

Today, two small abandoned adobe houses with tiled roofs, strangely out of place among the palm-thatched huts of Hueyapa, are all that remain to bear witness to



STELA D MAY RECORD A WEDDING OF LONG AGO

Three figures are carved in low relief in the yawning mouth of a grotesque animal which probably represents the Earth Monster. The style of carving is quite suggestive of Mayan art. The meaning of this scene is not known, but it may represent a wedding ceremony, as the central figure appears to be a woman. The monument is shown where it was found (page 198).

those romantic hacienda days. Now the former grazing lands are blanketed with trees.

The wide region which once supported immense herds of cattle is again the haunt of the deer and the jaguar. Near the villages of Hueyapa and Tres Zapotes are miles of guava trees. Along the arroyo enormous sapotes and mangoes furnish abundant fruit in the summer.

Thus a great cycle has been completed. The ancient inhabitants wrested the land from the virgin jungle, the Spaniard maintained it as a cattle range, and now the jungle has again taken possession.



TWENTY MAN POWER WAS NEEDED TO RAISE STELA D

It was found in a marshy jungle, in the midst of a small group of mounds, four miles from camp. The heavy stone presented a problem in mechanics as it lay in deep adobe mud (page 197).

But the reputation of the fertile lands around Tres Zapotes has spread in the State of Vera Cruz and now the ax of the *milpero*, or pioneer farmer, is again being heard in the forests. More and more new land is being converted into maize fields as the village of Tres Zapotes grows and prospers, for the *milperos* are working for themselves instead of for the hacienda, and their own industry is all that is necessary to keep them from want.

The village itself constitutes an interesting social study. The Mexican Government allots to each town an area called an *ejido*, or communal tract of land. Upon application to the local village head, each resident may obtain a number of acres for cultivation.

NATIVES USE ANCIENT MAYA METHODS

Along the Arroyo Hueyapa, the *milpa* (clearing) system of agriculture is practiced today as it was 2,000 years ago. In the little clearings around the mounds are found growing maize, beans, and squash,

the same plants that were raised by the ancient inhabitants. Two crops are grown each year, the exact date for planting and harvesting being designated by calendar today just as it was centuries ago by the early Maya, who used their own system of dating for that purpose (page 207).

With the good earth furnishing ample nourishment, the present Tres Zapotecan is a fine type of rural Mexican. Healthy, independent, industrious, and honest, he is by temperament cheerful and fun-loving. We found the natives to be, almost without exception, intelligent and skillful workers, easy to train in the careful techniques essential to proper archeological excavation.

We planned to use a crew of 30 men. As there were about 100 able-bodied men in the village and we wished to give all an equal chance to work, we decided to operate with three crews of 30 men, each crew working in rotation three consecutive days. The town council appointed a representative to name each list and keep it up to quota. The men quickly became interested,



A LOG, POTENTIAL PUPILS, BUT NO TEACHER

There was no school in the neighborhood of Tres Zapotes last winter, but special taxes were being collected and plans made to build one. The doll clutched by the smaller girl is a homemade rag affair. Playthings are few among the native children. Small boys are content with slingshots made of forked sticks, rubber bands, and pieces of leather.

Dr. C. W. Weiant had been assigned the task of setting up the camp which was to serve as our headquarters and laboratory. The main structures were built in accordance with local architectural procedure, each consisting of a rectangular framework of logs with a palm-thatch roof and walls made from the midribs of palm leaves.

CONCRETE FLOORS A LUXURY

Locally, the earth serves as a floor, but we added a note of luxury by constructing concrete floors, which considerably facilitated the problem of housecleaning.

Our main house consisted of two large rooms, one of which served as a "guest" room, the other as storeroom and laboratory. Back of this were the two family houses occupied by Dr. and Mrs. Weiant and by Mrs. Stirling and me. Each family house contained two cots with mosquito nets, a washstand, a table to serve as a desk, and a mothproof clothes closet. Our

suitcases, laid broadside on boxes, furnished additional storage space.

We made arrangements in the village for the hire of two young women, Maria to serve as cook and Valvina as maid of all work. Our kitchen range consisted of a large square box filled with hard-packed adobe. On this were placed two iron hoops fitted with tripod supports. Under these, our girls made wood fires and cooked our meals in locally made earthenware vessels.

From the village we obtained beans and rice, fresh beef or pork when available, and chicken consisting principally of feathers and bone. Eggs were usually procurable, as were seasoning materials (page 210).

On the whole the girls appeared proud of us as their employers, although they did not always approve of some of our peculiar customs. The dining table, placed under the palm-thatched porch of the main house, was covered with oilcloth, which was more or less impervious to the weather and



A HUMAN FIGURE IN STONE LIES HALF DROWNED AFTER A TROPICAL STORM

This was Stela A, the largest uncovered at Tres Zapotes (page 209). The huge stone, 17 feet long, 7 feet wide, and 20 inches thick, fell in ancient times and broke into two pieces. The carving in relief (here inverted) represents a human deity standing in the open mouth of a manlike monster. Lobo, the expedition dog, is an interested spectator as the workmen bail out the excavation. Because this stone was too heavy to turn, it was necessary to run tunnels beneath it in order to examine the back. Traces of elaborate carving can still be detected in the flat areas on either side of the standing figure, but because the stela fell face upward they have been so badly weathered that their exact nature cannot be deciphered.

easily cleaned. Maria and Valvina felt that people in our position should use a tablecloth and tactfully suggested this on numerous occasions!

Casual passers-by, also noting this lack, occasionally returned with various hand-embroidered specimens which they offered for sale, and, upon being turned down, inquired: "Don't you use tablecloths in your land?"

ON INTIMATE TERMS WITH INSECTS

While the thatch on our houses was new, we were confronted by a number of problems of an entomological nature. Large armies of ants were continually deciding that when they found our house in their way it was simpler to go right on through than to deviate from their course. Fat worms dropped like manna from the green roof—usually down our necks when we sat at the desk, or on top of the mosquito nets where they collected in quantities and sometimes even succeeded in working their way between the sheets.

Now and then a big hairy tarantula would make a social call and one evening when Mrs. Stirling was washing her face she felt something rough—a big black scorpion had taken refuge in her washcloth!

After the wettest part of the rainy season had subsided and the palm leaves forming the roof had become dry, these visitations became much less frequent.

"LITTLE BROTHERS UNDER THE SKIN"

The principal pests of Tres Zapotes, however, were the ticks. These were of three sizes, called respectively *conchutas*, *garapatas*, and *pinolillos*. The *conchutas* are about a quarter of an inch in length and the *pinolillos* so small as to be barely noticeable to the eye.

These *pinolillos*, "little brothers under the skin," as Weiant called them, cluster in balls about a half inch in diameter, which gather ingeniously on the ends of twigs or grass stems projecting over a path. From this advantageous position they instantly detach themselves in a veritable cloud and pepper the clothing or bodies of any person or animal passing by.

Once such a swarm gets aboard one's trouser leg, if not noticed at once and beaten off, they speedily apportion one's body; each having laid claim to a certain section, they proceed to burrow in and bury themselves beneath the skin, where they

gorge with blood and remain for days to grow. Each locality thus possessed on the skin soon sets up an itch out of all proportion to the size of the burrow.

The faculty of these pests for filtering through and under tight-laced boots and riding breeches is unbelievable. We tried various applications ranging from liquid aguardiente to powdered sulphur in the vain hope that they might have a discouraging effect. The *pinolillos*, however, seemed to feel that these garnishings merely gave added flavor to the skin and went about their labors with customary zest.

The only way, we discovered, to avoid their evil effects was to go over our bodies carefully from stem to stern each evening, close to the bright light of a gasoline lantern, to locate and pick them off patiently, one by one. If they were allowed to remain over night, it would be too late, as by morning they had had time to burrow under.

MEN PRIZE SHOES FOR DANCING

The social life of Tres Zapotes reached a climax each week end with dances which were held on Saturday and Sunday nights. The favorite dance typical of southern Vera Cruz is the *huapango*, the music for which is furnished by two instruments, a stringed one called a *jarana* and a homemade guitar. It is danced by two women or by a man and a woman.

The men are allowed considerably more freedom of movement in the dance than the women, who stand with the hands on the hips or holding the skirt while the lively rhythm of the dance is stamped with the heels; all the movement is from the waist down.

The ambition of every Tres Zapotes man is to save enough money to buy a pair of shoes in order that he can stamp more vigorously at the *huapango*. The male on-lookers participate in the music by singing in a high falsetto as the dance continues. Each *huapango* tune has an unlimited number of verses and new ones appropriate to the occasion are continually improvised by the singers.

Order is maintained at the dance by the local police force, who patrol the dance floor with their ancient rifles slung on their backs. Any disorder or incipient fight is quickly and tactfully suppressed by these efficient guardians of the law, who are elected by popular vote and receive no pay



Photograph by Matthew W. Stirling.

A CROSS SECTION THROUGH AMERICAN PRE-HISTORY

This exploratory trench through Mound B of the Ranchita group of mounds illustrates the method of determining the construction of these earthen structures: Successive additions to the mound are disclosed. Pottery and other specimens from the different levels are carefully segregated in order to determine what cultural changes took place.

except the privilege of carrying a rifle.

On week ends when the south wind was blowing, as we lay in our cots at camp we could hear the music and the stamping of the dance continuing until dawn. From our point of view the only drawback to these social affairs was the return of visiting delegations, who, stimulated by more than the music, frequently passed the trail by our camp, shouting and firing their guns in the air from overabundance of spirits.

Our workmen, most of whom took part in these dances both Saturday and Sunday nights, nevertheless always appeared on time on Monday morning evidently none the worse for 48 hours of continuous activity.

For the sake of variety and out of sheer sociability, music for these dances was provided by various orchestras recruited from neighboring villages. These visiting orchestras, on passing our camp, would always stop to serenade us, a friendly custom that did much to relieve the routine of camp life (page 205).

Next to the huapango, the greatest source of entertainment on week ends was a visit

to the camp to watch us eat. Groups came before breakfast and stayed through dinner, men, women, and children. We never quite decided the cause for the attraction—our strange table manners, such as eating rice and beans with a fork instead of a knife; the astonishing sight of two women sitting at the table and eating with men; or the unbelievable quantity of food which we consumed.

POEMS OF A BUTCHER-BARD

Very few of the local natives had had the opportunity to learn to read and write. One exception was the village hog butcher, who combined with his profession a knack for poetry.

Whenever some significant event took place in our camp, such as the arrival or the departure of a member of the expedition, or the unearthing of a new monument, Damaso would appear at camp bearing a lengthy poem which he had composed to celebrate the occasion.

These poems are known as *corridos* and are intended to be sung in much the same fashion as the ballads of old England.



WHAT OTHER SECRETS OF AMERICA'S YOUTH MAY LIE BURIED BENEATH THIS MOUND?

Here was uncovered Stela C, which bears the earliest date yet found recorded in the Western Hemisphere (page 212). Since the dated fragment of stone is obviously broken from a large stela, other fragments may come to light when the mound is further investigated.

Damaso was the father of Valvina and he took this as the only means at his disposal for expressing his appreciation of our giving his daughter the opportunity to earn some money.

HONEY FROM STINGLESS BEES

All of our workmen likewise felt grateful for the money that we brought to the community and we were frequently recipients of such presents as they were able to provide, sometimes corn or squash, a grass for making tea, a few eggs, homemade cheese, or a bottle of honey from the stingless bees.

The local house builder who supervised the construction of our camp maintained an apiary of these interesting insects. The stingless bee is a native chiefly of Middle and South America. Both the wax and the honey were greatly prized by the ancient inhabitants of the region and ranked among the principal trade articles of the Maya. The honey is somewhat thinner than that to which we are accustomed, but it has a delicate and delicious flavor.

It is the custom among the women of Tres Zapotes to wear flowers in the hair.

Each morning when Maria and Valvina arrived in camp to begin their duties for the day, they brought flowers for Mrs. Weiant and Mrs. Stirling, who were thus literally compelled to adopt this decorative habit. This type of thoughtfulness was typical of most of the village.

One of our workmen thought that in view of the isolation of our camp we should have a watchdog, and, suiting the action to the word, he brought us one morning the best of a litter. In this manner Lobo became a member of our expedition.

Lobo soon won his way into the affections of all of us with his puppy loyalty, even though his own vigorous demonstrations of affection frequently smeared freshly laundered trousers with mud. His frequent excursions into the brush made him a wonderful collector of ticks and pinolillos, which he distributed lavishly around the household.

"LOBO" BRAVE EXCEPT IN EMERGENCY

It must be confessed that Lobo's intelligence left something to be desired, but his goodwill and affection were entirely beyond doubt. His courage too was somewhat



EARLY AMERICAN DOGS WORE COLLARS—BUT NO LICENSE TAGS!

The figurine may have represented the favorite pet of some ancient Tres Zapotecan buried in the Ranchita site. Several distinct types of dogs were represented in the clay models uncovered, but this is the only one in which a dog collar is represented.



WHAT WERE THESE "YOKES" USED FOR? AS COLLARS FOR SACRIFICIAL VICTIMS?

No one knows the real purpose of the beautiful objects carved from hard, fine-grained stone and highly polished. The one on the left is a conventionalized frog, while that on the right probably represents the mouth of a jaguar. They are called "yokes" because it was once believed they were placed around the necks of persons about to be offered to the gods.



A LOCAL BAND SERENADES THE AMERICANOS ON SUNDAY

Even the tiniest village has its orchestra. In addition to such store-bought instruments as concertinas and cornets, the players beat homemade drums and traps fashioned from gourds and turtle shells, one of which appears in the right foreground (page 202).

open to question. He took his duties as camp guardian very seriously and was extremely bold when it came to barking at the heels of passing women and children, but he managed to acquire a studied interest in birds and insects when strange men invaded the camp.

His principal amusement during the day was in bedeviling the cows that grazed near the diggings. Lobo often seemed amazed at his own temerity in chasing these huge crossbred zebu cattle, but he promptly turned tail whenever one stopped to face him.

In spite of all this, it was not easy to leave Lobo behind when our field work came to an end.

To avoid the necessity of keeping considerable sums of money in camp, we arranged with the local storekeeper to pay off our crew and we furnished the workers with typed pay slips which were made out

daily as the pay roll changed. Each morning it was Weiant's task to call the roll and each evening to distribute the pay slips.

All of my correspondence I dictated to Mrs. Stirling on the typewriter. The operation of the typewriter, particularly in the early part of the expedition, created considerable interest on the part of the natives, who gathered around the doorway to watch this entertaining operation.

I felt that the local citizenry must be pretty well impressed by my importance in thus having all such tasks done by others. One day, however, Valvina in a confidential mood turned to Mrs. Stirling.

"How unfortunate," said she, "that your husband never learned to read or write!"

LARGE CITY ONCE FLOURISHED HERE

The first week in camp was filled with interest. We began immediately the work of excavating the Colossal Head, which lay



Photograph by Alexander Wetmore

ERODED TRAILS SERVE AS HIGHWAYS

An occasional bullock cart is driven over this road near Tres Zapotes, but for the most part it is traversed by natives on foot or riding mules or steers. Along such trails natives drive pigs to market, or carry chickens or bundles of wood for fuel. When a man and his wife travel together, the wife usually walks and carries the burdens, while the husband rides.

not more than 100 yards from our camp. At the same time we started a trench through the mound immediately back of our house.

A portion of each day was devoted to exploration work, and it was not long before we realized that the site we had selected marked the former location of a great aboriginal city. More than fifty mounds were found in an archeological zone which stretched along the Arroyo Hueyapa for more than two miles.

Some sections of this area were exposed as the result of recently cleared *milpas* (clearings for planting); other sections

were densely blanketed with tall tough grass, marking the location of abandoned cornfields. Still other mounds were cloaked with jungle. Because of this fact, even the examination of the surface of the zone presented a difficult task.

At first, through information from the *milperos*, we were led to a new monument almost every day until nine in all were located.

Many were the stories we heard about the Colossal Head. We were told that years before, treasure hunters had found much gold around it. The breast of the figure had been exposed and two alligators



Photograph by Matthew W. Stirling

JUNGLE ALTERNATES WITH OPEN AREAS NEAR TRES ZAPOTES

All the materials for house building—timbers, palm, and vines for ties which take the place of nails—come from such dense growths. Farmers of Tres Zapotes follow the ancient Mayan methods of agriculture. First they cut and burn the tangled growth; then they plant corn, squash, and beans in holes dug with a pointed stick. Since they seldom plow the land, grasses and bushes soon grow up, crowding the vegetables. When this occurs, the garden plots, or *milpas*, are abandoned and new areas cleared (page 198).

were reported carved upon it. In addition, we learned that it was impossible to photograph the head, because it always turned around on the film and only the back would show!

Although we were rather skeptical of some of these details, nevertheless our interest was intense as we slowly cleared the great object of the heavy clay in which it was interred.

With a crew of twenty men the work of exposing the monument did not take long. On the second day our queries were answered. Carved from a single massive

block of basalt, the head was a head only, and it rested on a prepared foundation of unworked slabs of stone. At the level of the foundation was a hard-packed clay floor, demonstrating that despite its enormous weight the head had not sunk into the earth but had been buried by erosional processes (pages 185, 187).

TEN-TON HEAD INSPIRES AWE

Cleared of the surrounding earth, it presented an awe-inspiring spectacle. Despite its great size the workmanship is delicate and sure, the proportions perfect. Unique



SUGAR CANE IS CANDY TO TRES ZAPOTES FOLK

They chew it raw, make molasses from it, and distill the juice to *aguardiente*, Mexican "moonshine."



THIS CLAY MASK REPRESENTS THE DOUR FEATURES OF SOME DEPARTED RESIDENT. The purpose of the clay faces is unknown. Possibly they were associated with a cult of the dead.



A TROPICAL DARKROOM OF PALM THATCH

Richard H. Stewart, National Geographic photographer attached to the expedition, ran into some difficult problems. Because palm thatch was the only available building material, light could not be excluded for daytime work, and all developing had to be carried on at night. An assistant outside, eyeing a watch illuminated by flashlight, announced "time up" when the period for development had been reached. All the photographs accompanying this article were processed here.

in character among aboriginal American sculptures, it is remarkable for its realistic treatment. The features are bold and amazingly negroid in character.

Fully exposed to view for the first time in modern times, it still remains as great a mystery as ever, for it fits into no known aboriginal American cultural picture. Approximately 6 feet high and 18 feet in circumference, it weighs over 10 tons.

How was this great block of stone transported more than ten miles from its source near the base of Mount Tuxtla? This problem, which would tax the ingenuity of an engineer with the benefit of modern machinery, included crossing the 30-foot-deep gorge of the arroyo. The ancient engineers, however, performed the feat of successfully quarrying a flawless block of basalt and transporting it in perfect condition without the aid of the wheel or domestic animals.

This was not the only huge stone that had been transported, carved, and erected by these ancient people. At the base of a mound a half mile from our camp we found

a great stela, fallen on its back and broken into two pieces of approximately equal size. When we later excavated this monument we found that it measured more than 17 feet in length, almost 7 feet in width, and averaged 20 inches in thickness.

This stela may have fallen while the site was occupied by the people who erected it, or possibly by a later group. In the process of excavation we discovered that all around the edges of the fallen monument had been packed thousands of razor-edged obsidian flakes, evidently placed as offerings. Our workmen believed that these were lightning bolts and advanced the theory that the stela had been knocked down and broken as the result of being struck by lightning.

FIGURE HOLDS A HUMAN HEAD

Because it fell face up, the sculpture on this interesting stone is very badly weathered, but the principal elements can still be distinguished. The figure of a man carved in almost full relief occupies the central position of the main sculptured area (page 200). On either side facing him are



MARÍA'S MOTHER STIRS THE CHICKEN FOR SUPPER.

On such a primitive stove, consisting of a large wooden box filled with sand on which rests an iron hoop with three legs, was prepared the simple fare for the expedition members. Menus were not much different from those of the natives—chicken, local beef and pork, beans, and rice, with tortillas serving as bread for nearly every meal. Cooking utensils are of earthenware (page 199).

two other figures of equal size but carved in low relief. One of these holds, suspended from his hand, a human head. Above these figures is the great masklike face of some deity of the ancient people.

The two fragments of this monument were too heavy for us to turn over, but, realizing that if there were carving on the back it should be well preserved from weathering, we determined to run tunnels under the stone. This was done and the back was found indeed so perfectly preserved as to be almost polished—but, sad to relate, it was completely devoid of decoration. How the ancient sculptors could have resisted the temptation to do something with that great expanse of smooth stone still perplexes me.

This was the first stela that we discovered and was much the largest of any at the site, so we called it Stela A.

Almost due east of this monument was an elongated mound, at the base of which

projected a few inches of the broken edge of a stone box. One of these exposed sections displayed elaborate carving, so we soon brought a crew to expose it.

The result of this small piece of excavation surpassed our fondest expectations, for the stone box when revealed, even though incomplete, represented not only the finest piece of sculpture from the Tres Zapotes site, but one of the finest examples of stone carving ever found in Mexico.

SCENES OF COMBAT CARVED IN STONE

The box is five feet in length, the sides sloping somewhat so that the area of the bottom is smaller than the top. The exterior of each of the four sides is covered with extremely intricate and beautifully executed carving in high relief. Elaborate scroll designs are blended with a number of human figures or, what is more likely, gods engaged in cosmic combat.

The features of the gods here represented



UNDER A LEAKY THATCH ROOF, DISTINGUISHED SCIENTISTS ARE ENTERTAINED

Dr. Alexander Wetmore, Assistant Secretary of the Smithsonian Institution, is seated at the left. Beside him, partly hidden, is Matthew W. Stirling, Chief of the Bureau of American Ethnology, Smithsonian Institution, and leader of the expedition, and next is Engineer Agustín García. At the end of the table are Dr. and Mrs. C. W. Weiant. The smiling gentleman is Dr. D. Juan Valenzuela, a well-known Mexican archeologist. At the extreme right sits Karl Ruppert, of the archeological staff of the Carnegie Institution of Washington. Eating customs and strange implements of the archeologists fascinated the natives, one of whom stands in the background.

are strongly Mayan in feeling, but the nature of the remainder of the carving is unique (pages 195, 196).

BASIN USED IN HUMAN SACRIFICE

A few feet from the box, part of another stone was seen projecting above the ground. This, when excavated, proved to be a barrel-shaped piece of basalt, flat on the bottom and with a shallow basin on top. It was about two and a half feet in height and in all probability was a stone used for human sacrifice (page 194).

By analogy with what we know of Toltec custom, we believe that the sacrificial victims were placed over this stone where their hearts were torn out. The blood drained into the basin was then transferred to the stone box, as the most precious offering mankind could make to his gods. That human sacrifice of this nature was prac-

ticed in this section of Mexico at the time of the first arrival of the Spaniards we know from the accounts of Bernal Díaz and others.

For the sake of drama, the climax of an archeological expedition, as of anything else, should come toward the end, but in the case of our expedition we had been in camp only two weeks when the big moment arrived.

IN ARCHEOLOGY IT PAYS TO "LEAVE NO STONE UNTURNED"

Already more than pleased at our good luck and with the slogan of "leave no stone unturned," I started out on the morning of January 16, 1939, to the most distant section of the archeological zone, two miles from our camp. The purpose of this particular excursion was to turn over a flat stone that had been pointed out by one of



"NOVEMBER 4, 191 B. C.," SAY THESE BARS AND DOTS

This is interpreted as the oldest date ever found recorded in the Western Hemisphere. It represents a period a generation before Rome and Carthage began the Punic Wars. Pointing to the hieroglyphs is E. G. Casady, artist of the Bureau of American Ethnology, Smithsonian Institution.



Photograph by Matthew W. Stirling

THESE CARVINGS MAY BE A "DOUBLE CHECK"

On the reverse face of the famous Stela C (above), on which is carved the earliest recorded date in America, appear these badly weathered designs (opposite page). In the opinion of Dr. Alfonso Caso, noted Mexican archeologist, they represent the tear-streaked face of a deity related to Cocijó, the ancient Zapotecan rain god. Perhaps the carvings will be additional proof that the date is that on which the monument was set up (page 203).

our workmen a few days before. It had the proper shape for a stela and I had high hopes of finding carving on the other face.

It was a very hot day and the twelve workmen I had with me labored mightily with their wooden poles before the heavy slab could be turned. Finally this was accomplished, but again came disappointment; both sides of the stela were perfectly plain.

I remembered, however, that the guide two days before had pointed out another stone near by, a few inches of which projected above the surface at the edge of a tiny milpa owned by a native with the rather surprising name of Santo Sapo. This milpa was in the level area at the base of the highest mound in the entire Tres Zapotes zone. The stone was so inconspicuous that had I not been in the vicinity for another purpose I should scarcely have thought of excavating it.

As the digging proceeded, it developed that the stone was larger than I had thought and that it had definitely been worked. On the south face traces of a weathered design in low relief began to appear, but the back of the stone appeared to be plain.

A MONUMENT WITH NUMBERS!

Finally, at a depth of three feet in front, the workmen struck another stone. This, when carefully cleared, proved to be a perfectly flat altar, roughly circular in form but with unworked edges. The existence of this altar definitely showed that the first stone had been erected as a stela and was still in position as set up.

Try as I might, I could distinguish no pattern in the weather-beaten carving on the face of the stela. Thinking I might as well complete the job I had started, I instructed a couple of the men to finish exposing the back of the stela where we had stopped work when the altar was found.

As the men had been cautioned against scarring the monument with the tools, they were on their knees in the excavation, cleaning the mud from the stone with their hands, when one of them spoke up in Spanish:

"Chief! Here are numbers!"

And numbers they were indeed; I don't know how my illiterate workman guessed it, but there, running transversely across the back of our stone, was a beautifully carved row of bars and dots in the form of a Maya calendrical date (opposite page).

Here in front of my eyes was the thing we had all secretly hoped might show up in the course of our work, but which not one of us had had the temerity to expect.

It was obvious that the stone in front of me was a fragment broken from the middle of a large stela on which the date had been originally carved. This fragment had been broken off and re-used by the people who had placed it in position as we found it.

It was also apparent that the original stela had fallen on its back and lain in that position for a very long time before being broken up by a later group, for, although the stone is extremely hard, the face had become much weathered, while the back containing the date was scarcely weathered at all.

Through a remarkable piece of good fortune, when this piece was broken off almost all of the date was on this particular section.

NEW WORLD'S EARLIEST RECORDED DATE

Under the broiling sun I copied the characters and hurried back to camp, where we settled down to decipher them. Before long our calculations were complete. Our date was 6 Eznab 1 Uo of the Maya calendar. Using the day by day correlation of Dr. Herbert J. Spinden, this is equivalent to November 4, 291 B. C., which represents the oldest recorded date ever found in the New World—193 years earlier than the Tuxtla Statuette (page 183).

The style of the date on Stela C, for thus it has been designated, resembles more closely that of the Tuxtla Statuette than any other known Maya date. The design carved on the other surface of the stela represents, according to the distinguished Mexican archeologist Dr. Alfonso Caso,* a very early form of the rain god.

These facts, combined with the ancient weathering and re-use of the monument by a people who were themselves probably contemporary with the classic period of Maya civilization, convinces the writer that the probabilities are all in favor of the fact that the date actually represents the time at which the original stela was erected. The definite establishment of this fact, however, constitutes an interesting problem.

It was not difficult to visualize the ancient sculptor at work upon this monument,

* See "Monte Albán, Richest Archeological Find in America," by Alfonso Caso, NATIONAL GEOGRAPHIC MAGAZINE, October, 1932.



UP THIS STONE STAIRWAY CLIMBED ANCIENT PRIESTS

While excavating a small mound, the archeologists were surprised to find a rectangular platform faced with stone masonry unbonded by mortar. A steep stairway of four flights led to the top. This was the only example of stone architecture discovered during the excavations.

recording, no doubt, some occasion of great importance to his tribe. One imagines that the design on the face of the stone was first completed, representing the god to which the monument was dedicated.

WHAT TALES THIS STONE COULD TELL

Then, while gaily bedecked priests and astronomers looked on, the sculptor outlined the glyphs and numerals on the back by abrading grooves around them with his stone tool.

When the proper depth had been reached, the remainder of the surface of the hard stone was painstakingly ground down by the same method until only the glyphs and the bars and dots stood out in sharp, low relief.

The stela was erected and probably stood for a long time, an object of admiration and veneration and a center of religious ceremonies.

Eventually misfortune overtook the tribe or they migrated to other lands. The stela

fell on its back, where it lay until, centuries later, another group of people came to occupy the site.

Finding this massive relic and with little respect for the gods of their predecessors, they broke the great stone into several pieces of a size that they could more easily handle. The middle fragment bearing the date, being wider than it was long, they set up on one edge in front of a great stone altar, where once more, serving different gods, the stela looked out on strange ceremonies.

DECIPHERING DATE WAS EXPEDITION'S GREATEST THRILL

Time passed, the city was again abandoned, and gradually Nature buried the monument with its altar so that it all but disappeared from sight, until just now our spades have brought it to light.

The Maya calendar, like our own, indicates dates by marking periods of time reckoned from a fixed point in the past.



THE EXPEDITION'S EQUIPMENT ARRIVES BY OXCART

The last leg of the journey to Tres Zapotes was a 10-mile overland trip. Beyond the zebu oxen is the thatched structure which served as dining room, kitchen, and workshop.



BULLOCKS TAKE THE PLACE OF AUTOMOBILES FOR TRES ZAPOTES LABORERS

While many of the workers came to the excavation site on foot, the more opulent rode into camp on saddled steers which they "parked" while they worked. The mount is guided by the nose ring.



OLD-MAN-OF-THE-MOUNDS

Such faces in baked clay probably represent important deities of the aboriginal inhabitants of Tres Zapotes. The specimen was found in Mound F at the Ranchita site and shows unusual skill in the modeling. It formerly decorated the rim of a large urn.

Just as we start our calendar from the birth of Christ, the Maya begin theirs with the date of 4 Ahau 8 Cumhu (about 5,000 years ago), which must have marked some event of tremendous significance to them in their mythologic history.

HOW THE MAYA MEASURED TIME

In order to record the time that has passed up to the date desired, the Maya used five time periods, each of which is written down. These are the Baktun, the Katun, the Tun, the Uinal, and the Kin. They represent, respectively, time periods of 144,000 days,

7,200 days, 360 days, 20 days, and 1 day.

Thus a Maya date recorded as 9 - 12 - 6 - 5 - 16 would represent 9 periods of 144,000 days, 12 periods of 7,200 days, 6 periods of 360 days, and so on, the sum of which would indicate the number of days that had passed since the beginning point of 4 Ahau 8 Cumhu.

This is much as though we would indicate August 1, 1939, by writing 19-3-9-7-1, meaning 19 periods of 100 years each, 3 periods of 10 years each, 9 periods of 1 year, 7 periods of 30 days, and 1 period of 1 day. If our months were all 30 days in length and all periods were translated into terms of days, we could thus indicate our dates in about the same form as the Maya, showing the time elapsed since the birth of Christ.

In writing their numbers, the Maya used a system of bars and dots, a bar indicating 5 and the dot 1.

Biggest thrill of the expedition came when Mrs. Stirling, who was making the calculation, arrived at the conclusion and we saw that the date was 6 Eznab 1 Uo, or November 4, 291 B. C., by the Spinden correlation.

If three inches more had been broken off either the top or the bottom of the monument, the date never could have been determined.

This find was the high point of our season, but the work went on. We discovered the site of the ancient cemetery where we obtained a rich collection of beautiful figurines and pottery vessels.

TWO DISTINCT PEOPLES DWELT HERE

Here we found evidence of the occupation of the site by two distinct peoples. In the black humus soil near the surface were cremated burials, the charred bones having been placed in pottery vessels which were always carefully covered. Deep below these were direct inhumations with offerings consisting of an entirely different type of pottery. We do not believe, however, that this older culture represented in the cemetery site belongs to the people who carved Stela C, as the people who re-used that monument had this same type of ceramics.

As a result of the large shard collection obtained, we hope eventually to establish a detailed chronology for the site, which may then be tied in with other known archeological centers of Middle America. This will, in fact, represent the most important scientific result of the expedition.

For almost four months the camp by the Colossal Head was our home. There were periods of heavy rain and mud when cold



Photograph by Marion Stirling

THE EXPEDITION'S MOST INTERESTING PRIZE TRAVELS WITH A SCIENTIFIC ESCORT

The dated monument is on a launch bound downstream to Tlacotalpan and thence to Mexico City, to be placed in the National Museum there. On the right, facing the camera, is Mr. Stirling. Dr. Wetmore, wearing dark glasses, sits on the rail to the left. Standing, facing the stone, is Ricardo Gutiérrez, the storekeeper of Tres Zapotes and owner of the launch.

northers swept down upon us, halting the work and filling the excavations with water which had to be laboriously bailed out again (page 200). More often the sun shone as the steady south wind dried the ground.

When Dr. Alexander Wetmore, Vice-Chairman of the National Geographic Society's Committee on Research and Assistant Secretary of the Smithsonian Institution, arrived with Richard H. Stewart of The Society's photographic staff, a new



THE EXPEDITION'S BRIDE AND GROOM SET UP HOUSEKEEPING IN TROPICAL SIMPLICITY

This young couple was married while the expedition was at work at Tres Zapotes. The bridegroom was one of the laborers. The house of palm "timber" is oriented with its ends pointing in the direction of the prevailing winds.

house was built including a palm-thatched darkroom for Mr. Stewart and a work-room where Dr. Wetmore prepared and stored his bird skins. Shortly after this, E. G. Cassedy, our artist, appeared with his drawing materials and our personnel was complete (pages 209, 211).

There was little time for leisure and the busy days passed quickly. There were excursions to El Mesón and to Lirios to view other groups of mounds. There was constant cataloguing and packing of specimens. There were serenades and Sunday visitors, many of whom had traveled two days to see our exotic establishment.

GIANT HEAD STILL HOLDS SECRETS

They were interested in our well, our cement floors, and our clothing. They went to see the head and some of the other nearby monuments, but most of all they liked to gather by our porch to watch us eat. Many left us flowers and other little gifts and we

reciprocated as best we could with empty tins and old magazines, the pictures from which were in much demand.

But all things must end. Our departure was set for April 15. The night of the 14th almost the entire village came to our camp for a surprise farewell serenade. With two orchestras, one for the huapango and the other for the fandango, the party lasted until the early-morning hours when we bade our farewells to these kindly people who had become our friends. Before the sun was up, we left our camp at the foot of Mount Tuxtla.

Like a great American Sphinx, the Colossal Head, newly cleared of the imprisoning earth, still looks imperturbably toward the north across the abandoned plaza where once barbaric ceremonies were performed. Could his great mouth but speak, one of the most important chapters of American history would doubtless be revealed to us.

FLOWER PAGEANT OF THE MIDWEST

From March to November Nature Embroiders an Ever-changing Pattern of Living Color

BY EDITH S. AND FREDERIC E. CLEMENTS*

With Paintings and Biographies of 125 Flowers by Edith S. Clements

EARLY on a brilliant May morning in 1811, John Bradbury clambered up a steep bluff of the Missouri River just above the mouth of the Platte and looked westward over the prairie, which stretched in swelling waves as far as the eye could reach.

Both botanist and intrepid explorer, he had set out from England two years before to discover plant novelties for public gardens, at a time when the flowers of the prairies were still little known.

Now he viewed the spring display at the height of its color, set against the intense verdure of the grasses and forming a kaleidoscope of many-hued blossoms spread over Nature's vast palette of green.

On the cooler slopes, anemones in pink and blue swayed in the wind, and buffalo plums like purple shadows lingered past their season. The warmer hillsides were mantled with a mosaic of violets, phlox, puccoons, false indigo, and spiderworts mingled freely or clustered to deepen each varied tint.

A BOTANIST'S PARADISE

Bradbury was profoundly impressed by the grandeur of the view with its endless undulations and declared that he had never seen a landscape to match the prairie in beauty, however much embellished by art. He expressed the belief that the prairies would become one of the most beautiful countries in the world. To those who saw them at a later time, but before the period of general settlement, his praise seemed in no wise extravagant.

Spring comes unheralded to the prairies, since the first diminutive harbingers are scarcely to be perceived among the crowding shoots of grass. These are red-brown

dwarfs fitted to brave the chill breath of March as they snuggle close to the warm earth out of reach of late winter's blasts.

First to peep forth are the tiny primroses and whitlows, followed soon by pussytoes, anemones, and tuliplike pasqueflowers, and then by prairie fennel sprawling over warm sandy slopes.

In neighboring woodlands of oak and hickory, the first blooms of snowy wake-robin, varied hepaticas, white and yellow adder's-tongues, and the blushing rue anemone waken to throw off their blankets of leaf mold, and the trailing arbutus distills the magic of its evergreen leaves in fragrant bells.

A SEASON-LONG PARADE MARCHES BY

These forerunners meet few rivals for the favor of early spring and they rapidly extend their pure or blended colors over wooded dell and hillside. With an auspicious start, all of the first-comers gather such momentum as to carry them well into the throng of spring bloomers during April and May.

April on the prairie is ushered in by spreading troops of slender windflowers in blue and white and sturdier pasqueflowers in rougher coats well suited to northern climes. Shooting stars may accompany them in serried ranks, and on the flanks the yellow parsley marches along the ridges.

As the sun's rays strike more directly, birdsfoot and larkspur violets with golden buttercups press in throngs over meadow and hill slope, and violet oxalis and trailing strawberries hide among the clumps of grass. Marsh marigolds brighten moist lowlands and bogs, while spiderworts and blue-eyed grass enliven meadows with blue and rose, dotted with the gold of starworts.

May arrives with the advent of warm days and tall plants of yellow false indigo hang out their long racemes and blend colors with the orange and yellow of the puccoons, in vivid contrast to the pink phloxes which bejewel the curving swales and gentle slopes.

* See "The Family Tree of the Flowers," by Frederic E. Clements and William Joseph Shou-walter, and "Wild Flowers of the West," 206 illustrations in color by Edith S. Clements, both in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1927. See also *The Book of Wild Flowers*, published by the National Geographic Society, \$5 in United States and Possessions, elsewhere \$1.25.

Most striking of all are the pentstemons, or beardtongues, some of them with stems taller than a man and bearing purple or lavender flowers often two inches long. On the rougher slopes and ridges grow shrubby groups of yucca or Spanish bayonet, with rosettes of stiff, erect leaves crowned by long spikes of nodding lilylike flowers.

While the spring pageant of color has been passing across the prairie, a quieter display of great charm has accompanied the leafing out of the woods. Wake-robin, adder's-tongue, and their companions have been joined by other forest dwellers, all intent on making the most of the sunshine before the leafy canopy blots it out.

Among the forest dwellers are the best-loved flowers of spring, many of them white or delicately shaded with pink—spring beauty, bloodroot, dutchman's-breeches, squirrel corn, false Solomon's-seal, and several trilliums. Color in this charming ground cover is provided by blue and yellow violets, bellworts, rue anemone, lady-slipper, showy orchid, Jacob's-ladder, the mottled jack-in-the-pulpit and green dragon, and the pink and purple wake-robins.

The pattern is rendered more vivid by masses of blue phlox, rose-red geranium, and brilliant patches of scarlet and yellow columbines. The giants of the springtime tower above their humbler companions in the form of wandlike blue larkspurs, blue cohosh, meadow rues, and Solomon's-seal.

COLOR FLOODS THE PRAIRIE

On the warm prairie the season anticipates the calendar, and many of the blossoms of spring yield to the onrush of summer before May has departed. The grasses have stretched up and some are in bloom, so that the flowers pollinated by insects must strive to overtop them in order to be seen by bee and butterfly.

For the same reason it is desirable to mass color and to reinforce it to some degree by fragrance. Plants of lowly stature are unable to make headway against their taller competitors and must take the role of underlings or seek opportunity in drier or more open places. In this aspect, members of the pea family give the dominant note, modulated by certain composites.

Chief among the peas is a group of close relatives: lead plant, psoralea, dalea, prairie clovers, together with indigo plant, false indigo, goatsrue, vetches, locoweeds, tick trefoils, and licorice.

The visible pattern is woven of these, with the purple-and-old-gold lead plant and flowery psoralea rivaled in number only by the snowy sheets of prairie daisy drifted across slope and ridge. Embroidered upon this are broad bands of prairie clovers, pink and white over the hillsides, and the rose-colored clusters of wild bergamot in the meadows, often blended with the white of anemones and prickly poppies.

Striking contrast is provided by some of the most brilliant flowers of the prairie, notably the blue false indigo, the purple coneflower, the butterfly milkweed, burnt-orange in color, and the prickly pears in yellow, rose, and dark red.

Below the canopy of bloom may run the flaming hue of the rose gentian, or centaury, the sky blue of the Venus's-looking-glass, or the varied yellows of the fluxes.

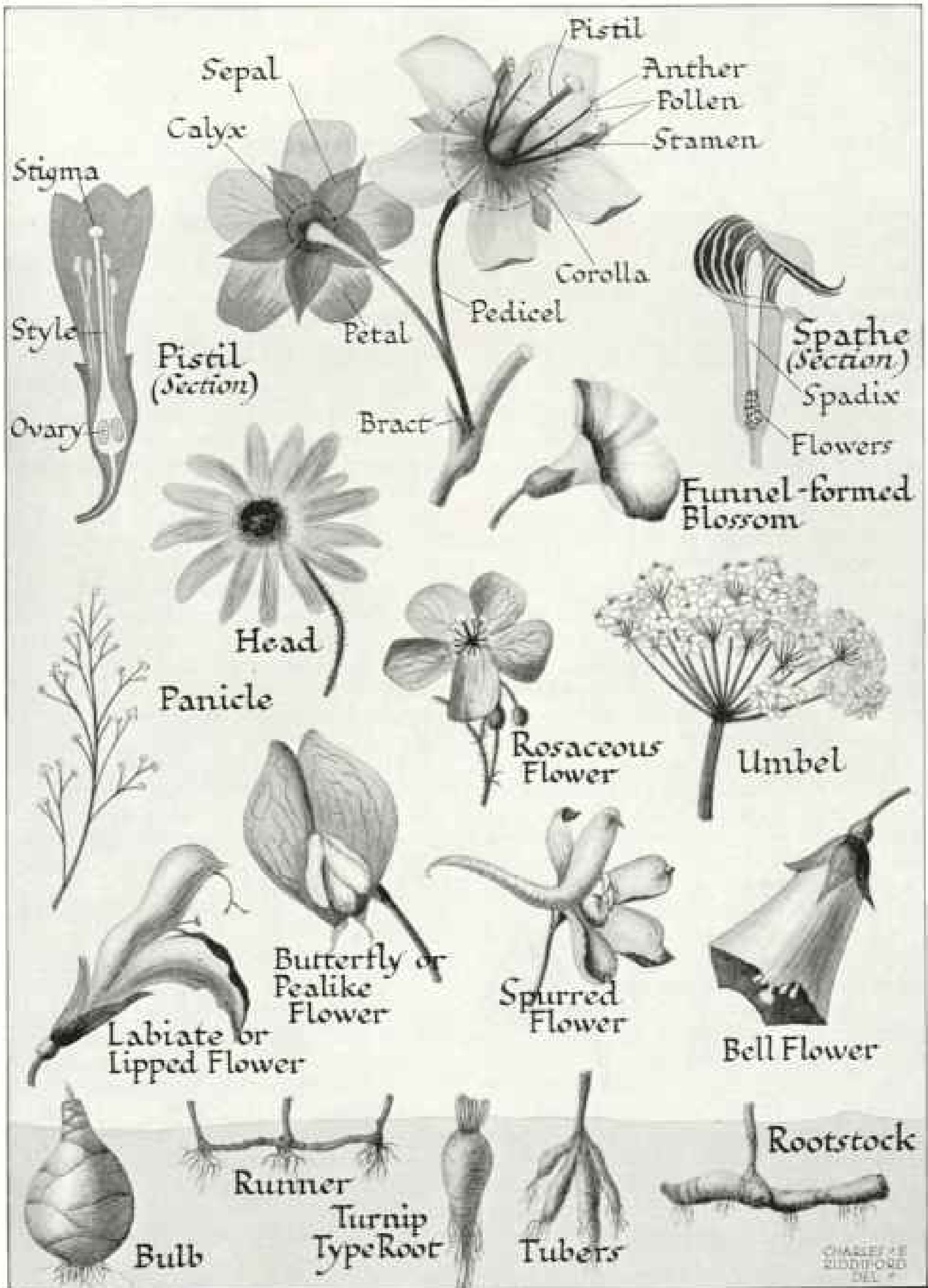
A hint of autumn is to be seen in the many yellow blossoms, most of them claiming kinship with the sunflower. Conspicuous among these are the several coneflowers, the most familiar being the black-eyed Susan, those intelligent giants the compass plants, the oxeye and early-blooming sunflowers, coreopsis and the closely related bur marigolds or tickseeds.

PRIMROSES SIX INCHES ACROSS

On dry or rocky hillsides or in open borders are dotted thickly the golden cups of evening primroses often six inches across, and near by may be seen the rose-and-gold balls of the wild sensitive brier or the orange-yellow masses of the sensitive plant.

Midsummer in the woods is the season of deep shade, which is usually less favorable to number, size, and color in flowers. Bright flowers are to be seen in openings, beneath sun-flecked canopies, and along streams and borders, but where shadows lie heavy, coarse weeds with small white or green blossoms abound. Such are the wood and false nettles, goosefoots, pokeweed, snakeroot, and sweet cicely, or the lowly bedstraws, clearweeds, pellitories, and three-seeded mercury.

Most charming of the shade plants are the yellow-and-orange jewelweeds, or touch-me-nots, with glistening leaves and jack-in-the-box pods. They also deserve the favor of garden lovers, which has fallen instead upon the red bee balm, the rose dragonhead, and to a less extent upon the tall bellflower, the giant hyssops, and the skullcaps.



TYPES AND PARTS OF FLOWERS.

Whatever form the orthodox flower takes, it is an assemblage of four parts—stamens, which produce the fertilizing pollen, tipped by anthers; pistils, which receive the pollen in the stigma and conduct it into the ovaries, where it fertilizes the seed produced there; petals, that form the corolla, which acts as an advertisement to be read by the pollen bearers; and sepals, which form the calyx, whose main task is to shield the delicate machinery. It has been by the modification of these four parts of the flower, whether by the change in the numbers of stamens, pistils, petals, and sepals, by changes in their respective shapes, or even in their respective tasks, that the thousand and one familiar forms of flowers have come to us.

The ubiquitous pea family is represented by a number of tick trefoils and bush clovers, but of greater interest are the trailers, the groundnut with its brown-purple clusters and sweet tubers, and the wild peanut, which ripens some of its fruits underground, as does its namesake.

Late summer and autumn make heyday for the asters, goldenrods, sunflowers, and their many kith and kin. The advance guards appear in the prairie by the middle of summer, but in August composites take possession of the landscape to hold it until they yield to the frosts of oncoming winter. In stature the leaders are sunflowers, compass plants, and rosinweeds, some of them much taller than a man, and sunflowers, goldenrods, and asters vie with each other in number of species and masses of bloom.

Yellow is the pervading tint, but it is varied by the blue and rose of asters and the purples of ironweeds and blazing stars. The most distinctive note in this symphony is given by the blue sage, which rivals the sunflowers in height and like them graces the long Indian summer. Of equal beauty are the late gentians, blue lobelia, the ruellias and gerardias, but these are mostly hidden away among the grasses.

In the autumn woods, asters and goldenrods hold almost complete sway, disputed only by occasional groups of sunflowers, crownbeard, boneset, or Indian plantain. The only worthy rivals are the thoroughworts and their sinister cousin, the snake-root, which spreads a snow-white mantle through its favorite woods.

Throughout the prairie, the grasses are the solid citizens of the community, exercising the general direction of affairs but caring little for publicity. In the forest, on the contrary, the trees are as conspicuous as they are controlling, and all other members of the community must adjust themselves to the demands of these feudal overlords. In the one, grass and herb avoid the clash of competition as far as possible; in the other the issue has long been decided in favor of the trees, the shrubs representing a middle class and the herbs a lower class.

STRUGGLE FOR WATER AND SUNLIGHT

In both prairie and forest there is a frequent or constant scarcity of water, raw mineral materials, or power in the form of sunlight, and the struggle for these limits the co-operation that every community must maintain to some degree.

Three families of flowering plants take precedence over all others in the prairie community. As is to be expected, the reigning family is that of grasses, while the distinctive societies of the seasons are organized chiefly by peas and composites, with roses, buttercups, lilies, snapdragons, and mints less prominent among the elite.

In the forest the grasses sink to an unimportant level and the ruling group is drawn largely from the oak and hickory families. The aster family is less distinguished and the lilies much more abundant.

PARENTAL SOLICITUDE IN PLANTS

Strikingly unlike as they are in stature and general appearance, the pre-eminence of oak, hickory, beech, and chestnut in woodland, and of spear grass, dropseed, bluestem, and wheat grass in prairie is due mainly to family pride, which leads them to give their offspring the best possible start in life. This consists in storing a large supply of food in the seed for the tiny plantlet and in providing the latter with a thick coat, and sometimes a sweater also, to guard it against buffets of weather.

So well has this been done that man has come to appropriate the food supply in grass seeds for his own use as flour and cereals, and has done much the same in a smaller way with various kinds of nuts.

Peas and sunflowers employ a similar method for starting their offspring out in the world, but with somewhat less concern and hence less complete success.

Parental solicitude for the helpless offspring must begin long before the seed is formed. The foremost families have learned to limit the number of seeds to a single one for each flower, an advance brought about by the need to conserve material and energy through division of labor.

In the peas this has been done in the traditional way by dividing the work among the brightly colored petals, though this has required a wide departure from the custom of their ancestors, the roses. In place of five petals, each a "jack-of-all-trades," one is set aside as a banner to attract insects, or as a landing platform for their convenience. Two other petals are soldered together in a keel to protect pollen and nectar.

This specialization is still somewhat imperfect in its results, for most peas still produce pods with several seeds, and only a few, such as the most important prairie species, bear flowers with a single seed.

The asters, goldenrods, and sunflowers all limit the work of each flower to the production of one seed, and their great success seems to be due mostly to close co-operation among the florets of the flowerlike head.

"ALL FOR ONE, ONE FOR ALL"

As already suggested, the head is actually a socialized group in which each kind of floret or part has its own special task and in which waste is all but eliminated.

In the dandelion, for example, the original green calyx has become useless and is converted into a parachutelike device for air travel. Grass flowers have likewise taken on the social habit and have banded themselves together in small but efficient groups.

However, the trees of our deciduous woods have lagged behind in their social organization, the catkins of pussy willow, birch, and oak having developed little feeling for co-operation.

At first thought, it appears strange that plants with brightly colored corolla should be the conservatives of the floral world and the grasses and trees with insignificant green flowers the progressives. This is quite at variance with man's interest in flowers, which often ignores the existence of flowers in grasses and our common shade trees.

FLOWERS USE "COLOR ADVERTISING"

Peas, asters, roses, and lilies, like nearly all other treasures of field and garden, have remained faithful to the practice of their buttercup ancestors, which were the first to turn to color advertising of their wares. This custom has been preserved by the large majority of flower families, though nearly all have improved upon it in one or more details.

However, this adherence to tradition appears to have been more a matter of necessity than of choice, and attempts to break away from it have not been infrequent, the sunflower that became a hay-fever ragweed being one of the innovators.

Grasses and oaks have long lived in positions favorable to a change from the ancestral plan of pollen transport by insects, but the evidence indicates that their exposure to wind was not the cause of their departure from accepted custom. This may well have been due to the advantage of having the first chance at power and

raw materials, thus placing more food at their disposal.

The consequence was to put emphasis upon the two parts, stamens and pistil, which are essential to seed production; less concern was taken for the corolla and this began slowly to disappear, the calyx following at a distance.

Not a few plants, like the maples, are in the midst of this transformation today, and many still exhibit remnants of the once-useful corolla or calyx.

Some, like the four-o'clock, flowering dogwood, and poinsettia, have pressed too rapidly along the path of progress, it seems, and have had to retrace their steps, calling in some other part, such as calyx or leaf, to act as substitute for the corolla.

The final result was that all grasses came to be pollinated by the wind and now seem to show no relationship whatever to their remote forebears, the lilies.

The oaks underwent similar changes from the pattern of the ancestral witch hazels and sumacs, but carried them to the further point of assigning stamens and pistils to different flowers.

AN AGE OF SPECIALIZATION

There is considerable evidence that flowers are slowly changing today in the direction of further specialization. Much of this is due to the continuation of the processes just described, but some of it is to be assigned to the manifold disturbances wrought by man.

Apart from the breaking by plow that has destroyed most of the prairie, these disturbances include the alterations in cover and conditions due to grazing, and even more significant is the aftermath of change in abandoned fields and cutover woodlands.

In spite of destruction and modification, there still remain many thousand square miles of fairly typical prairie, especially in the farther Middle West, and this may be much increased as the numerous projects for conservation are carried into effect.

No important species of the prairie has vanished and few indeed of the rare ones, so that the local disappearance of favorites may be readily compensated for by planting in wild gardens, parks, reserves, and along highways.

The guideposts for an excursion into Nature are placed here and there in the pages that follow.



© National Geographic Society

LARKSPUR SPIKES ARE HORNS OF PLENTY FOR HONEYBEES

In payment for stolen sweets, bees pick up pollen grains on their furry bodies and carry them to other flowers, thus fertilizing the seeds. Wild flowers of the broad region from the Rocky Mountains to the Appalachians and from Canada to the Gulf of Mexico are presented in these water colors by Edith S. Clements. (1) Tall Larkspur, *Delphinium exaltatum*; (2) Marsh Marigold, *Caltha palustris*; (3) Red Columbine, *Aquilegia canadensis*; (4) early-blooming Hepatica, *Hepatica americana*; (5) Anemone, *Anemone caroliniana*; and (6) Rue Anemone, *Synedrella thalictroides*.

BUTTERCUP FAMILY*(Ranunculaceae)*

Persons who think of buttercups as saucer-shaped blossoms flecking spring meadows with gold may be surprised to learn that purple monkshoods, red columbines, and blue larkspurs are members of the same family.

In all flowers which are considered as belonging to the buttercup family, the badge of membership lies in the simple pistils and the many clustered stamens. They may easily be seen in the centers of globe-flowers, buttercups, pulsatillas, and the like, but are hidden from view within such oddly shaped blossoms as those of monkshoods and larkspurs.

The earliest-known buttercups were found in Europe, but their descendants are scattered today over the face of the globe where cool temperatures prevail.

Tall Larkspur

Pa. to N. C.; west to Ala. and Kan.

Larkspurs (1) look not at all like their cup-shaped forebears, but appear almost fantastic, with one sepal prolonged into a spurlike slender tube, and the petals so changed as to be easily overlooked. Two have been reduced to a pair of tiny fringes which hang down over the stamens and protect them from wetting by rain or dew, while the second pair extends back into the spur in the form of two small sacks filled with honey.

It is difficult for a clumsy bumblebee to reach the store of sweets, and he makes a big fuss about it, buzzing and grumbling as he tumbles awkwardly over the stamens which block the way. Successful at last, he blunders away to rob the next flower, carrying on the underside of his hairy body ripe pollen grains which are in turn deposited on the receptive stigmas of the pistils in older flowers.

Larkspurs of the Middle West are lovers of the open prairies, the species illustrated (1) being the only one to prefer woodlands; there the long spikes of lavender-blue flowers bloom throughout July and August. Some of the prairie species are poisonous, but since stock eat them only when feed is scarce, the intelligent cattleman protects his herds by taking care not to let them overgraze the range.

Marsh Marigold

Newfoundland to S. C.; west to Sask. and Neb.

April finds the golden cups of marsh marigolds (2) opening in the pale spring sunshine and offering nectar to the yellow hover flies that find this special brand of honey very much to their liking. The plants have been used at times as potherbs in early spring when the shoots are tender, but unless well cooked they have an unpleasantly acrid flavor. The buds have been considered in some places a satisfactory substitute for French capers.

Marigolds take readily to cultivation and bloom in the garden year after year, with occasionally a second crop of blossoms in the fall.

Red Columbine

Nova Scotia to n. w. Canada; south to Fla. and Tex.

Columbines may be small and demure as the doves (*columba*) they are fancied to resemble, or large and flaunting. Their spurs may be so long that visiting insects can reach the nectar in their tips only by biting holes and stealing it, or so short they are scarcely spurs at all.

America is fortunate in having some form of this lovely flower native to nearly every State in the Union. The red columbine (3) of the East and Middle West brightens rocky woodlands with spots of vivid scarlet. On the Pacific coast similar forms show a preference for more open thickets and woods. In Colorado, the blue columbine casts a veil of delicate blue and white over mountain meadows.

Hepatica

Nova Scotia to Fla.; west to Mo., Iowa, and Manitoba

Among the earliest of flowers, hepaticas (4), which are commonly called "liverleaf," sometimes come into bloom in December in the warmer parts of the country; and March or April in middle-western and eastern woodlands finds the pale blossoms opening. Hues of delicate lavender or pink may tint the narrow petal-like sepals, which vary from six to twice that number in different flowers.

In daylight, hepatica flowers stand more or less erect and expose the pollen-laden anthers in their centers to the visits of insects; but at night, when dews might damage the pollen, they droop so that the flower resembles a half-opened bud.

Anemone

Wisconsin to Ga.; west to Tex. and S. D.

The beautiful fragile anemones (5) are called "windflowers" because they love to dwell on wind-swept prairies and hill slopes. The sepals curve inward over the stamens at night or when wet weather threatens, and there is a legend that the buds open only when the breezes blow.

Garden anemones are easily grown, and the most popular are varieties of the poppy-flowered anemone, which produces blooms as large as two and one-half inches across.

Rue Anemone

N. H. to Fla.; west to Kan. and Minn.

The rue anemone (6) presents a happy combination of beautiful foliage, like that of the rue and the dainty flowers of the anemone. The scientific name as well as the common one refers to this union, for *Synedemon* means "bound together." The blossoms are white or pale pink and bloom very early in the woodlands of the East and Middle West. If transferred to the garden, the plants should be placed in partial shade.



© National Geographic Society

BLOODROOT AND DUTCHMAN'S-BREECHES ARE DESCRIBED BY THEIR NAMES

A representative of the Poppy clan is the (1) **Bloodroot**, *Sanguinaria canadensis*, whose pure white flower stems from a red-brown root. Close relatives of the Poppies are the dainty (2) **Dutchman's-Breeches**, *Dicentra cucullaria*, suggesting a Netherlander's trousers, and the sun-loving (3) **Golden Corydalis**, *Corydalis aurea*. (4) **Pink Cleome**, *Cleome serrulata*, belonging to the Caper family, is cultivated on a large scale as a source of honey. A fragrant member of the Mustard group is the glowing (5) **Western Wallflower**, *Erysimum asperum*.

POPPY FAMILY*(Papaveraceae)*

The petals of poppies gathered from field or garden fall so quickly that the flowers must be enjoyed where they grow rather than be fashioned into bouquets. Moreover, many of the cut stems exude a milky juice which is disagreeably sticky to the touch, or merely watery and acrid. Although the flower lover may view this characteristic with disfavor, not so dealers in opium and other drugs derived from it.

Closely related to the poppies is the group of plants called "fumitories" because of a faint odor of smoke in the foliage of some species. The best known are probably Dutchman's-breeches, which look very little like poppies.

Bloodroot

Nova Scotia to Fla.; west to Ark., Kan.,
N. D., Manitoba

This creamy-white blossom (1) might be mistaken at first glance for an anemone, but since the petals are deciduous and the pod is one-celled and two-valved, it actually resembles poppies more than buttercups.

The leaves continue to grow after the petals have fallen, becoming so large by the middle of the summer as to give the plants an entirely different appearance.

It is the red-brown root with bright-red flesh and juice which gives the clue to identity as well as the name of "bloodroot" to the plant. All parts when cut or broken exude this red juice, which is acrid and bitter to the taste and possesses narcotic and stimulant properties.

Bloodroots, among the earliest flowers, grow abundantly in the loose, rich soil of woodlands.

Dutchman's-Breeches

Nova Scotia to N. C.; west to Minn., Mo., Kan.

The coolness of shadows suits this daintiest of spring plants so well that it must be sought beneath the overhanging branches of woodland bushes. Here, from clusters of feathery gray-green foliage, spring slender, curving stalks on which are hung the oddly shaped white or pale-pink blossoms named from a fanciful resemblance to baggy Dutch trousers (2).

The bruised foliage of the related fumitory gives off a faint odor as of smoke, and Pliny noted that it also causes the eyes to smart.

Golden Corydalis

Nova Scotia to Minn. and Alaska; south to
Pa., Mo., Calif.

Golden corydalis (3) closely resembles the dicentras in the structure of the flower and in the similarly finely cut foliage. It prefers open spaces where gravelly soils may be covered by the masses of silvery-green leaves and clusters of bright-yellow blossoms. In dry seasons the plants may be dwarfed to but an inch or so in height, but when moisture is plentiful they may grow a foot tall and cover an area two feet in diameter.

The flowers have but one spur and are

jauntily crested and erect. This is taken note of in the scientific name, meaning "crested lark."

CAPER FAMILY*(Capparidaceae)*

The capers may well be regarded as direct ancestors of the mustards, from which they may be distinguished by numerous projecting stamens with threadlike filaments and by pods borne on long, slender stalks. The petals are narrowed at the base like those of a mustard blossom, but spread widely instead of forming a compact group. The family is not a large one; its best-known member is French capers, a shrub from the Mediterranean region with pungent buds that have been used in medicine since ancient times.

Pink Cleome

Ill. to Minn. and w. Canada; south to Mo.,
N. M., Ariz.

The ball-like clusters of pink cleome flowers (4) are at their loveliest midway in their blooming period. Then many individual blossoms are wide open, with the long rose-colored filaments of the stamens uncurled and spread widely, each tipped with a bright-green anther, while next above these are half-opened flowers of a deeper hue, and the cluster is rounded off at the top with dark rose-purple buds.

Bees are attracted in such great numbers to the nectar secreted abundantly by these dainty blossoms of prairie and roadside that the species is often called "Rocky Mountain bee plant" and has been cultivated for many years as a source of commercial honey.

MUSTARD FAMILY*(Brassicaceae)*

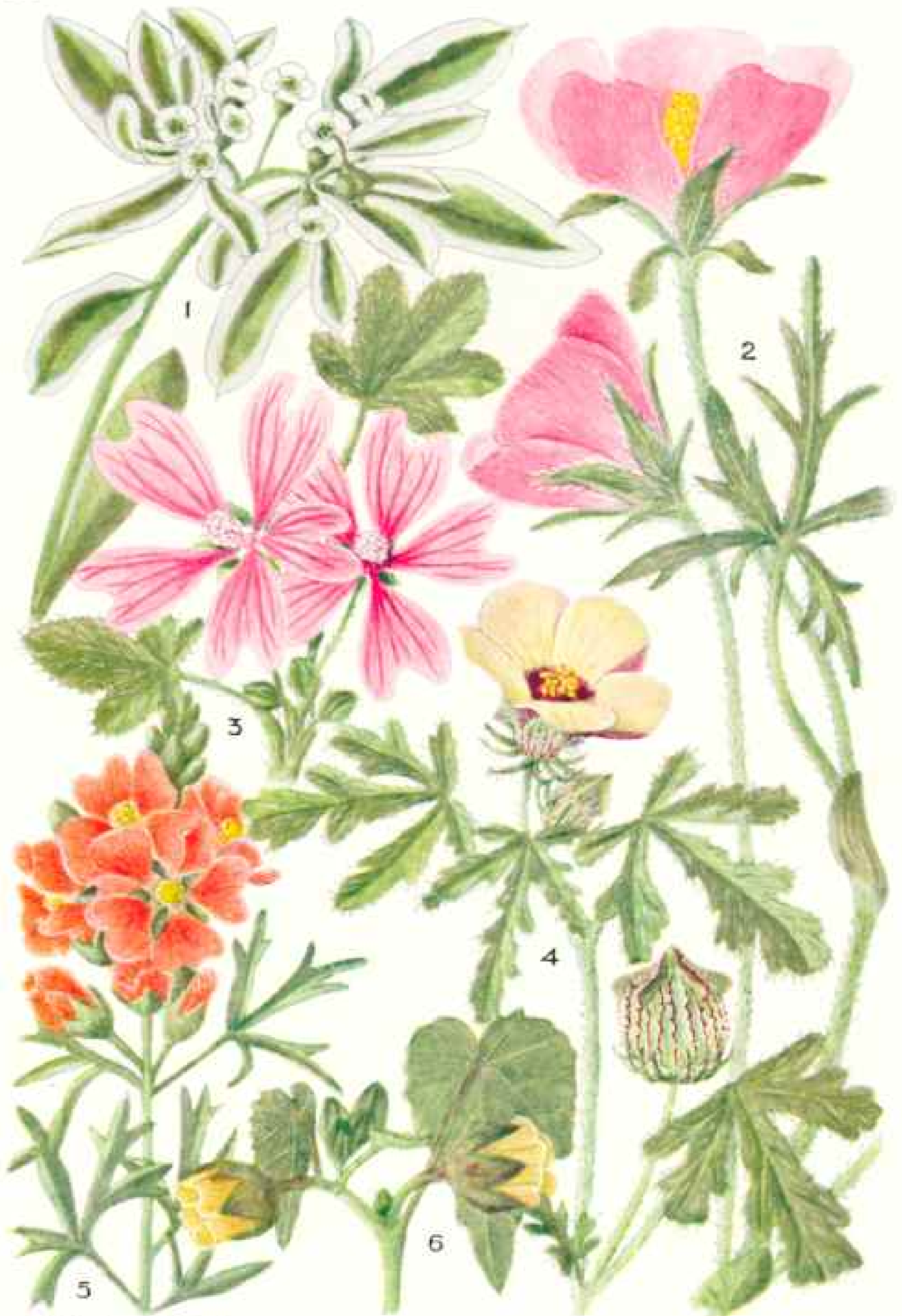
Members of the mustard family are to be recognized by the four petals of the flower arranged in pairs at right angles to each other in the form of a Maltese cross, and the seed pod with a partition down the middle. The number of stamens may be either four or six. If six, two are shorter than the others.

More useful if less beautiful members of the family yield vegetables such as cabbages, Brussels sprouts, turnips, cauliflower, and radishes, all of which will produce flowers of similar structure if allowed to "go to seed."

Western Wallflower

Manitoba to Okla.; west to N. M. and Montana

The fragrant globelike clusters of the western wallflower (5) may wear any tint of yellow from pale cream-color through lemon and gold to burnt orange of so deep a shade as to seem almost brown. It is a ready traveler, but prefers to take root in sandy fields instead of among the fallen stones of ruined walls, where a distant cousin, the true wallflower, flourishes after escaping from English gardens. Other relatives are the wild radish, which clothes vacant fields in California with masses of rose-purple blossoms, and the charlock, which annoys eastern farmers.



© National Geographic Society

LOVELY TO LOOK AT, SNOW-ON-THE-MOUNTAIN (1) CARRIES POISON IN ITS VEINS.

The milky juice of the striking *Euphorbia marginata*, a member of the Spurge family, may blister the picker's skin. Related to hibiscus, hollyhock, cotton, and okra are the rosy (2) **Poppy Mallow**, *Callischoe involucrata*; (3) **High Mallow**, *Malva sylvestris*, with notched petals; and (4) **Flower-of-an-Hour**, *Hibiscus trionum*, which opens its blossoms only for a short period each day. Other Mallows are (5) **Red False-Mallow**, *Malvastrum coccineum*, which paints the prairies in late spring, and (6) **Velvet Leaf**, *Abutilon theophrasti*, an immigrant from India.

SPURGE FAMILY*(Euphorbiaceae)*

Although the Greek words "beautiful herb," applied to the spurges, may describe such as have ornamental foliage, the great majority are insignificant plants with no charm whatever. Many are desert dwellers, or grow in dry and sterile places, and are frequently so bizarre in appearance as to be cultivated as curiosities, often together with the even more fantastic cacti.

Whatever color or beauty the spurges have resides in the ornamental bracts which surround the group of tiny stamens and pistils which form the flower proper.

Spurges are also characterized by a milky juice in leaves and stems, which, although frequently poisonous in varying degrees, is the source of valuable articles of commerce, such as drugs and dyes. Castor oil and rubber are other products from members of the family.

Snow-on-the-Mountain

Minn. to Colo.; south to Tex.

When massed in gardens or beside the road, snow-on-the-mountain plants (1) give strikingly handsome effects, especially when the snowy-white edgings to the smooth gray-green leaves and bracts are unusually well marked.

It is well, however, to "touch not, taste not," for the milky juice which exudes from cut stems may blister the skin, and honey from the flowers causes unpleasant effects when eaten.

Many euphorbias are insignificant herbs, but the poinsettia (*E. pulcherrima*) has few rivals for stately beauty. The plants may grow to the height of small trees.

MALLOW FAMILY*(Malvaceae)*

Many mallow flowers are brightly colored and beautiful, the hibiscus, hollyhock, and abutilon deserving special mention. The cotton blossom is attractive in itself, but has been cultivated since earliest times for the sake of the fibers produced by the seed coats. Okra, marshmallow, drugs, and drinks are also supplied by different members of this family.

Poppy Mallow

Minn. to Mo.; west to Tex., Utah, Wyo.

Callirhoe (*Callirhoë*), the musical Greek name of the poppy mallow (2), is the same as that borne by a nymph of the sea, perhaps because both are beautiful, for there seems to be no other point of resemblance between a wild flower of the Middle West and the South and a mythical maid of the ocean.

Brilliantly colored, this mallow occurs in patches of crimson purple or cherry red all summer long on prairies and plains from Minnesota to Texas, in company with a species of paler tint (*C. alceoides*) and the poppy mallow with large reddish-purple flowers with fringed petals (*C. digitata*).

High Mallow

Occasional escape from cultivation

Malva is the genus which has given the scientific name to the mallow family, and is represented by a number of common species which have come over from the Old World and run wild in this free country. Among these are the "cheeses," which conceal tiny flowers of pale hue by numerous large round leaves, but which on maturing produce mucilaginous fruits sought by children at play. Others are the musk mallow, with large rose-colored or white flowers, and the high mallow (3), which grows in waysides and about gardens.

On the Pacific coast the mission mallow has long been a favorite of the Franciscan fathers from whose gardens it has escaped, and the stately shrubs with maplelike evergreen leaves and rose-purple blossoms may now be found where the ocean spray keeps cool the air.

Flower-of-an-Hour

Nova Scotia to Fla.; west to S. D. and Kan.

The dainty little flower-of-an-hour (4), though it works on "short shift," clothes waysides, roadsides, ditches, and waste places during hot summer days with a low mass of fresh green leaves and cream-colored blossoms. The tiny fruits are like fairy lanterns decorated with pale-green flutings and dark veins.

Eastern marshes are the homes of the swamp rose mallow (*H. moscheutos*) whose large pink flowers, sometimes seven inches across, are of unrivaled loveliness, although the crimson-eye rose mallow (*H. oculiroseus*), in similar situations, is a close rival.

Red False-Mallow

Manitoba to Iowa; west to Tex., Utah, Ore.

May on midwestern prairies and plains sees the earliest blossoms of this malvastrum (5), and by midsummer they may cover large areas with vermilion-red masses of color, the grayish green of the foliage making a happy combination with the bright hue of the flowers. A very similar western cousin (*M. ambiguum*) blooms so abundantly in overgrazed cattle country as to cast a rust-colored haze over the landscape as far as one can see. Quite different in coloring and habit, the delicate rose-lavender blossoms of the bush mallow (*M. fasciculatum*) grace shrubs of southern California hills.

Velvet Leaf

Eastern, Central, and Southern States

The soft velvety leaves of this abutilon (6), which has come to our country from faraway India, are much more conspicuous than the small, dull-yellow blossoms on short stalks beneath them. Although classed as a weed, since it is quite content to occupy waste places, vacant lots, and similar spots throughout warm countries, it helps redeem them from barren ugliness and is by no means a nuisance to the farmer. It is grateful for any care and will add its share to the garden.



© National Geographic Society

BLUE POOLS OF FLAX RIPPLE IN THE PRAIRIE BREEZE

Western Indians spin cord from the fibers of (1) **Blue Flax**, *Linum lewisii*, a wild branch of the Flax clan, source of linen. Of the numerous Violets, the (2) **Two-Color**, *Viola pedata bicolor*, and the large (3) **Bird-foot**, *Viola pedata*, are shown. The ripe fruit of the (4) **Violet Woodsorrel**, *Oxalis violacea*, bursts at a touch, scattering wide its seeds. (5) **Wild Geranium**, *Geranium maculatum*. (6) **Jewelweed**, *Impatiens biflora*, belongs to the Touch-Me-Not.

Blue Flax

Manitoba to Neb.; west to Tex., Calif.,
and Alaska

A field sown thickly with seeds of the cultivated flax will become a sea of azure-blue blossoms rippling in the breeze, while the wild blue flax may form pools of color here and there on the prairies. The same brief span of life governs both, and after 10 o'clock on a sunny day, both "sea" and "pool" have given way to a dull expanse of gray green.

The flowers of the wild blue flax (1) are somewhat larger than those of the cultivated variety, and, although the fibers in the stems are not so long and strong, from them the Indians of the Northwest have woven baskets, mats, snowshoes, fish nets, and similar useful articles.

VIOLET FAMILY

(*Violaceae*)

The violet family seems to be more or less a homeless waif among flower families, for, although several claim close relationship, the evidence on which the claims are based is either contradictory or inconclusive.

There is scarcely a part of the country where violets are not to be found, unless it be the deserts. Some prefer swamps and bogs, moist ravines, thickets or woods; others like dry prairies, hillsides, mountains, and subarctic regions, or waste places and cultivated fields.

Birdsfoot Violet

Mass. to Minn.; south to Fla. and La.

One of the largest and showiest of violets is this species (3) with leaves so deeply cut as to suggest the name "birdsfoot." The spring months find it blooming in open woods.

Two-Color Violet

Mass. to Minn.; south to Fla. and La.

Two shades of color distinguish this variety (2) of the birdsfoot violet (3). Frequently there are streaks, dots, or splotches of darker shades on a lighter background, and all variations may be present in the flowers of one plant.

In flower economy, these markings usually serve the purpose of guiding pollinating insects to the nectar, but although violets have some honey in the spur, they receive few visitors. In consequence, many of the species have perfected a unique method of self-pollination.

Toward the end of the flowering period, the buds fail to open, and within them the pollen is transferred from anther to stigma by direct contact. As the fruit matures, it splits into three little canoe-shaped sections, each filled with a row of shining brown seeds, which are shot far out as the drying sections contract.

It is this brisk popping about, among autumn leaves, of objects which resemble fleas in size and color, that has led countryfolk in England to the belief that "violets breed fleas."

OXALIS FAMILY

(*Oxalidaceae*)

The woodsorrels may be recognized by leaves made up of three leaflets which fold together and "go to sleep" at night or in cool weather; by their pleasant acid taste; and by regular five-parted flowers. They show so close a relationship to the geraniums in the flower structure that the two families are often considered as one. The differences lie in the fact that the woodsorrels have but five stamens and many seeds in the capsule, while the geraniums possess ten stamens in sets of five each and a five-seeded pod with a beak.

Both have perfected devices for scattering the seeds, the geranium by means of a sort of slingshot for each seed, while the ripe fruit of the woodsorrels bursts at a touch and the seeds pop out in all directions.

Violet Woodsorrel

Mass. to S. D.; south to Fla. and Tex.

The violet woodsorrel (4) is a delicate flower of open woods in the East and Middle West. The commonest woodsorrels are insignificant plants with small white or yellow flowers (*O. corniculata*) which bloom all summer on lawns or roadside without becoming pests.

GERANIUM FAMILY

(*Geraniaceae*)

The best-known member of the geranium family is the garden nasturtium. Wild geraniums are better known by the common names of "storks-bill," "cranes-bill," and the like, from the resemblance of the tapering seed pods to the slender beaks of birds.

Wild Geranium

Maine to Manitoba; south to Ga., Ala., Neb.

Open woods throughout the East and Middle West shelter this rose, blue, or lavender species (5), and a western cousin (*G. incisum*) decorates the margins of mountain forests with rose purple.

The ten stamens of a geranium flower are arranged in two sets of five of slightly different lengths. The longer ones mature first and shed their pollen, then the shorter ones, and when all the pollen has been dropped or taken away by insect visitors, which seek the nectar at the base of each petal, the five slender stigmas curl outward and are ready to receive pollen.

TOUCH-ME-NOT FAMILY

(*Balsaminaceae*)

The family name is based on the fact that the mature capsule bursts apart at the merest touch and scatters the seeds far and wide.

Jewelweed

Newfoundland to Sask.; south to Fla. and Neb.

The name "jewelweed" may have been given this balsam (6) because its orange-yellow blossoms hang like pendants and form spots of glowing color in the shadows of moist woods.

PINK FAMILY*(Dianthaceae)*

Flower families are designated as a rule by the name of an important genus which may be changed from time to time at the dictate of the taxonomer. Thus it happens that when the carnation was called *Caryophyllus*, the family name was *Caryophyllaceae*. Later it became *Dianthus* and the family name changed accordingly to *Dianthaceae*, which counts among its members the clove pinks or carnations, Indian pinks, and other attractive garden or florists' plants. There are also annoying weeds, such as the corn cockle, with poisonous seeds, some species used in medicine, and many with insignificant blossoms, like the chickweeds, but with seeds that house canaries relish.

Bouncing Bet

Eastern and Central States

It is a simple matter for plant immigrants from Europe to become stowaways by means of seeds attached to cargoes of merchandise of all sorts. Once within this country, these foreigners speedily settle down and colonize waste places everywhere. They are sturdy and aggressive and quick to seize opportunities denied them in the Old Country, where crowded human populations must utilize every foot of productive soil.

Bouncing Bet (1) is one of the less obnoxious invaders, with flowers sufficiently ornamental to make its presence along roadsides not unwelcome. These are rose pink, paling to white, in large, loose clusters at the ends of rather stiff leafy stems. The plants are robust and spread with an energy that may well have been the basis for their name. The roots are supplied with a sap that lathers when mixed with water and suggests the Latin name for the genus, the root of which means "soap," as well as the common name of "soapwort."

Fire Pink

N. J. to Ont. and Minn.; south to Ga. and Mo.

The glowing vermilion blossoms of the fire pink (2) are found in dry woods from May to September throughout the Middle West. The stems are covered with a sticky substance that is disagreeable to the touch, but seems to serve the purpose, in plant economy, of entangling the wings of small insects on their way to steal the honey from the flower or to plunder the seeds. Sometimes these tiny marauders, unaided, are held prisoners for life.

PURSLANE FAMILY*(Portulacaceae)*

Many purslanes make little or no claim to beauty, since the flowers are tiny and short-lived, but their thick and juicy leaves are of value in salads, or furnish mild tonics. One, which has beautiful blossoms as well as edible herbage, is red maids of grassy meadows on the Pacific coast. The Indians of early Cali-

fornia made use of these plants as greens and ate the roasted seeds also. The flowers remain open only a few hours, but during this period offer a glimpse of brilliant rose-purple, satiny petals. Probably the most beautiful of native purslanes, the bitterroot of the Northwest, has large flowers with many narrow pink or white petals. The large roots are extremely bitter when raw, but the Indians have found them nourishing and tasty when well cooked.

Tiny Talinum

Minn., S. D., and Ark.; west to Ariz. and Tex.

The few species of talinum (3) to be found here and there in rocky or dry soil are all much alike in having succulent foliage and pinkish flowers on threadlike stems. The size of the blossoms varies somewhat in the different kinds, but since they close after a short period of blooming, they may easily be overlooked.

Spring Beauty

Nova Scotia to Sask.; south to Ga., Tex., Mont.

The delicate charm of the spring beauties (4) offers a distinct contrast to the gorgeous coloring of their South American cousin, the rose moss of our gardens, for their pale-pink flowers are dainty in form and color, and they bloom unobtrusively in moist woods instead of flaunting their faces boldly where all may see. The fragile blossoms live only a few days during the coolness of early spring and by the end of May can be found no longer.

BUCKWHEAT FAMILY*(Polygonaceae)*

The buckwheats are more distinguished as the source of food and drugs than for beauty. The first prize should perhaps be awarded to the plant whose three-cornered seeds, so like tiny beechnuts, are packed with a starch of the distinctive taste which makes buckwheat flour so well liked in griddlecakes. Moreover, the flowers of this buckwheat yield a fine honey that may well be spread on those same cakes.

The homely docks and sorrels deserve honorable mention as the source of an acid with more or less value as a drug, while that contained in the rhubarb adds a special flavor, in the spring, to the sauces and pies made from the petioles of the leaves.

Heartsease

Nova Scotia to Fla.; west to Kan. and Minn.

The roots of many species of polygonum possess acrid juices which are useful as astringents and which also give the reason for the name of "smartweed" often used for the plants (5). The scientific name of the genus, as well as the popular one of "knotweed," refers to the knobby swellings at the joints of the stems. As a rule, the plants are weedy in habit, with spikes of rose-pink flowers which may clothe moist roadside ditches all summer.



© National Geographic Society

IMMIGRANT BOUNCING BET (1) THRIVES ON ROADSIDES AND WASTE LAND

From Europe comes *Saponaria officinalis*, a Pink with clusters of pale-rose flowers. (2) **Fire Pink**, *Silene virginica*, has petals like red tongues. (3) **Tiny Talinum**, *Talinum parviflorum*, one of the Purslanes, is used in salads. Shy (4) **Spring Beauty**, *Claytonia virginica*, hides in cool woods. *Polygonum pennsylvanicum* is the correct Latin name for (5) **Heartsease**, a decorative Buckwheat. In the old days, when this species was named, "Pennsylvania" was commonly spelled with only two n's.

PRIMROSE FAMILY*(Primulaceae)*

There is, of course, nothing of the "rose" in any member of the primrose family except the name, which is said to be a corruption of an old French word, *primerole*. The Latin *primula* is descriptive in that it means "first flower of spring," for although many bloom in the summer time, cool seasons or cool climates are the preference of most.

Attractive in appearance, primroses disdain to be useful, as are their next of kin, the buckwheats and purslanes, although primrose wine may be made from the flowers of some species and certain bitter drugs come from others.

Birdseye Primrose

Newfoundland and Labrador to Mich.

The birdseye primrose (1), after the snows have gone, blooms throughout eastern Canada and northern Maine, with a decided preference for the northern shores of the Great Lakes. The clusters of flowers, each with a yellow center like a bird's eye, are borne on slender stems; the underside of the young leaves is so covered with a white mealiness as to give the species the scientific name of *farinosa*.

Shooting Star

Pa. to Ga.; west to Tex., S. D., Manitoba.

In these charming blossoms the slender stamens are grouped closely together to form a sharp point from which five ribbonlike petals flare backward like the tail of a comet (2). These earthly stars prefer rose to yellow and vary in tint from white to brilliant magenta or rose purple. They may be found in moist places throughout the country.

Loosestrife

Maine to Fla.; west to N. D., Ia., and Ariz.

The saucer-shaped blossoms of this member of the primrose family (3) are of an exquisitely pale-yellow tint, and though there is no great mass of bloom, since the flowers occur in pairs in the axils of the leaves, they are individually charming. All five of our native species are yellow-flowered and are to be found in moist thickets or swampy ground.

GENTIAN FAMILY*(Gentianaceae)*

The family takes its name from King Gentius, who ruled over Illyria some 2,000 years ago. The story goes that he made such good use of the bitter tonic in some of these plants as to check the ravages of malarial fever in his army.

Rose Gentian

Iowa to Ark.; west to Kan. and Tex.

Midsummer sees the prairies abloom with nothing more vivid in hue than the rose gentian (4), which forms patches of glowing color here, there, and everywhere. The shallow disks of vivid rose are different enough from

the namesake of King Gentius to be placed in another genus and named in honor of Sabati, an Italian botanist who lived in the 18th century.

A rose gentian (*S. angularis*) with four-angled stems and smaller flowers of the same brilliant color, grows in rich soil in the East and South, and western mountains offer choice sites for Amarella (*Gentiana amarella*) with tiny lavender blossoms fringed at the throat.

Fringed Gentian

Quebec to Manitoba; south to Iowa and Ga.

It is the blue gentians (5) that claim the stellar role in the floral pageantry of autumn. From the blue of this fringed gentian, which artists assert most nearly approaches that of the sky, to the dark purple blue of the fringed gentian (*G. calycosa*) in the Sierra Nevada and Cascade Range, some variation in tint or shade is claimed by nearly every one of the true gentians. They are all deep-throated flowers, with petals joined into a tube and often cut around the edges or at the joinings into fringes of varying length and thickness.

DOGBANE FAMILY*(Apocynaceae)*

A red flag of warning should be waved by practically every member of this criminal family, for, concealed by attractive exteriors, handsome foliage, beautiful and sweet-scented flowers, lurks the potential poisoner.

Although the greater number of plants in this family inhabit the tropical zones and so do not immediately concern us, some, like the oleander, have been transferred to our gardens and a few may be found growing wild. They are so attractive and yet so poisonous that everyone should learn to know them by sight in order to avoid risks due to ignorance of their true nature. To chew an oleander leaf or twig may be fatal!

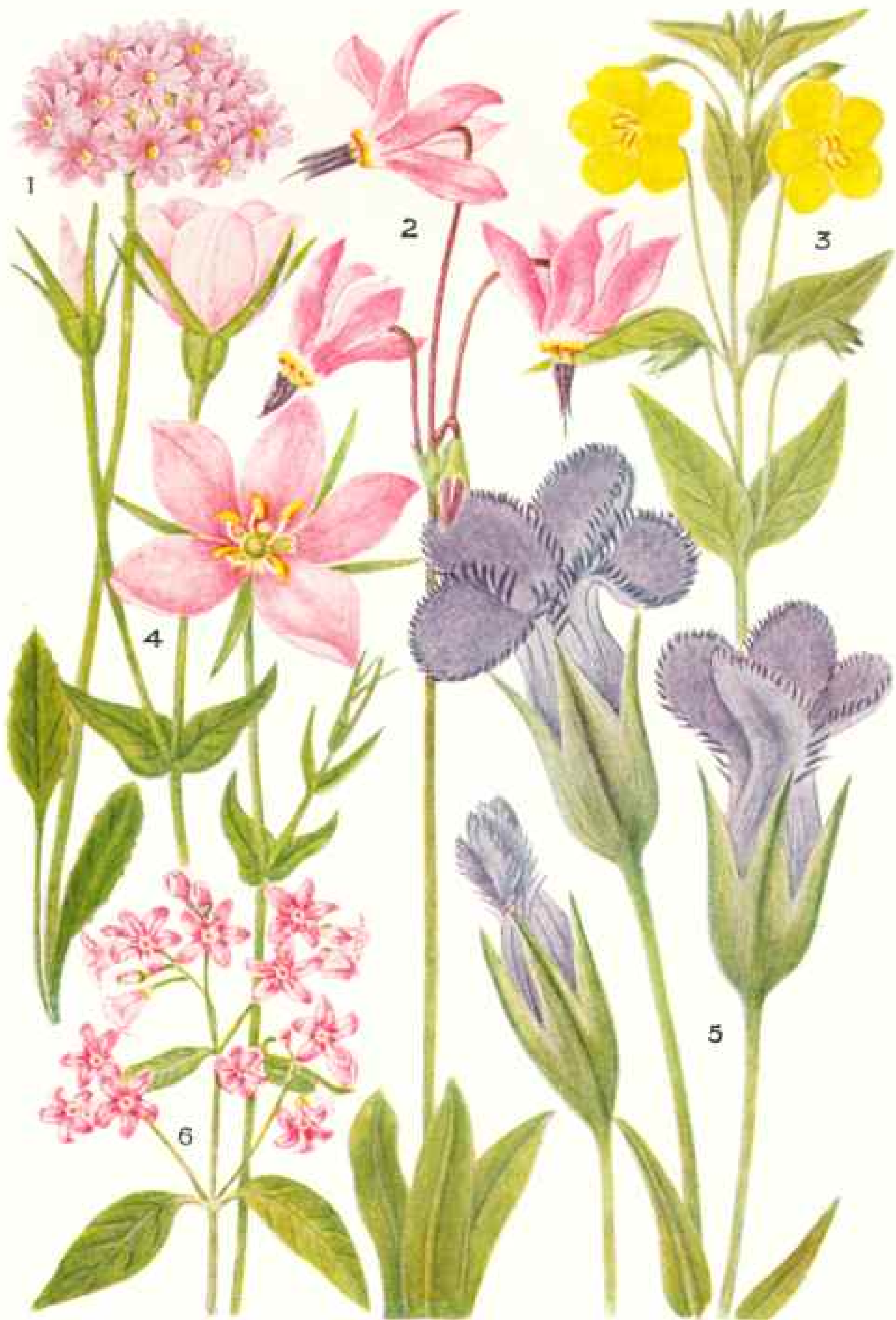
Pink Dogbane

Quebec to Ga.; west to Ariz., Idaho, and B. C.

This attractive little plant (6), with its descriptive common name and appallingly long scientific one, forms low borders to thickets in the East and West and is especially abundant along the Missouri River. In British Columbia many hundreds of acres may be given over to it.

Bees, attracted by the sweet odor, hover about it continually in search of the excellent honey concealed in the tiny blossoms.

It is only the larger bees that are able to visit the flowers with impunity, for an ingenious trap formed by the growing together of the anthers catches smaller insects that are unable to bring about pollination and yet would like to have a share of the nectar. Besides yielding honey of commercial value, the pink dogbane serves mankind with a medicinal drug obtained from the roots, and recently the milky juice of the stems has been found to contain a rather high percentage of rubber.



© National Geographic Society

"PRIMROSES, THE SPRING MAY LOVE THEM; SUMMER KNOWS BUT LITTLE OF THEM"

Thus William Wordsworth described the early-blooming family of which three representatives are shown: (1) **Birdseye Primrose**, *Primula farinosa*, which prefers lake shores of the northern Middle West; (2) **Shooting Star**, *Dodecatheon meadia*; and twin-blossomed (3) **Loosetrife**, *Steironema lanceolatum*. Blushing (4) **Rose Gentian**, *Sabatia campestris*, contrasts with the blue goblets of (5) **Fringed Gentian**, *Gentiana crinita*. One of the less virulent members of a poisonous family is (6) **Pink Dogbane**, *Apocynum androsaemifolium*.

POTATO FAMILY*(Solanaceae)*

The family to which the humble potato belongs yields mankind other garden vegetables such as tomatoes and eggplants, the valuable drugs of belladonna, atropine, and nicotine, and such favorite flowers as petunia, butterfly flower, and Chinese lantern.

Since the family comprises some species with violent poisons, such as the deadly nightshade and Jimson weed, suspicion has at times rested upon members which were later proved innocent. For a long time tomatoes were considered unpalatable and even today are regarded with suspicion in certain parts of the world. The tubers of the potato may be actually poisonous if eaten when young.

Silver Nightshade

Mo. to Tex.; west to Calif.

Waste places may often be redeemed from ugliness by the silvered foliage and attractive rose-lavender blossoms of the silver nightshade (1). The flowers are distinctive in being quite flat, five-pointed, and crinkled or ruffled where the petals join.

Many solanums are poisonous, in part at least, or at some time during their development. Thus the unripe berries of the black nightshade, which has small white flowers, may be extremely poisonous, but can be safely used in pies and preserves when thoroughly ripe and well cooked. On the other hand, the bright orange-colored berries of the bittersweet (*S. dulcamara*) are poisonous at all times.

Purple Ground-Cherry

Kan. to Tex.; west to Ariz.

Unlike many of the ground-cherries which have drooping, bell-shaped flowers, such as the clammy ground-cherry (*P. heterophylla*) of the eastern half of the country, those of the purple ground-cherry (2) of high plains resemble nightshade blossoms in being flat and saucerlike, with plaited borders. They are borne on low, spreading plants with abundant leaves.

In some varieties the fruits have a delicious flavor and form an important article of trade in the West Indies, in Mexico, and other Latin American countries. Each berry is enclosed in an inflated calyx of papery texture and often of such brilliant coloring as to be unusually ornamental, such as that of the Chinese lantern of our gardens, which is two inches in diameter and a glowing red in color.

BORAGE FAMILY*(Boraginaceae)*

In days gone by, the borage family enjoyed great repute as supplying more herbs to professional and domestic medicine than almost any other flower family. Today not one of them is considered of any value in treating human ailments. Even a layman nowadays

would scoff at the idea of using the lungwort (*Mertensia*) in lung diseases simply because the leaves were mottled. Nor would he rely on viper's bugloss (*Echium vulgare*) for snake-bite because its flower cluster coils snakelike as it matures, nor on the puccoon (*Lithospermum*) for dissolving bladder stones because its seeds resemble small round stones.

Although with the passing of the years and the advance of knowledge, the family may have lost its prestige in the field of medicine, it still boasts a large number of plants of unusual beauty and charm. Here belong the fragrant forget-me-not, heliotrope, hound's-tongue, fiddle-neck, and many other garden favorites or familiar wild flowers.

Stickseed

Manitoba to N. M.; west to Calif. and B. C.

In autumn, when the tiny, burlike fruits of the stickseeds (3) attach themselves by the score to the clothing of anyone intent on a stroll through fields or woodlands, it is easy to forget that early in the season clusters of forget-me-not-blue flowers bloomed in their place. That these little hooked fruits may be more impressive than the blossoms is attested by the names "stickseed" and "Lappula," the latter word meaning "little bur." However, the flowers of the species illustrated are so like those of the true forget-me-not that its sins are more easily forgiven than are those of the many other species which occur as weeds the country over and have flowers so small and lacking in bright color as to be entirely without charm.

Virginia Bluebell

N. Y. to Ga.; west to Minn. and Kan.

The pale-blue flowers and rosy-pink buds of the Virginia bluebells (4) are clustered on slender branches which arch gracefully over rushing brooks or smooth-flowing streams. They are past blooming by the end of May, but high up in the Rockies of Colorado, the Sierra Nevada of California, and far northward, the mountain mertensia (*M. sibirica*) remains in flower until midsummer. At still higher altitudes and above timberline, the alpine mertensia (*M. alpina*) perfumes the air with sweet-scented blossoms of a deeper blue.

Fringed Puccoon

Manitoba to Ill.; west to Tex., Ariz., and B. C.

The prairies are at the height of their floral beauty from April to July when the puccoons appear to add a touch of yellow in long-tubed blossoms with crinkled edges to the petals (5). When the seeds are formed late in the season, they are seen to be tiny, hard, and round like pearls or white stones, and for this reason the name of "pearlwort" is also sometimes used for these plants. The hairy puccoon (*L. canescens*) may dwell side by side with the fringed puccoon, its orange-hued blossoms adding a deeper note of color to the scene.



© National Geographic Society

NIGHTSHADES, MANY POISONOUS, ARE COUSINS OF POTATOES AND TOMATOES

So many members of the Potato family are harmful that innocent species, such as the tomato, were long thought guilty. Star-shaped (1) **Silver Nightshade**, *Solanum elaeagnifolium*, flourishes on waste lands. On high plains sprawls (2) **Purple Ground-Cherry**, *Physalis lobata*. (3) **Stickseed**, *Lappula floribunda*, bears clinging burlike fruits. (4) **Virginia Bluebell**, *Mertensia virginica*, has pink buds; and (5) **Fringed Puccoon**, *Lithospermum linearifolium*, cheerful yellow "trumpets."

MORNING-GLORY FAMILY*(Convolvulaceae)*

Morning-glory vines clamber over trellises or fences in our gardens and open trumpet-shaped blossoms of varied hues during the early hours of the day, giving pleasure to all; bindweeds of many sorts cover the ground with close mats of arrow-shaped leaves and creeping stems which cause the farmer great vexation and much extra labor, for they are exceedingly difficult to eradicate.

Sweet-potato vines likewise spread over the ground and bear blossoms similar to those of the morning-glory, but they are welcomed since their edible tubers are filled with a sweet starch. Quite different in appearance to all these, but also belonging to the same family, the dodder smothers low shrubs with masses of bright-orange twining stems which look like skeins of tangled silken threads.

Small Bindweed

Throughout United States

This little immigrant, although attractive to look at in full bloom (1), is one of the worst of pests in field or garden. Once established, it is almost impossible to eradicate and soon ruins the land for crops. It also climbs over useful or ornamental plants, handicapping them in the struggle for existence or even killing them off entirely. The flowers are daintily pink and white, and, though smaller, very similar to those of the hedge bindweed (*C. sepium*), which is even more successful in eliminating competitors.

SNAPDRAGON FAMILY*(Scrophulariaceae)*

The majority of flower families are made up of flowers that are symmetrical in shape and have a definite number plan for sepals, petals, stamens, and parts of the ovary. Often there may be found irregular forms, such as the larkspurs and monkshoods among the buttercups, and in some families it is the oddly shaped flowers that become the rule and regular ones the exception.

Such a family is that to which the snapdragons, pentstemons, wood betonies, foxgloves, and blossoms of similar appearance and structure belong. It is an unusually large and beautiful family of attractive wild flowers and garden ornamentals, with but one of any value medicinally, the foxglove, which yields digitalis used in diseases of the heart.

Giant Pentstemon

Wis. to Mo.; west to Okla., Colo., Wyo.

Bumblebees find the broad lower lip of a pentstemon flower a very convenient place on which to alight as they make their daily rounds in search of nectar and pollen. It is a simple matter then to enter the open throat of the blossom and, though the fuzzy sterile stamen which lies at the entrance may cause some

grumbling at the obstruction, it serves the purpose of forcing the visitor's back up against the ripe pollen clinging to the anthers.

Flowers as large as those of the giant pentstemon (2), which are nearly two inches in length, or those of the cobaea pentstemon (*P. cobaea*) of similar size, offer easy access even to the largest bees; but in the tiny flowers of the clustered pentstemon (*P. confertus*) or the narrow tubes of the scarlet bugler (*P. centranthifolius*) honey is accessible only to the smaller bees and insects. Within these limits there are all variations in size, and all shades of blue, purple, pink, scarlet, or lavender are to be found within this genus, yellow being the only color unrepresented.

Sand Pentstemon

Colo. to Tex.; west to Ariz. and Utah

The sand pentstemon (3) presents something of a puzzle in often having five anther-bearing stamens, and in the unusual size of the spreading lobes of the corolla in comparison with the slenderness of the tube. That is perhaps why part of the scientific name is *ambiguus*! However, it is a most charming flower, which in summer covers sandy spots on the plains with a wealth of delicate pink blossoms tinged with carmine in the throat. The buds also are this same deep hue. The plants do well when transferred to the garden in sandy soil.

Butter-and-Eggs

Newfoundland to Ga.; west to N. M. and Manitoba

When European plant immigrants are as attractive as butter-and-eggs (4) with its close clusters of two-toned yellow flowers, they are welcome invaders of bare or waste ground, and since they are not likely to spread rapidly from these chosen sites into the farmer's fields, he need only see to it that they do not gain the first foothold. Once established, however, they are difficult to eradicate.

The name of the genus, which is derived from the Latin word for "thread," refers to the similarity of the narrow leaves to those of flax. There are lovely linarias for garden culture, some with white, blue, or purple flowers, and they need little care.

Turtlehead

Newfoundland to Fla.; west to Kan. and Manitoba

The names of many flowers are often misleading, inappropriate, or harsh-sounding, but in the case of the turtlehead (5) the flattish corolla slightly protruding from the enclosing leaves has a similarity to the head of a tortoise emerging from the shell; also, like turtles, the plants are most at home in wet places.

The pink turtlehead (*C. lyoni*) of eastern swamps is similar in appearance to this one farther west, but the blossoms are a deeper rose purple. Both will do well in the garden if planted in moist soil and half-shade.



© National Geographic Society

DAINTY BLOOMS OF SMALL BINDWEED (1) SPRING FROM CROP-STRANGLING VINES

Farmers' foe is *Convolvulus arvensis*, the fast-spreading "black sheep" of the Morning-glory clan, an unwelcome colonist from Europe. Oddly shaped flowers are the rule among the Figworts. Examples are (2) **Giant Pentstemon**, *Pentstemon grandiflorus*, with lavender "bells," and (3) **Sand Pentstemon**, *Pentstemon ambiguus*. (4) **Butter-and-Eggs**, *Linaria vulgaris*, is a welcome immigrant. Compact (5) **Turtlehead**, *Chelone glabra*, favors wet places and half-shade.

Pink Gerardia

Quebec to Ga.; west to La., Kan., and Manitoba

In the 16th century the botanist John Gerard wrote a large and comprehensive volume concerning the plants known in his day, with descriptions and notes as to their uses. To a modern reader, this is one of the quaintest of books, although there is much information in it that has stood the test of time.

The author's fame has been further perpetuated in the naming after him of a genus of flowers which are occasionally yellow but more often some tint of rose purple. This pink gerardia (2) is a lovely shade of rose with a pale-yellow throat, and the slender plants with narrow leaves are found blooming in dry woods and thickets in late summer and autumn.

Yellow Wood Betony

Nova Scotia to Fla.; west to N. M., S. D., and Manitoba

The pale-yellow flower of this wood betony (3) looks comically like some tiny animal with eyes at either side of the head and a tusk protruding from the mouth. They are grouped in a roundish cluster at the end of a rather thick stiff stem, with attractive leaves of a soft grayish green very much scalloped and ruffled along the edges. The plants are most at home in dry woods or thickets of the Middle West and aspen groves in the Rocky Mountains. In the Northwest, boggy mountain meadows offer coolness and moisture to another *Pedicularis* (*P. ornithorhyncha*), which has similar oddly shaped blossoms of deep rose purple clustered at the ends of short stems.

PHLOX FAMILY

(*Polemoniaceae*)

The phlox family is one of those better known for its many handsome ornamentals than for practical value. Among these are bright-colored sweet williams, gillias of many hues, blue polemoniums, Jacob's-ladder, etc., some of which are to be found in almost any garden. The Pacific coast is especially rich in wild species of gilia and polemonium, and eastern woodlands shelter the dainty creeping polemonium of tender blue.

Meadow Phlox

Ontario to Fla.; west to Tex. and Manitoba

There are many native phloxes in this country which should be placed in the garden with the sweet williams, since they respond to cultivation readily and bloom profusely with little care. As early as 1720 some of the taller species were taken to England and planted in gardens, since none grow wild there.

Although the name "phlox" means "flame," these dainty blossoms exhibit many shades of blue and lavender, as well as the brighter pinks, crimines, or rose purples. Of the latter, the wild sweet william (*Phlox maculata*) grows in moist woods and along streams in the East,

while the meadow phlox (1) brightens dry prairies of both the East and the Middle West with flowers of an even more vivid hue.

ACANTHUS FAMILY

(*Acanthaceae*)

There are comparatively few well-known members of the acanthus family in this country, since they seem to prefer more tropical climates, where they supply the natives with foods, dyes, and drugs. A unique use has been found for a shrubby species in East India. When planted in the rice fields, it is said to produce a poison capable of destroying aquatic weeds and low forms of injurious insect life.

A few ornamentals have been brought to this country and placed under cultivation, and a number of wild species are to be found in the warmer parts of the South and East.

Hairy Ruellia

N. J. to Fla.; west to Tex. and Neb.

Here and there on our prairies, where the soil becomes more or less dry during hot summer days, leafy plants of the hairy ruellia (4) bear slender long-tubed blossoms of pale lavender. They may be two or three inches in length, with petals spreading widely at the throat, but being short-lived and few, they make no great showing of color.

VERBENA FAMILY

(*Verbenaceae*)

From the gigantic Asiatic forest tree (*Tectona grandis*), which is the source of the handsome teakwood used by cabinetmakers and builders, to the unassuming little wild flower of the roadsides, members of the verbena family exhibit a wide range of usefulness or beauty. A few make contributions as dyes, oils, and decoctions. The Tropics furnish many of the ornamentals, such as lantanas, callicarpas, and the fragrant verbena familiar in many gardens and so similar to some of our wild species as to suggest that they, too, might well be cultivated.

Prairie Verbena

S. D. to La. and Tex.

From May to September, the rose or blue-lavender flowers of this verbena (5) make patches of bright color throughout dry plains and prairies of the Middle West, and one with larger blossoms occupies similar spots farther east. From June until frost, verbenas in the garden put forth clusters of showy fragrant bloom in all shades from white through lilac and purple to dark purplish blue, as well as pink or yellow.

Roadsides and waste places make a place for the humble blue vervain (*V. hastata*) with spikes of small dark-blue flowers, which merits attention for its reputation among the ancient Romans as a medicinal herb, and with the Druids of Gaul as useful in incantations.



© National Geographic Society

VIVID CLUSTERS OF MEADOW PHLOX (1) SPLASH DRY FIELDS WITH COLOR

Phlox pilosa is a member of a plant genus so widely distributed that it has been suggested for the national flower of the United States. Two Figworts are (2) **Pink Gerardia**, *Gerardia tenuifolia*, and (3) **Yellow Wood Betony**, *Pedicularis canadensis*, with small plumelike blossoms. (4) **Hairy Ruellia**, *Ruellia ciliosa*, is a member of the Acanthus family. The huge Asiatic teak tree and delicate (5) **Prairie Verbena**, *Verbena japonatifida*, are related.

MINT FAMILY*(Menthaceae)*

The mint family needs no introduction, since it is famous the world over for the fragrant volatile oils of peppermint and spearmint, for the savory leaves of thyme, sage, and rosemary, and for many handsome garden plants and wild flowers.

What would the plantation garden of the Old South have been without its bed of mint for juleps?

These two-lipped blossoms borne in stiff spikes have reached such a degree of perfection in their adaptation to the visits of pollinating insects that bees rarely fail to be dusted with pollen on entering the tube of the flower, or to deposit it in turn on ripe stigmas of others. As a result, four sturdy little nutlets in each seed pod suffice for the success attained by the mints in populating the earth.

Wild Bergamot

Maine to Ga.; west to Tex. and B. C.

This wild bergamot (1) has traveled widely, but whether its favorite dry plains and prairies be in Canada or Texas, Maine or Alabama, the bright rose-purple clusters are eagerly sought by bees, butterflies, and hummingbirds. A wild bergamot of moist woods in the East, which is known locally as "oswego tea" (*M. didyma*), is especially gorgeous with flowers of brilliant red; lovely tints of pink, lilac, rose, or crimson are favored by the monarchs of meadows of the Middle West and a variety (*M. media*) to be found in moist thickets farther east. In comparison with these gaily colored beauties, the horsemint (*M. punctata*) of sandy soils seems little more than a homely weed, for the flowers are pale yellowish, spotted with purple, but it yields a fragrant oil.

Hedge Nettle

Newfoundland to N. C.; west to Minn., Colo., and w. Canada

The square stems of this mint (2) may rise stiffly from moist places in almost any part of the country, as also in Europe and Asia. The flowers are arranged at regular intervals along the stem in prim clusters to which the scientific name *stackys*, "spike," refers.

Individually, the pale rose-lavender blossoms, prettily speckled with a deeper shade of the same color, and with long drooping lower lip and tiny hooded upper petal, have a delicate charm much like that of the far-western woodmint (*S. bullata*).

Prairie Sage

Neb. to Tex., and Colo.

In late summer and early autumn, long spikes of blossoms add touches of an exquisite and unusual shade of blue to field and roadside where the prairie sage (3) may have found a foothold. The foliage, downy with soft hairs, is grayish green, and the plants, more or less

branched, sometimes reach a height of three or four feet.

The flat lower lip of the corolla affords a conveniently broad landing platform for the visiting bee, which, on entering the tube of the flower, brushes against the pollen sack above its head. This is attached by a tiny hinged lever which is set in motion at the slightest touch and shakes a shower of pollen down upon the bristly head or back of the nectar seeker. The intruder unwittingly carries a load of pollen to the stigma of the next flower and thus brings with it more than it takes away. So perfect is this mechanism that cross-pollination among the mints rarely fails.

Dragonhead

Quebec to Fla.; west to Tex. and Kan.

This attractive plant (4), having clusters of rose-purple flowers with oddly shaped corollas which have been likened to the head of a dragon, has run away from gardens and taken root in moist soil here and there in the eastern half of the country. It has rather few close relatives, numbering about seven species in North America and some abroad. A few have been found useful in medicine, and one in Siberia is brewed into a tea.

Prunella

Newfoundland to Fla.; west to Calif. and B. C.

The round clusters of purple prunella flowers (5) bloom inconspicuously in fields, woods, and grassy places throughout the country and attract attention more by reason of their quaintness than for any brilliance of coloring or beauty of form. The individual blossom has the flat, drooping lower lip of a typical mint, and the hooded upper one within which two stamens are protected against wetting.

Like many mints, prunella has achieved some reputation in medicine. To this the name bears witness, for it is derived from the German word for "quinsy," and the drug is listed in the pharmacopœia of today.

These diminutive plants are suitable for rockeries or slightly shaded borders and will thrive in almost any soil that is not too dry.

Skullcap

Newfoundland to N. C.; west to Ariz. and Alaska

Skullcap flowers (6) have the flaring lower lip and hooded upper one which characterize the family of mints, but the calyx is so oddly shaped as to set them apart in a separate genus, and also to suggest the name for the group.

The members of this genus are widely distributed over the globe on dry plains, rocky banks, swamps, or gravel slides. The blossoms are usually of some shade of blue or purple, but in some cases are whitish, yellow, or reddish.

The large blossom of the hyssop skullcap resembles a visored helmet.



© National Geographic Society

GOOD LOOKS RECOMMEND THESE RELATIVES OF USEFUL MINTS

On dry plains and prairies from Canada to Texas flourish (1) **Wild Bergamot**, *Monarda mollis*, a favorite source of nectar for hummingbirds, butterflies, and bees. Characteristic of the Mints are square stems, pairs of opposed leaves, and flowers borne in stiff spikes; (2) **Hedge Nettle**, *Stachys palustris*, (3) **Prairie Sage**, *Salvia pitcheri*, and (4) **Dragonhead**, *Dracocephalum virginianum*, (5) **Prunella**, *Prunella vulgaris*, and (6) **Skullcap**, *Scutellaria galericulata*, are less conspicuous cousins.

PEA FAMILY

(*Fabaceae*)

From the tiniest of psoralea blossoms, scarcely one-eighth of an inch across, to the magnificent Spencer sweet peas of the florist, twenty times as large, the members of this family show wide gradations in size, as well as an infinite variety of colors. But with certain exceptions the flower itself exhibits the familiar butterfly form throughout this vast group. It is made up of a bright banner in the usual shape of a broad upright petal, a keel fashioned from two others to resemble that portion of a boat and flanked or often concealed by the two remaining petals known as "wings."

A tiny ovary, which will develop into a pod full of peas or beans, and ten stamens as a rule are so snugly packed away in the keel that it is often only with great difficulty that even the strongest bees can reach the nectar. For the most part the stamen filaments are united into a tube, leaving one free to form a slit for the tongue of bee or butterfly as it probes for sweets.

This family is sometimes divided into three, one containing the sensitive plants, acacias, and their relatives; another the cassias, dwarf and royal poinciana, and the redbuds; and the third, and much the largest and best known, the peas, vetches, clovers, lupines, etc. The simplest flower is that of the acacia, with many stamens and no hint of banner, keel, or wings. The exotic and native sensitive plants have merely reduced the stamens to 10 or less.

The petals become somewhat irregular in cassias and paloverdes, and are distinctly pea-like in the redbud. Close to these among the true peas are the wild indigos, with ten separate stamens, and lupines with them all united into a tube.

There are only two or three other flower families that equal this in size, world-wide distribution, and economic importance. Nutritious foods and fodders, drugs, dyes, poisons, oils, and woods are among its contributions to mankind, not to forget the services rendered by the nitrogen-fixing bacteria of the roots, which enrich the soil and thus serve as nurse crops for other plants, grasses especially.

Sensitive Brier

Va. to Fla.; west to Tex. and Colo.

The feathery rose-purple balls of sensitive brier (1), dotted over with tiny bits of orange-yellow pollen, have failed to retain the family tradition of the "butterfly" pea flower, and hence are placed with the mimosas and acacias in a special group of their own within the larger limits of the family proper.

The weak stems, thickly set with sharp, hooked spines and pretty foliage, trail over the dry soil of midwestern prairies. The leaves, made up of tiny leaflets, are so sensitive to shock that the slightest touch will cause them

to fold together and droop on the stalk. The true sensitive plant (*Mimosa pudica*) comes from tropical America and has flowers only one-third to one-half as large as those of the sensitive brier.

Pink Krameria

Fla. to N. M.; north to Kan.

Krameria departs from the usual by wearing a unique shade of wine red in blossoms that appear like five-pointed stars (2). They have little in common with the sweet pea and its relatives, with their butterflylike flowers, but do bear some resemblance to the simpler members of the family, such as the cassias or partridge peas. The petals differ in size and shape, and the stamens are only four instead of the usual ten.

The fruits are round and barbed, and do not open as does the typical pod of the peas; hence it is easy to understand why botanists disagree about the relatives of this plant, some including it among the simple peas and others placing it in a separate family in their neighborhood.

This species is an herb that is particularly fond of sandy prairies in and about the "Dust Bowl," where it crawls over the soil with a wealth of blossoms in May and June; but the other species are mostly denizens of the deserts of the Southwest. Like other dwellers in hot climates, it has stems which have become woody to form low spiny shrubs, while the leaves have dwindled almost to nothing in face of the need to conserve water.

Blue Wild Indigo

Pa. to Ga.; west to Ind., Kan., and Ark.

Wild indigo flowers are among the handsomest of our natives, for not only are the individual blossoms of unusual size, but they also occur in dense clusters a foot or so long, and are a rare shade of very dark blue (3). The plants are low-growing with attractive foliage, and since they will thrive in ordinary soil with no special treatment, they make excellent subjects for garden culture.

Yellow or White Wild Indigo

Mich. to Minn.; south to La. and Tex.

There are a number of yellowish-flowered wild indigos at home in different parts of the country, but this species (4) is one of the most showy, since the pale cream-colored blossoms are not only unusually large but are arranged in nodding clusters that almost rival those of the wistaria in size. They sometimes grow side by side with the blue wild indigo (3) on midwestern prairies, and are equally easy to introduce into gardens, where they occasionally hybridize with each other.

The wild indigos are most abundant in the southern States, where one species was formerly used in dyeing. However, the indigo of commerce comes from tropical species which are somewhat distant relatives.



© National Geographic Society

BUTTERFLY BLOSSOMS TYPIFY THE USEFUL PEA FAMILY

Foods and fodder, drugs and dyes, are some of the contributions of this plant group to mankind. An exception to the common butterfly form of flower is the feathery (1) **Sensitive Brier**, *Scrankia uncinata*, whose leaves fold and droop at a touch. Large showy blooms cluster thickly on stems of (3) **Blue Wild Indigo**, *Baptisia australis*, a source of medicinal drugs, and (4) **Yellow Wild Indigo**, *Baptisia leucophara*. (2) **Pink Krameria**, *Krameria secundiflora*, belongs to a closely related family.



© National Geographic Society

LOVELY LOCOWEEDS (1, 2) LURE HORSES AND CATTLE TO THEIR DEATH

When feed is scarce, stock acquires a fatal taste for these two poisonous Peas. Less harmful than (1) **Pink Loco**, *Oxytropis lambertii*, is (2) **Purple Milk Vetch**, *Astragalus adurgens*. Prairie dogs store pods of (3) **Ground Plum**, *Astragalus cranicarpus*, for winter fare. (4) **Pink Prairie Clover**, *Petalostemum purpureum*, has straight and narrow leaves. Blossoms of (5) **Purple Amorpha**, *Amorpha canescens*, wear a "halo" of orange stamens.

Pink Loco

Manitoba to Mo.; west to Colo. and Mont.

The pink loco (1) is one of the most attractive of all the so-called "locoweeds," and its large spikes of vivid rose purple make bright patches of color during the long warm summers on the plains and prairies.

Often in the plant world, as among the races of man, a fair exterior is no guarantee of inner worth, and this is eminently true of this section of the pea family, known as "locoweeds" or "crazyweeds," for death by slow poison lies in wait for man or beast that may be inclined to feast upon the foliage.

Fortunately, this offers no attraction to the palate of mankind, and little at first to that of his livestock. However, all too often have the latter been tempted, because of lack of other more palatable feed, to nibble at the leaves, with the result that an enslaving habit is formed as the morphine habit acquired by man.

Losses to stockmen in consequence of the effects of continued indulgence of a taste for locoweeds on the part of cattle, horses, and sheep have amounted to more than a million dollars, and large bounties have been offered by State governments for an effective method of avoiding such loss. Unfortunately, the many chemists who have sought to determine definitely which of the substances in the plant constitute the active poison have as yet failed of complete success.

The effects, however, have been established beyond a doubt, and are such as to give the name of "loco" or "crazy" to the plant, for its addicts stagger about unable to control their muscular or nervous reactions. They become gradually more and more emaciated, and eventually die of starvation.

It is the white form of this locoweed that causes the greatest damage, since it is much more abundant, remains green all winter on the Texas plains, and seems to be considerably more attractive to all kinds of grazing stock than some of the other species.

Purple Milk Vetch

Manitoba to Minn.; west to Colo., Ore., B. C.

The purple milk vetch (2) shares in the evil repute of other locoweeds, although it seems less harmful than many, and much less so than its very near relative, the purple locoweed (*A. mollissimus*), which is especially abundant in Texas. The latter has brown pods and flowers of deep purple, and is apparently relished more by horses than by cattle.

There are a number of other species of astragalus growing on the plains, prairies, and meadows of the Middle West, which differ from each other mainly in the amount of hairiness, shape and size of leaflets, color of flowers, and size of pods, but all possess the typical "butterfly" flowers that distinguish members of the pea family.

Many kinds of locoweeds are cultivated in the Old World, but comparatively few in Amer-

ica despite the presence of numerous species, some of them very handsome and well suited to the flower garden.

Ground Plum

Manitoba to Mo.; west to Tex. and Mont.

This member of the group of so-called "crazyweeds" provides the exception to the rule, for, far from being poisonous, its fruits are quite edible (3). These take the form of thick, succulent pods which are more or less pleasant to the taste and have long been sought by prairie dogs as a desirable addition to their winter store of food. At one time these fruits were under experimentation at the hands of scientists in the United States Department of Agriculture, with a view to increasing their size and succulence and eliminating a certain bitterness, in the hope that they might be more suitable for mankind.

In some species the fruits are beautifully speckled or banded with reddish purple, while others are papery in texture and inflated so that they make excellent "poppers" when crushed.

Pink Prairie Clover

Manitoba to Ind.; west to Ark., N. M., Sask.

Prairie clovers may be white, pink, purple, or violet, and although there is little in the narrow-clawed petals attached to the stamens to remind one of the "butterfly" flower of the true clovers, nevertheless a close relationship exists (4). The name *Petalostemum* is a Greek word referring to the peculiar union between the stamens and petals which distinguishes prairie clovers from other genera of the family.

Throughout July and August on the plains and prairies of the Middle West, the low-growing clumps with finely cut leaves put forth a succession of showy spikes of rose-purple blossoms. A white-flowered species (*P. candidum*) may usually be found near by, but it shows a definite preference for moister soil, so that the two rarely intermingle.

Both these prairie clovers are sufficiently ornamental to be worthy of cultivation in rock gardens or borders, for the foliage is attractive and a succession of delicately tinted blooms may be counted upon.

Purple Amorpha

Manitoba to La.; west to N. M. and Mont.

Silvery-leaved, low-growing shrubs, bearing spikes of blue-purple blossoms with orange stamens, add a touch of distinction to mid-western prairies when the amorphas come into bloom (5). This pretty scientific name means "without form" and indicates that the flowers differ not only from the "butterfly" flower of regular peas, but also from the fluffy balls of the sensitive brier and the star-shaped blossoms of krameria. Each amorpha flower possesses but one tiny petal, but so many of them are crowded closely together in a long spike as to make a good midsummer showing.



© National Geographic Society

WILD COUSINS OF THE GARDEN SWEET PEA PAINT THE PRAIRIES

Patches of (1) **Ornate Sweet Pea**, *Lathyrus ornatus*, and (2) **Goatsrue**, *Tephrosia virginiana*, touch with color unsightly embankments, gullies, and abandoned fields. Trailing (3) **Vetch**, *Vicia americana*, "feels" its way with curling tendrils. Tiny purple blossoms of (4) **Prairie Psoralea**, *Psoralea tenuiflora*, are a foil to bright golden flowers of (5) **Partridge Pea**, *Cassia chamaecrista*.

Ornate Sweet Pea

S. D. to Okla.; west to Colo. and Wyo.

Although not so large or variously colored as the cultivated sweet pea, this little cousin of the open prairies is of sufficient size and depth of color to cast a purple tinge over areas massed with its bloom (1). Railway embankments, roadside ditches, and midwestern prairies that offer adequate moisture may be clothed in a favorable season with the pretty leaves and delicate two-toned blossoms.

The task of pollinating some of the peas presents unusual difficulties to the busy bee, for the nectar is concealed within the tightly closed "keel" at the base of the stamens. In order to reach it, the bee rests on the two wing petals, braces its head against the standard, and by pushing vigorously may succeed in depressing the keel far enough to permit the tongue to enter the opening. As the keel is lowered, the stamens are forced out and up against the body, where the pollen is then deposited.

Relatively few insects are sufficiently strong to accomplish this result, and pea flowers have in consequence perfected the mechanism for self-pollination to such a degree that many are independent of insects.

The beach pea (*L. maritimus*) of eastern lake shores or sea beaches is so similar in size and coloring to this ornate sweet pea farther west as to be scarcely distinguishable, and the crimson sweet pea (*L. splendens*) of southern and Baja California differs in nearly every respect. It is the finest of all wild specimens, with large clusters of blossoms of unusual size and deep-crimson color. The long trailing stems clamber over shrubs on coastal hills to a height of ten feet or more, and bear a profusion of gorgeous bloom that is the wonder and admiration of all beholders.

Goatsrue or Cracca

Maine to Fla.; west to Tex. and Manitoba

The flowers of this lovely plant, known also in common parlance as "hoary pea" and "cat-gut," resemble those of true sweet peas to a marked degree (2), though the plant has no tendrils with which to climb. The Latin name *cracca* means "vetch."

As yet this charming flower has not been introduced to culture, but the home gardener in search of something new may well find it worth experimenting with for massed effects on dry sunny slopes.

Vetch

New Brunswick to Va.; west to Ariz. and B. C.

The rose-purple and pale-pink butterfly blossoms of the American vetch perch on trailing stems which clamber over low shrubs or bushes by means of curling tendrils (3). Meadows or moist soil afford this little traveler satisfactory homes the country over, but it has no

objection to settling down in garden soil if given the least encouragement.

The common vetch (*V. sativa*) is cultivated as a forage crop abroad as well as in this country, where it also serves as a cover crop in orchards. The best-known species for agricultural purposes, however, is probably the Windsor bean (*V. faba*), which is used as food by Europeans, but is grown for cattle feeding in regions of the United States where summer temperatures do not climb excessively high.

The seeds may be an inch or more across in pods a foot or so in length, and although suspected of poisoning anyone who eats them before they are fully ripe, they seem to have been in use since prehistoric times.

The European species of vetch have often escaped from fields into waste places, but, unlike many of the other plant immigrants to our shores, they rarely become noxious here.

Prairie Psoralea

S. D. to Tex.; west to Ariz. and Mont.

These blossoms of dark blue-purple that cluster loosely on silvery stems are of the smallest and yet each is a perfect butterfly flower with standard, wings, and keel within which ten tiny stamens and a wee pod lie snugly housed (4). This species forms one of the most familiar societies of prairies and plains, with both plants and blossoms attaining a larger size where the rainfall is greater. They offer some danger of poisoning to stock, but only when other feed is scarce.

A number of Psoraleas have been used in medicine; one has furnished fiber to California Indians; and the pomme blanche (*P. esculenta*) was known both to the aborigines and to early French voyageurs as having edible tubers.

Partridge Pea

Maine to Fla.; west to Colo. and Minn.

The Cassias are lovers of sunny places and it is not unusual to find the partridge pea (5) forming dense masses in sandy fields or dry open areas in the eastern and middle-western parts of the country. The showy flowers of a rich golden yellow, frequently decorated with a purple spot at the base of each petal, spring from short stalks in the axils of the finely cut leaves. They are unusually ornamental and well fitted to form in a short time an attractive feature of sandy roadsides.

The sensitive nature of this species apparently varies with conditions, since the leaflets on plants in the drier part of its range respond only slightly when touched vigorously, though they will close rapidly when a branch is plucked from the parent stem.

Most of the species of Cassia are tropical, and it is from the leaves of natives of far-eastern Syria and Arabia that the drug known as "senna" is derived. The partridge pea may contain some trace of a similar constituent, since it cannot be eaten safely by stock.



© National Geographic Society

WITCH HAZEL (1) WITHHOLDS ITS RIBBON FLOWERS UNTIL THE EVE OF WINTER

Fluttering yellow fringes of *Hamamelis virginiana* gleam above bright autumn leaves. Its bark and leaves yield witch-hazel extract. The crinkled, square-faced flowers of (2) **Trumpet Evening Primrose**, *Oenothera lavandulæfolia*, change from yellow to reddish brown as they wither. By opening its blossoms in the morning, the (3) **Prairie Evening Primrose**, *Oenothera serrulata*, belies its name. (4) **Scarlet Gaura**, *Gaura coccinea*, is a third member of the Evening-Primrose family.

WITCH HAZEL FAMILY*(Hamamelidaceae)*

The witch hazel family has few representatives in North America, the majority being natives of Japan, India, and Cape of Good Hope. Among them all, our liquidambar, or sweet gum, stands out as the most beautiful. It has fine-grained wood and fragrant leaves which take on such brilliant colors in autumn in this country that the trees stand out conspicuously in the swampy woods of the East.

Witch Hazel

Nova Scotia to Fla.; west to Minn. and Tex.

Low-growing witch hazel shrubs (1) delay their blossoming until the bright-hued leaves of autumn strew the ground and trees and shrubs stand stark and bare. Then, out from tight brown buds in cream-colored calyx cups, unfurl narrow ribbonlike petals of pale yellow. There are only four to a flower, but the clusters make a beautiful showing of wavy fringe and spots of color in the winter woods. It is not until the following autumn that the seeds ripen in the pods, which then pop open with such vigor as to scatter the contents briskly to some distance in all directions.

The seeds contain a useful oil, and both leaves and bark are sources of the popular extract of witch hazel.

Witch hazel shrubs come into bloom in late fall and early winter when scarcely any other shrub still retains its flowers. The blossoms of some of the species in northern latitudes are not injured even when the temperature falls to zero. Before the flowers appear on bare branches, the leaves make a brave showing of color by turning bright yellow, orange, or purple.

EVENING PRIMROSE FAMILY*(Onagraceae)*

The flowers of this family are not primroses, nor do most of them open in the evening; neither does their preferred time of blooming correspond to the original meaning of the word primrose as indicating "the first flower of spring." Nevertheless, as with many common names of plants, the name "evening primrose" has come to set apart a large group of striking flowers, many of which blossom in the morning or evening to last but a single day.

At first glance, the flower of an evening primrose might be mistaken for one of the mustard family, since both have four petals placed at right angles to each other. But here the resemblance stops, for in the evening primrose the petals are borne on the long calyx tube which crowns the ovary, and the stamens number eight. The calyx tube may reach half a foot in length in some species, but in such a case the nectar may rise an inch or more so that it can be sipped by long-tongued moths.

A number of unusually showy species are to be found within the limits of the evening primrose family, including the rose-purple

Clarkias and Godetias of California, the Fuchsias, Epilobiums, Lopezias, and Oenotheras. Of the latter, the yellow evening primrose (*O. missouriensis*) of limestone cliffs and barrens in the Middle West and Southwest, bears blossoms sometimes six inches across.

An almost equally large-flowered species (*O. caespitosa*) of western hills and the Rocky Mountains unfolds crinkly white petals in from two to seven minutes as dusk begins to fall. Sphinx moths await access to the honey, and after their visits the flowers gradually droop, fading to a rosy pink by morning.

Trumpet Evening Primrose

S. D. to Tex.; west to Ariz. and Wyo.

The decumbent plants of the trumpet evening primrose (2), with clusters of narrow leaves, may be found in open sunny places throughout the plains and prairies of the West and Middle West. The flowers are borne in the axils of the leaf clusters at intervals along the stem, where they bloom in succession from the lower part toward the upper end. Thus one may see at any one time an unopened bud with enclosing calyx colored rose purple and green stigma emerging at the pointed tip; a full-blown blossom whose silky crinkled petals bend back sharply from the "trumpet tube" to reveal eight anthers bursting with yellow pollen; and an older flower that changes from bright yellow to reddish orange as it wilts and fades.

Prairie Evening Primrose

Manitoba to Mo.; west to Tex., Ariz., Alberta.

This little evening primrose (3), with bright-orange buds, blossoms of cheery yellow, and leaves cut into teeth along the edges, blooms from May to July in the dry soil of the prairies. It should, however, be called "morning primrose," since the flowers reverse the order of blooming by opening in the morning and closing in late afternoon.

The common evening primrose (*O. biennis*), however, is more orthodox, opening at dusk and so quickly that the movement is plainly evident. Hawk moths are fond of this denizen of waste places and flutter about as the daylight wanes, awaiting the opening of bright-yellow blossoms well supplied with nectar.

The root of this species is sweet and edible; and the plant yields a remedy used for coughs and asthma, but on the whole evening primroses have no economic value.

Scarlet Gaura

Manitoba to Tex.; west to Ariz. and Mont.

Gaura flowers individually have a quaint and delicate charm, but they make no great showing as loose clusters on rather rangy, leafy plants (4). The color is normally a pale coral pink, but as the petals age they take on a deep scarlet tinge that increases their attractiveness, especially as stems and capsules are often reddish also, and the anther sacs are crimson.



© National Geographic Society

BLOOMS BURST FROM SPINE-GUARDED "WATER BOTTLES"

Members of the Cactus family have merged stems, branches, and leaves into tough-skinned, bulbous reservoirs. If unchecked (2) **Western Prickly Pear**, *Opuntia humifusa*, and (3) **Spiny Prickly Pear**, *Opuntia polyacantha*, overrun the land and ruin it for grazing. (4) **Purple Cactus**, *Mamillaria vivipara*, displays asterlike flowers. At dusk, (1) **Evening Star**, *Mentzelia ornata*, unfolds creamy blossoms. (5) **Meadow Beauty**, *Rhexia virginica*, bears its family name.

EVENING STAR FAMILY*(Loasaceae)*

Evening-stars constitute a small but interesting family characterized by stinging or barbed hairs on stems and leaves, and beautiful star-shaped flowers. The barbs are small enough not to cause wounds, but sufficiently numerous to impart a roughness to stems and leaves which enables them to cling closely to whatever they touch. A boutonniere of mentzelia blossoms needs no fastening other than firm pressure against the clothing.

Evening Star

Manitoba to Iowa; west to Tex., Nev., Alberta.

Night-flying insects are attracted by the fragrance of the large cream-colored blossoms of this evening star (1), as the petals fold back in late afternoon or early evening and reveal an abundance of pollen on the dense clusters of stamens in the center. The foliage of these stately plants may likewise claim a share of beauty, for the prettily scalloped leaves are silvered over with hairs which feel rough to the touch, and the stems or pods often show a flush of pink.

An especially beautiful evening star (*M. aurea*) of the Pacific coast should be rechristened "morning star," since it prefers to reverse opening and closing times. It too is fragrant, but differs in having a smaller number of broader petals of rich yellow and orange-red centers. Gravel slides in the Rocky Mountains are often starred over in early summer evenings with bright-yellow ten-pointed blossoms of another evening star (*M. multiflora*) on stems that stick to clothing most tenaciously.

CACTUS FAMILY*(Cactaceae)*

Since the cactus craze has swept the country of recent years, one scarcely needs a formal introduction to this family of spiny plants of weird and fantastic shapes, which produce blossoms of such unrivaled beauty. Cactus plants have no true leaves, but their stems and branches have been developed into reservoirs of water stored against the demands made by the heat and drouth of the desert climates where they are most at home. They may take the form of rotund barrels, or of immense branched trees towering up thirty or forty feet; some appear like rows of organ pipes and others like stunted shrubs bristling with spines. Many have fruits that are eaten by natives of the Tropics or exported to other regions, and the spineless forms may be used as fodder for cattle.

Western Prickly Pear

Minn. to Tex.; west to Colo. and N. D.

Prickly pears had long been cultivated by the aborigines of this country when the early Spanish explorers appeared. Attracted by their edible fruits and odd appearance, they took

the plants to Spain and Spanish colonies, whence the culture eventually spread to all arid and semiarid countries. Wherever grown, however, the plants show a tendency to escape and become persistent and troublesome weeds.

Undesirable though the prickly pear may be from the point of view of agriculture and grazing, there is no doubt that the large silken-petaled blossoms of clear lemon yellow (2) or glowing magenta pink are exquisitely beautiful.

Spiny Prickly Pear

Minn. to Mo.; west to N. M., Utah, B. C.

All opuntias, or prickly pears, have about the same qualities as those mentioned above, though only a few of the species are chosen for cultivation. The finest nowadays are grown in Sicily, where they are used as food.

The spiny prickly pear (3) is so abundant in some parts of middle-western plains, especially where cattle have eaten out the grasses, that it threatens to ruin the land permanently. Over vast areas the plants grow so thickly that it is difficult to find one's way between them. Methods of eradication and control are being tried out today, but as yet nothing completely satisfactory has been discovered.

The yellow prickly pear (*O. engelmanni*), in addition to possessing edible fruits, is an excellent honey plant, especially in Texas, where it is unusually abundant.

Purple Cactus

Manitoba to Kan.; west to Colo. and Alberta.

Mamillarias may be recognized by the small globular stems carved into nipplelike protuberances, and by flowers with several rows of narrow petals. The purple cactus illustrated (4) belongs to this group and is to be found in dry or rocky soil of western plains. It never becomes so abundant as the prickly pears, but the flowers are individually attractive, with silken petals of brilliant magenta.

MEADOW BEAUTY FAMILY*(Melastomaceae)*

This family of tropical plants is represented in our country by a scant number of species that have found sandy swamps and shores or boggy places suited to their needs. Certain drugs, oils, and dyes are to be had from some of them, and an unusual edible berry that dyes the mouth black. The Greek name for the family refers to this peculiarity, for *melastoma* means "black mouth."

Meadow Beauty

Maine to Fla.; west to La. and Iowa

This meadow beauty (5), with bright rose-purple blossoms and reddish urn-shaped calyxes, associates with pitcher plants and cranberries in low meadows or bogs throughout the East and Middle West. It is a favorite in English gardens and should also find favor in this country, since it is one of the few herbaceous species in a family of tropical shrubs.



© National Geographic Society

HERALD OF SPRING IS THE ENQUISITE TRAILING ARBUTUS (2)

In evergreen woods of the North and East, fragrant clusters of *Epigaea repens* appear as soon as the snow melts. The drooping blossom of (1) *Monarda uniflora*, and nodding flowers of (3) **Green Pyrola**, *Pyrola chlorantha*, hide in moist and shady woodlands. These first three belong to the Heath family. A member of the Bellflower clan is (4) **Bluebell**, *Campanula rotundifolia*. Among the Lobelias are (5) **Cardinal Flower**, *Lobelia cardinalis*, and (6) **Blue Lobelia**, *Lobelia siphilitica*.

HEATH FAMILY*(Ericaceae)*

England, Scotland, and northern Europe may justly take pride in the rosy carpet which the true heaths and the heather spread over vast moorlands when the tiny rose-purple bells come into bloom. In contrast to the massed effect of small flowers, our own rhododendrons and azaleas achieve a superb showing by means of large clusters of handsome blossoms.

A further contrast is offered in the quality of honey obtained from each. That from wee heather blossoms is sparkling in color and of an unusual fragrance and flavor; that which their magnificent cousins on this side of the water produce is extremely poisonous. The army of Xenophon is said to have been severely poisoned by eating a honey from the blossoms of rhododendrons growing on the shores of the Euxine Sea (now the Black Sea).

Other poisonous members of the heath family are the kalmias, frequently called "lambkill" from the effect they have on grazing animals. On the other hand, this family also contributes some of our choicest fruits, such as huckleberries, blueberries, and cranberries.

Moneses

Greenland to Pa.; west to Colo., Ore., and Alaska

The Greek name "single delight" aptly designates this tiny heath (1) with fragrant waxy-white or rose-tinted blossom on bent stem, for there is only one flower to a plant and it is indeed charming. It is a shy and solitary plant, found growing in moist, cool woods of the North, on brook banks in spruce forests of the Rocky Mountains, or in similar places in Europe and Asia.

Trailing Arbutus

Newfoundland to Fla.; west to Ky. and Sask.

As soon as the snows have melted, one may seek the exquisite clusters of pale pink, spicily fragrant blossoms of trailing arbutus (2) in the evergreen woods of the country bordering the Great Lakes, especially where the soil is somewhat rocky or sandy. If some care is taken in removing a large portion of the soil around the roots so as not to disturb them, the plants may be coaxed to grow in the garden, especially if placed to root in a cold frame where there is little or no sunlight, in sandy peat soil mixed with a little loam.

Green Pyrola

Labrador to B. C.; west to Calif. and B. C.

The pyrolas are all lovers of cool woods, where their straight, rather stiff stalks rise from clusters of evergreen leaves and bear small nodding flowers in a vertical row. In some species these may be cream-colored; in others pink; but all are delicately tinted (3). As a rule, they possess little nectar or other attractions for insects, and in consequence have

perfected a method of their own for effecting self-pollination.

BLUEBELL FAMILY*(Campanulaceae)*

The flowers of bluebells and lobelias look quite different in external appearance, but in both groups the corollas are attached on top of the ovary, and there are other important similarities of structure which warrant their being placed in the same family. They are also alike in possessing a milky juice in stems and leaves, but that of the bluebells is harmless, while the juice from the lobelias will blister the skin and cause serious internal inflammation.

Both groups provide the florist or home gardener with charming varieties, of which the huge clusters of the Canterbury bell, the scarlet cardinal flowers, and purple lobelias are the most beautiful and popular.

Bluebell

Labrador to N. J.; west to Ariz. and Calif.

The lavender-blue, perfect bell flowers of this bluebell (4) may nod a greeting from grassy slope or rocky bank almost anywhere in the Northern Hemisphere, for it is found the world round in favored spots. On the middle slopes of the Rocky Mountains of Colorado the plants grow tall and slender and produce many blossoms; but in alpine meadows the stems are only a few inches in height, with but a single large flower to a plant. In addition to an enormous variation in size of flower, from a quarter of an inch to an inch in length, there is an equally striking variability in form, from shallow, almost saucerlike corollas to deep goblet- or narrow tube-shaped ones.

These differences are responses to the amount of water available during the season, or in local situations where the particular plant grows. An individual rooted on a warm slope where the soil water evaporates quickly will produce smaller flowers than one in moist shade.

Cardinal Flower

New Brunswick to Fla.; west to Tex., Colo., and Sask.

Showy clusters of brilliant vermilion-red flowers on tall, leafy stems mark the spots in the East and Middle West where the cardinal flower (5) finds moisture to suit its needs. Hummingbirds, always attracted by this color, wing their way unerringly to the nectar and with their long bills find no difficulty in reaching it at the bottom of the slender tubes.

Blue Lobelia

Maine to Ga.; west to La., Colo., and S. D.

The blue lobelia (6) equals the cardinal flower in size and beauty of flower, but offers a striking contrast in color, since it is intensely blue. Moist soil in the native haunts is favored by the leafy-stemmed plants with blossoms in dense racemes and they do well in gardens.

ASTER FAMILY*(Asteraceae)*

The aster family comprises within its wide limits an enormous number of species of every degree of attractiveness, from tiny greenish wayside weeds such as the ragweed, whose wind-borne pollen is a trial to hay-fever sufferers, to magnificent dahlias and chrysanthemums.

Among such a host are many that are useful as tonics, drugs, or stimulants, food and forage, dyes, medicines, beverages and poisons.

Together with the grasses, the asters, or "composites," as they are sometimes called, bid fair to inherit the earth and in time to eliminate competitors in the plant world. Hence the need of conserving less hardy wild flowers that suffer in the struggle for existence.

Despite the striking differences in outward appearance of these two most successful groups of flowering plants—the asters and grasses—both have developed in their inflorescences communities of flowers that specialize in the processes that go to produce numerous strong seeds. For instance, the aster community is represented by what a casual observer would consider a single flower, but which is called a "composite head" by the botanist and is made up of a large number of individual flowers.

Part of the success attained by the asters in producing many new plants and spreading rapidly is due to the fact that this group of seed-making flowers matures successively from the outer edge of the disk toward the center. The result is that pollen is produced over a long period with greater certainty of fertilization being accomplished by the many more visits, necessitated by this habit, on the part of the bees and butterflies.

The last touch of efficiency in this flower community may be found in the new duties assigned to the calyx of each blossom. This little "cup" of green leaves is considered to act as a protective and food-making device for most flowers, but aster flowers are crowded so closely together in a head that they protect one another, and already have plenty of food supplied by the other green leaves of the plant, especially those of the involucre. Then the calyx often develops into a device for carrying the ripe seed to its new home, or into hooks and spines which carry beggar-ticks far and wide to start communities in other regions.

Rose Gaillardia

Neb. to La.; west to Colo. and Ariz.

The dull expanse of short-grass plains in the south-central part of the country may be splashed with great patches of vivid color when the rose gaillardia (1) comes into bloom. The plants are especially abundant in Texas, where they constitute a source of excellent honey.

The flower heads are reddish purple with yellow tips to the rays, whereas the perennial gaillardia (*G. aristata*) of western plains has orange-red centers and bright-yellow rays, often with a crimson spot at the base.

Rose Coneflower

Colo. to Tex.; west to Mont. and Sask.

The stout stems of the coneflower stand stiffly here and there in the vegetation of the prairies and for two months or more of summer bear large heads with prickly red-brown centers and long, drooping rays of pale pink or rose color (2). A somewhat deeper hue is worn by the purple coneflower (*E. purpurea*), of rich, moist soil in the East and Southeast.

The sharp angle at which the rays hang, and the high, conically shaped center distinguish these coneflowers from the closely related black-eyed Susans, which are sometimes called "coneflowers" also. Their centers, moreover, are not so high and are soft to the touch, while this genus, named *Echinacea* from a Greek word meaning "hedgehog," has rounded centers that are distinctly prickly to the touch.

Blue Lettuce

Saskatchewan to Mo.; west to N. M., Calif., British Columbia

The blue lettuce (3) still runs wild in prairies and wet meadows, although its sister, the garden lettuce, has been in captivity ever since 400 B.C., when records indicate it was served at the tables of Persian kings. Under cultivation the leaves have developed at the expense of the flowers.

The Latin name for lettuce is derived from the word for "milk" and refers to the thick white juice which exudes from broken stems and is said to have been used for insomnia. Other close relatives of the lettuce are the chicories, with roots that are roasted and mixed with coffee; endive, used in salads; and the oyster plant, the root of which is served as a vegetable.

Golden Ragwort

Newfoundland to Fla.; west to Tex., S. D., Manitoba

The greater number of our ragworts have yellow centers and yellow rays, but the name *Senecio*, derived from the word meaning "old man," has been given to them, since, when the seeds float away, it is by means of a pappus of white hairs, and they leave behind a naked disk more or less resembling a bald head. Many of the plants have a covering of white hairs.

There are many different kinds of ragworts, or groundsels and squawweeds, as they are also called, distributed throughout the country, but the golden ragwort (4) must be looked for in swamps and wet meadows. The strong-scented root was formerly used in aboriginal medicine and is still important in commerce.

Pink Othake

Neb. to Tex.; west to N. M. and Colo.

This pretty plant (5) with the odd name can be found occasionally in the dry soil of mid-western prairies, from July to September.



© National Geographic Society

HARDY ASTERS LIFT CHEERFUL FACES TO THE SUN

"Carpets" of (1) **Rose Gaillardia**, *Gaillardia pulchella*, cover the plains in the southern Middle West. Prickly "hedgehog" centers and down-curving rays of (2) **Rose Coneflower**, *Echinacea angustifolia*, stand on stout, stiff stems. (3) **Blue Lettuce**, *Lactuca pulchella*, is a cousin of the garden vegetable. Away on "kites" of white down float the seed of (4) **Golden Ragwort**, *Senecio aureus*. Dainty (5) **Pink Othake**, *Othake sphaerolata*, blooms on dry soil.

Showy Goldenrod

Nova Scotia to N. C.; west to Ark., Kan., Minn.

Of the numerous species of goldenrod, all but three or four are natives of North America, and each section of our country has its own particular favorites. This so-called "showy goldenrod" (1), however, is fairly widespread, being found in rich soil from Massachusetts and North Carolina in the East to Minnesota, Tennessee, and Arkansas in the Middle West. It is one of the many that cling to the traditional flower cluster of the group.

There are, however, so many species and varieties of goldenrod, with such difficult distinctions between them, that none but the specialist or the honeybee can tell them apart. The latter rarely makes mistakes, and when working on a certain kind will visit it regularly, even though there may be several other sorts in the vicinity.

Other insects with which goldenrods are prime favorites are not so critical and will swarm by the hundred over any and all species. The small green ground beetles and ladybugs are in search of plant lice and insect eggs; the blister and soldier beetles compete with honeybees in seeking nectar, while some very tiny insects end the day's work by crawling deep within the florets to spend the night in cosy comfort. Man utilizes goldenrod tannins and volatile oils in medicine.

Stiff Goldenrod

Ontario to Ga.; west to Ark., Kan., Sask.

The stiff goldenrod (2) is distinguished by the unusual flat-topped form of the flower cluster and also differs in preferring sandy, gravelly, or rocky slopes of hills rather than the moisture of meadow lands.

Goldenrods are so common that it is not often considered worth while to grow them in the garden to any degree. However, they are very easy to transplant from their native haunts, and under cultivation will improve in size and abundance of bloom. They are especially ornamental when planted together with the wild asters invariably found with them in nature, for the yellows of the goldenrods combine most artistically with the purple and lavenders of the asters.

Button Liatris

Minn. to Fla.; west to Tex., Neb., and Manitoba

The species of *Liatris* are often known as "blazing stars," for no reason that meets the eye, since the flowers are bright rose purple or lavender and not the conventional yellow ascribed to stars. Moreover, the inflorescences are dense spikes, consisting of buttonlike clusters of individual flowers closely crowded on stiff stems, and are not the flat five-petaled blossoms so often alluded to as "starlike."

However, the coloring of the two common species of *Liatris* is brilliant enough to be termed "blazing," and perhaps especially so

since the flowers appear in late summer or early autumn when other blooms have passed out of the picture.

The rose-lavender flowers of the button *liatris* (3) are crowded thickly together into sheathing cups of brightly colored crimson bracts, and the heads are attached to stiff stems at frequent intervals. Long, slender styles, matching the blossoms in hue, emerge from the mass and intermingle in a way that adds a touch of grace to an otherwise ungraceful plant. This prefers the dry soil of the true prairie of the Middle West, but a similar species (*L. squarrosa*) lives on mixed prairies farther east.

There are a number of races of *Liatris* differing in leaf form and size of heads, and among them some are hardy perennials well adapted to planting in the wild-flower garden, where they require no special care. Grouped in masses, they form bright patches of color in late summer and autumn when other plants have ceased blooming.

Although of no particular value in supplying man with drugs or food, the rhizomes of several species yield an aromatic drug.

Mistflower

N. J. to Fla.; west to Ark., Kan., and Mich.

An aura of antiquity hangs about this delicately pretty plant of meadow and garden (4). Its scientific name recalls Mithradates Eupator, an ancient King of Pontus, who employed a related species as a counterpoison, thus setting a precedent for its use in modern medicine. The rough joe-pye weed of New England seems to have served the Indian herb doctor in somewhat the same way during pioneer days. The plants are larger than those of the mistflower, and the flower heads are a rich rose purple instead of the misty blue which gives rise to the name for this species, also called "blue boneset."

It is a favorite of old-fashioned gardens, and is popular in some localities as a household remedy. For this purpose a hot infusion or "tea" is made that is considered useful in the early treatment of colds, sore throat, and similar acute infections.

Ironweed

Ohio to Okla.; west to Neb., Kan., Minn.

The dark reddish-purple clusters of ironweed (5) bloom in late summer and may linger on into October, making rich spots of color in fields and roadside ditches when little else is in flower. The plants are large and robust and may be easily cultivated in any rich soil, where they may perhaps best be grouped with other late-blooming composites.

The masses of dark-purple, yellow, and lavender-blue flowers that result, especially when the mistflower is added to the group, are strikingly beautiful, and have the further advantage of providing honeybees with nectar when the supply has been reduced elsewhere.



© National Geographic Society

TO TELL APART THE MANY GOLDENRODS TAKES A BOTANIST—OR A BEE.

Often discriminating honeybees collect nectar from one species at a time. All Goldenrods but one are bright yellow; yet the insects rarely fail to distinguish them. Moist meadows are the haunts of (1) **Showy Goldenrod**, *Solidago speciosa*, while (2) **Stiff Goldenrod**, *Solidago rigida*, prefers sandy or stony slopes. Other members of the Aster family are (3) **Button Liatris**, *Liatris scariosa*, with feathery bloom, (4) **Mistflower**, *Eupatorium coelestinum*, and hardy (5) **Ironweed**, *Vernonia fasciculata*, which decorates fields and roadsides in September.

Smooth Aster

Maine to Va.; west to La., Mo., Colo., and Sask.

Dainty flowers with delicate tints belong to the springtime. A varied host of more brilliant coloring, fitted to survive the heat and dryness of long summer days, then take possession of the fields. Although some may linger on, it is the asters and goldenrods that reign supreme through the autumn. Side by side, these sturdy plants, adapted to warm days and frosty nights, mingle complementary colors of golden yellow with violet or rose purple.

Asters are especially abundant in North America, whence many of the handsomest species have been taken across the water and grown in European gardens, sufficiently long and successfully to be considered deserving of special names for the resulting varieties. From abroad, many of these have again been returned to this country to be introduced into gardens.

The smooth aster (1) is one of the loveliest of these so-called "starflowers," because of the many slender rays about a golden center and the aggregation of the numerous blue-violet heads in a close panicle. It is not exacting in its requirements and will succeed in good soil in either full sunlight or partial shade.

A late-flowering aster (*A. novi-belgii*) of similar color, is frequent in swampy soil near the Atlantic coast, while in the Far West the common aster (*A. chilensis*) is found in the valleys and foothills of parts of California.

New England Aster

Quebec to S. C.; west to Ala., Colo., and Sask.

The superb clusters of rich rose-purple blossoms of the New England aster (2) should be awarded the prize for stately beauty in the floral pageant from August to October, when they exhibit a profusion of bloom in fence rows or other sunny situations where moisture still lingers. This preference affords a hint that may well be taken into account when transferring to the garden, where but little shade, if any, together with moist soil, will make this plant feel very much at home.

In company with lavender and white asters, and yellow goldenrods, New England asters offer the landscape architect a wealth of material for roadside beautification.

Boltonia

Conn. to Fla.; west to La., Neb., Minn.

For all practical purposes, boltonia (3) may be treated as an aster, though the fruit exhibits one or two technical differences. It is named for an English professor of botany. It is a pretty plant, with smooth leaves and head with rose-pink rays and yellow centers, which may be found in moist places and along streams in the East and Middle West. The plants grow tall and leafy and bear a profusion of bloom in late summer. This makes it of especial value for highway landscaping where unusual moisture is available, since there are few showy species adapted to growing in such situations.

Boltonias are easy of cultivation, and need little care when once well established.

Prairie Coneflower

Minn. to Tex.; west to Ariz., Mont., B. C.

There are three common genera in the aster family that are popularly known as "coneflowers," since all are characterized by unusually well-developed centers to the flower heads. The individual species, however, present distinct differences in the shape and texture of the "cones." The rose coneflower (*Echinacea*, Plate XVII), for instance, has a symmetrically rounded center that is rough and prickly to the touch, while black-eyed Susan (*Rudbeckia*, 5) receives its name from centers that are dark brown, firm and satiny, and the prairie coneflower (*Lepachys*) is distinguished by "cones" that are soft and furry, slender, and sometimes as long as two inches or more (4).

Still another characteristic that marks this species with distinction is to be found in the remarkable ray flowers that are frequently almost as broad as long, and sometimes reach a length of one and a half inches. The color is usually a bright golden yellow, but a handsome variety with a maroon-red splotch at the base of the ray is not uncommon and occasionally the entire ray is similarly colored.

Black-eyed Susan

Ont. to Fla.; west to Tex., Colo., and Manitoba

The "black eyes" of "Susan," which reflect the light with a satin sheen, are the chocolate-brown, firm-textured centers of flower heads with long spreading rays of brightest yellow (5). Groups of these plants with stiff, bristly stems and rough leaves brighten meadows and moister prairies from May to September.

Rudbeckia is the third member of the popular trio of coneflowers, and when its shining gold is associated with the rose purple of *Echinacea*, and the maroon-tinged *Lepachys*, a truly interesting floral combination results. Like these others, it is remarkably easy of cultivation and will thrive in situations that are too hot and dry for less hardy species.

Of those that are more exacting in their water requirements, the tall coneflower (*R. laciniata*) which prefers brook banks when growing wild, will give rise to unusually large and greatly doubled forms in the garden, where it is deservedly popular under the name of "golden glow." Autumn glory and autumn sun are varieties of still another species (*R. nitida*). The former has a longer period of blooming, lasting sometimes until Jack Frost rings down the curtain on the floral parade. Autumn sun, with bright primrose-yellow blooms, may reach a height of six feet and will flower from August to October.

Another coneflower (*R. triloba*) forms dense twiggy bushes about three feet tall and wide, and bears a profusion of heads similar to those of black-eyed Susans, though smaller. The tall coneflower may be poisonous to sheep.



© National Geographic Society

PAINTY STAR FLOWERS PROVE "SHE LOVES ME" OR "SHE LOVES ME NOT"

Through warm days and frosty nights of autumn, the Aster clan strews fields with matching hues of yellow, violet, and rose purple. The (1) **Smooth Aster**, *Aster laevis*, is content in dry exposed areas, while (2) **New England Aster**, *Aster novae-angliae*, thrives on moist soil. In late summer streamsides are spangled with (3) **Boltonia**, *Boltonia asteroides*. Furry-soft cones and short broad rays identify (4) **Prairie Coneflower**, *Lepachys columifera*. From May to September, ranks of (5) **Black-eyed Susan**, *Rudbeckia hirta*, toss their gold-and-brown heads.

Stiff Sunflower

Ill. to Ga.; west to Tex., Kan., Minn.

In that season of the year when the great disk of the sun delays its rising and hastens its setting, miniature floral suns blaze in fields, prairies, and along roadsides, where they are popularly believed to turn their faces ever toward the golden orb in the sky above them.

This pretty fancy, however, will not survive in the face of plain truth, for, more often than not, it is the wind that causes the flower heads to turn in the same direction, and though that may often be toward the position that the sun is occupying at the moment, it is not always so.

Sunflowers in general and the common species (*H. annuus*) in particular are not popular with the farmer, who looks with no friendly eye upon this robust adventurer into his fields, for, unless repulsed, it soon takes full possession to the detriment of cultivated crops. Nevertheless, Kansas has selected this species of *Helianthus* as the State flower, and the Incas of Peru exalted it to a high position in their ceremonies of sun worship.

Starting as a modest plant of the plains, the common sunflower has responded to cultivation to such a degree that many varieties of unusual height and size of flower head have been produced, some growing as tall as 12 to 15 feet with heads a foot or more in diameter. The seeds become so large as to be used as an article of food in foreign countries, and as feed for poultry and birds here. In addition, they yield an oil that is an important article of commerce, and the stems yield a fine fiber comparable to silk.

The Jerusalem artichoke (*H. tuberosus*), which is not an artichoke and does not come from Jerusalem, is a sunflower with an edible tuber that was first appreciated by the Indians, and is still extensively cultivated.

Although not commercially valuable, the stiff sunflower (1) offers an attractive addition to the garden. It is remarkably easy to grow and may reach a height of eight feet under favorable conditions.

The flower heads present a pleasing contrast of brown centers and golden rays, much like those of California's bush sunflower (*Encelia californica*), a handsome shrub of the coastal hills.

Rough Oxeye

Maine to N. J.; west to N. M. and British Columbia

Oxeyes (2) are tall, leafy plants bearing numerous attractive bright-orange flower heads that come into bloom in late summer. Although not generally cultivated, they are well suited for the back of borders and deserve greater popularity in home gardens. They might easily pass for sunflowers, except for the fact that the ray flowers, instead of falling back from the head, turn dry and persist as they do in zinnias of the garden.

Tickseed

Pa. and Del.; west to Tex., Kan., Ill.

Tickseeds, sticktights, and beggar-ticks are all names that have been applied to the genus *Bidens*, which means in Latin "two-tooth." All these terms refer to the little flat fruits with two hooked prongs at one end that enable them to catch hold of anything with which they may come in contact, and so get free transportation to other places.

Many species of *Bidens* have insignificant flower heads that may often entirely lack encircling rays; but some, like the one illustrated (3), are quite showy, with large heads and conspicuous bright-yellow rays. As a rule, these are fond of wet places and are found in swamps, ponds, or along the banks of streams. It is probably this liking for water that has prevented their being more generally introduced into gardens in contrast to their close relatives, the dahlias, cosmos, and coreopsis, which are all prime favorites under cultivation.

Golden Coreopsis

Minn. to La.; west to Ariz., Neb., Alberta

With broad rays warmly golden in color and rich crimson in the center, with tall, slender, branching stems and beautifully cut foliage, coreopsis (4) transforms ditch banks or wet places into gardens of loveliness. Although the seeds look much like those of its less popular close relatives, the tickseeds (3), they are not so well provided with hooks and are less likely to travel and become nuisances.

Wavy Thistle

Mich. to Tex.; west to Ariz. and B. C.

The wavy thistle (5) has leaves covered with a dense white wool, and the plants are large and handsome, with flower heads colored a rich rose lavender. A near relative, termed the "yellow-spined thistle," is armed with innumerable long, yellow spines, which qualify it as the prickliest member of the genus. The western thistle (*Cirsium occidentale*) of the Pacific coast wears an unusually deep shade of crimson, and takes possession of sandy soil from Baja California to Oregon.

The name "thistle" has been applied to a variety of plants, but belongs properly only to those members of the aster family that have large heads of tubular florets, typically armed with stiff prickles. For instance, the Russian thistle, far from belonging to the aster family, is a relative of beets and spinach in the family of the "goosefoots."

Neither the Canada thistle (*C. arvense*) nor the Scotch thistle (*Onopordon acanthium*) is a native of the land for which it is named. The former is actually a stowaway immigrant from Europe, and the latter is not even known to grow in Scotland at all! The exact species honored as the Scottish national flower cannot be definitely known, since it was so chosen in the thirteenth century when only traditions and not science were sources of information.



© National Geographic Society

TALL SUNFLOWERS ARE MINIATURES OF THE SKY'S GLOWING ORB

Brown centers contrast with butter-colored rays of (1) **Stiff Sunflower**, *Helianthus rigidus*, which may grow eight feet high. Tall and handsome (2) **Rough Oxeye**, *Helopsis scabra*, forms a bright background for the garden. Pronged "hitchhiking" seeds, which catch on anything that brushes by, name (3) **Tickseed**, *Bidens involucreata*. Relatives are (4) **Golden Coreopsis**, *Coreopsis tinctoria*, and (5) **Wavy Thistle**, *Cirsium undulatum*, with woolly stems and leaves.

SPIDERWORT FAMILY*(Commelinaceae)*

Spiderworts belong to that division of the plant kingdom called "monocotyledons," since the tiny plant as it bursts from the seed has but one seed leaf instead of two. Later, when the mature leaves appear, they are frequently long and narrow like grass leaves, or, if broader, can be distinguished by the veins which run parallel to each other instead of forming networks or branching freely as they do in most plant families. The flowers of spiderworts have three green sepals and usually three brightly colored petals that last only a short time after the bud opens.

There are but few spiderworts at home outside of the Tropics, but many of them may be grown in the garden in any rich, light soil.

Spiderwort

N. Y. to N. C.; west to Ark., Kan., Minn.

The spiderworts are exquisitely fragile blossoms, lovely with tints of rose color or lavender blue (1). When the spring and early summer seasons are warm and moist, the slender-leaved plants may thrive to such a point that railway embankments or prairies and meadows of the Middle West become spectacular with bloom. The beauty is fleeting, however, for as the temperature rises toward midmorning, the petals wilt and the buds await the coolness of another day.

The most important spiderwort under cultivation is called the "wandering Jew" (*T. tricolor*), since the trailing stems grow to great lengths and wander in all directions.

Dayflower

N. Y. to Fla.; west to Tex. and Kan.

Dayflowers (2) are the progressive members of the spiderwort family, for they have seen fit to enlarge two of the petals at the expense of the third, so that a casual glance gives the impression that there are but two. These, however, are a blue of such purity and intensity that it cannot be matched by any color on the artist's palette. The other parts of the flower have also taken on an unusual appearance that makes it easy to distinguish them.

LILY FAMILY*(Liliaceae)*

Apparently the true lilies have found that their device for attracting insects, by means of having the six parts of the perianth brightly colored instead of leaving the three sepals green as the dayflowers have done, has been an enormous advantage in the struggle for existence, for they constitute a very large family spread all over the world except the Arctic zone. Moreover, among them may be found some of the most beautiful flowers in existence anywhere, of which tulips, hyacinths, day lilies, spring lilies, and mariposa lilies are known to every flower lover.

Red Lily

Maine to N. C.; west to S. D. and Manitoba.

In the moister climate of the eastern part of the country red lilies (3) take to the woods and thickets, but in the Middle West or the Rocky Mountains of Colorado they prefer brook banks and wet meadows. These handsome plants are tall and stately, with large blossoms of brilliant vermilion at the ends of stiff stems with whorls of narrow leaves.

That few gardens exhibit any of the many lovely species available for cultivation may be due to a mistaken notion that lilies are difficult subjects. It is true that some require a close imitation of their native habitats to thrive, but others, with beautiful flowers suitable for cutting, are remarkably easy to grow.

Yellow Lily

Nova Scotia to Ga.; west to Ala., Neb., Minn.

This beautiful golden-yellow lily (4), decorated with maroon spots, is nowhere especially abundant, but may be found in swamps, meadows, and fields throughout the eastern half of the country where varieties with red flowers or recurved perianths also occur. The Turk's-cap lily (*L. superbum*), and the Canada lily (*L. canadense*), with orange or orange-red blossoms, are perhaps more strictly eastern, while the stately plants of the western yellow lily (*L. parryi*) seek moisture on the middle slopes of the mountains in southern California and bear huge flowers of pale yellow.

Pink Onion

Colo. to Ariz.; west to Calif. and B. C.

To many who are accustomed to thinking of onions only in terms of the leafy bulb which appears in the kitchen or on the table as a vegetable of special flavor or quality, it may never have occurred that there are also onion flowers. Not only do onion plants produce blossoms as well as stems and leaves, but they are often daintily attractive or brilliantly colored, and, since they usually occur in clusters, may also be effectively ornamental.

This pink onion (5) has small flowers of rose lavender, loosely clustered at the ends of rather stiff but slender stems, and is fond of prairie sites as well as the lower slopes of the Rocky Mountains. The different flowers in a single group open successively from the outside toward the center, so that at any stage there may be capsules enclosed in papery calyxes ripening on down-bent stalks, full-blown blossoms making up most of the cluster and unopened buds pushing up in the center.

In middle-western hills and mountains the nodding onion (*A. cernuum*) is so named because of the pendent position of the blossoms, a lovely rose pink. The purplish field onion (*A. vineale*) of eastern fields and meadows is a European emigrant that repays naturalization in this country by infesting pastures and tainting the flavor of butter in spring.



© National Geographic Society.

STATELY LILIES BASK IN MIDDAY SUN THAT WILTS FRAGILE SPIDERWORKS

On cool spring mornings the prairies display masses of fragile blooms of (1) **Spiderwort**, *Tradescantia virginiana*. When the sun soars high, their petals wilt. Another exquisite Spiderwort, (2) **Dayflower**, *Commelina erecta*, blossoms in late summer and early autumn. Members of the Lily legions are (3) **Red Lily**, *Lilium philadelphicum*, with brilliant upturned "goblet," (4) **Yellow Lily**, *Lilium canadense*, which modestly hangs its "head," and dainty (5) **Pink Onion**, *Allium acuminatum*.

Bellwort

Quebec to Fla.; west to Mis., S. D., Manitoba

Graceful bellwort plants (1) with delicate green leaves grow side by side with violets, spring lilies, wake-robins, and Dutchman's-breeches in moist woodlands of the eastern half of the country, as well as in similar situations as far west as Minnesota and Kansas. During May and June they put forth pale-yellow blossoms that are faintly fragrant and hang bell-like on slender stems. They are charming rather than showy, and although not as yet known to home gardens they are hardy and easy to cultivate in a light rich soil in the shade.

Two other species of bellwort, much like the one illustrated, are to be found similarly in rich, deciduous woods over a wide region, from Minnesota to eastern Canada and southward to Georgia and Arkansas. Of these, the so-called "large-flowered bellwort" (*U. grandiflora*) is little more than a somewhat larger edition, while the "sessile-leaved bellwort" (*U. sessilifolia*) is thus awkwardly named because of leaves that touch the stem without closing around it. In spite of the larger flowers borne singly, bellworts are not-so-distant relatives of the commoner and better-known true and false Solomon's-seal.

White Adder's-Tongue

Ontario to Ga.; west to Tex. and Minn.

Adder's-tongues are also popularly known as "dogtooth violets" or "spring lilies," although they are not true lilies of the genus *Lilium*, and certainly are not in any respect violets. The scientific name of the genus, *Erythronium*, is derived from a Greek word meaning "red" and may refer to the red mottlings on the foliage of some species. These markings are faintly visible on the pair of pretty grayish-green leaves of the adder's-tongue illustrated (2), between which springs a slender, graceful stem bearing a single drooping white blossom delicately flushed with rose color. This species is found occasionally in the East, but not so frequently as in the West and South, where it blooms from March to May.

The white adder's-tongue possesses an interesting and unique habit that is also characteristic of some other woodland species. By means of contractile roots on the solid bulb or "corm," this underground part is pulled gradually downward in the soft-yielding leaf mold of the forest. Each year the corm sends up a single leaf until eight or ten years have passed, when two leaves appear and the flower unfolds between them. In consequence, there may be seen in any favorable situation thousands of one-leaved plants to one that bears a flower.

Yellow Adder's-Tongue

Nova Scotia to Fla.; west to Ark. and Minn.

The yellow adder's-tongue (3) resembles the white species (2) in having a slender, pink-tinged stem with a nodding blossom at the tip, and in having leaves mottled with crimson.

It differs in color of flower and in the attachment of the pair of leaves, so much lower on the stem that they appear to be basal. The one excels in delicate charm, the other in a more colorful beauty; both are partial to the cool moisture and shade of spring woodlands or thickets and will grow equally well in similar conditions under cultivation.

Another similarity is to be found in the presence of contractile roots which draw the corm downward through the leaf mold from year to year for a number of years.

This habit seems to be conditioned, in part at least, by the character of forest soil, for where erythroniums grow in the firmer soil of the prairies, or volcanic ash, two-leaved flowering plants are the rule and not the exception. In consequence, a favorable spring will see the slopes of Mount Rainier carpeted by thousands of plants of the yellow glacier lily (*E. parviflorum*) and the white avalanche lily (*E. montanum*), with flowers in such abundance that the leaves can scarcely be seen for the myriads of bright blossoms nodding above.

Snowy Wake-Robin

Pa. to Ky.; west to S. D. and Neb.

Trilliums differ from their numerous lily kinfolk in having a green calyx, such as is found in the spiderwort. In consequence, they are to be regarded as the lowliest of the lilies in spite of the beauty of the flowers, since these have not taken the step of coloring the sepals to match the bright petals.

The Latin name, *Trillium*, refers to the fact that all parts of the plant occur in threes: sepals, petals, styles, and leaves.

The interesting common name of "wake-robin" alludes to the early appearance of the blossom in spring, so early it seems even to precede the robin, one of the earliest birds.

The lovely white-flowered species illustrated (4), with a snowy expanse of petals against a background of dark-green leaves, is one of the earliest to bloom in woods and thickets of the East and Middle West, together with bellworts, adder's-tongues, and Dutchman's-breeches.

Nodding Wake-Robin

Newfoundland to Ga.; west to Mo., N. D., and Manitoba

A decided contrast to the snowy wake-robin, this trillium (5) is dark wine red, with a calyx of narrow pointed sepals and three very large broad leaves a few inches below the flower, which hangs on a slender stem. It blooms somewhat later in the spring in moist woods, together with the purple trillium (*T. sessile*) which has a much larger rose-purple blossom borne upright without a stalk. This beautiful wake-robin also grows in the Far West in woodlands of California and northward.

Trilliums, erythroniums, and bellworts are all reputed to possess roots which are violently emetic if the drug derived from them is taken internally, but which may also be found soothing in the form of poultices for swellings.



© National Geographic Society

FAVORITES AMONG "THE FLOWERS THAT BLOOM IN THE SPRING"

During May and June moist woodlands are dotted with pale-yellow blossoms of (1) **Bellwort**, *Uvularia perfoliata*. Cool shady groves and thickets are the abode of (2) **White Adder's-Tongue**, *Erythronium albidum*, and (3) **Yellow Adder's-Tongue**, *Erythronium americanum*, both popularly known as "dogtooth violets" or "spring lilies." Other Lilies are (4) **Snowy Wake-Robin**, *Trillium nivale*, and (5) **Nodding Wake-Robin**, *Trillium cernuum*, so named because they sometimes bloom before the robins arrive in spring.

AMARYLLIS FAMILY*(Amaryllidaceae)*

The amaryllis-family stands midway between lilies and irises in development, retaining the six stamens of the one and acquiring the inferior ovary, which is one of the main steps of advance from lilies to irises. With such ancestors as the lilies, it is no marvel that amaryllises possess an equal or even greater degree of beauty. The best known are snowdrops, snowflakes, tuberoses, jonquils, daffodils, and spider lilies. Some furnish delectable perfumes and others drugs, poisons, alcoholic drinks, or food.

Yellow Star Grass

Maine to Fla.; west to Tex. and Sask.

The bright-yellow starry blossoms (1) of this little dweller in prairies and meadows bloom inconspicuously on small plants with grasslike leaves. A demure and modest little plant, it is of no value except to add interest and variety to half-shady places in the rockery or border of the garden.

IRIS FAMILY*(Iridaceae)*

This family ranks high in providing many of the most beautiful and interesting flowers known either in nature or under cultivation. The genus *Iris* alone presents an almost endless variety in form, color, and size, and new ones are being developed constantly by professional horticulturalists. Other remarkably beautiful and well-known members of the family are the gladiolus, freesia, crocus, and watsonia.

Blue-eyed Grass

Newfoundland to Va.; west to Colo. and B. C.

The blue-eyed grass (2) may have leaves that resemble those of grasses somewhat, but the dark purple-blue, six-pointed blossoms with perianth attached to the top of a little round ovary are known by this structure to belong to the family of irises and not grasses.

The flowers are short-lived, but so abundant on vigorous plants that each new day sees many buds opening and revealing to insect visitors by a yellow spot at the base of each petal the exact location of the nectar gland.

IrisNewfoundland to Fla.; west to Tex., Neb.,
Manitoba

This species (3), sometimes called the "blue-flag iris," invades marshes and wet meadows in the East and Middle West with stiff-leaved plants crowded closely together and producing an abundance of indigo-blue, tightly rolled buds which unfurl into "flags" of lavender. The broad landing platforms of the down-curving petals are prettily ornamented with a splash of yellow which adds to the beauty of the blossom and at the same time serves to guide bumblebees to the nectar farther back.

ORCHID FAMILY*(Orchidaceae)*

The orchid family represents the highest development in specialization of the flower for insect attraction and in the perfection of devices for bringing about cross-pollination. Oddly, however, instead of this resulting in a small number of sturdy seeds certain to germinate and carry on into the next generation, which is the usual consequence of infallible fertilization, it seems to have been followed by the contrary effect. The seeds are so tiny that there may be as many as a million in one capsule, and the method of germinating them and of coaxing the seedlings to grow into mature plants is one of the most painstaking and difficult known, and may take a number of years to bring to full accomplishment.

In nature the many orchids that inhabit tropical forests, where heat and moisture are superabundant, often grow attached to tree-trunks by adventitious roots; in the temperate portions of the Northern Hemisphere they spring from the earth. Wherever they may be, however, their blossoms are remarkable for the curious and varied shapes of the perianth, which may resemble all sorts of queer objects or animals from slippers to beetles or even monkeys.

In size they may vary from the tiniest of white orchids, looking like pearls strung on the stem and only an eighth of an inch across, to those that measure six to eight inches and are incredibly gorgeous in coloring. Only a few are of use to man, and of these the vanilla is the most important.

Coral-Root

Nova Scotia to Fla.; west to Calif. and Alaska

The coral-root (4) belongs to the strange group of plants known as saprophytes or parasites, which manage to survive by stealing from the neighbors instead of making an honest living by manufacturing their own food. The plants are never fresh and green, but take on pale tints of white or cream color, rose purple like the coral-root, or even such fiery, translucent red in the snow plant (*Sarcodes*) that no paint can match it.

Showy Orchid

New Brunswick to Ga.; west to Minn. and Kan.

Delicate and dainty rather than strikingly handsome, the showy orchid (5) produces small clusters of pale-lavender blossoms on a stalk between two large leaves. From April to June showy orchids must be sought in rich woods of the East and Middle West, since they are too difficult for cultivation at home.

Purple Fringed OrchidNewfoundland to N. C.; west to Neb. and
Manitoba

The purple fringed orchid is most at home in meadows, swamps, and wet woods in the north-central and southeastern parts of the country.



© National Geographic Society

WILD BEAUTIES OF THREE FAMILIES MAKE GARDEN BORDERS GAY

Starry blossoms of (1) **Yellow Star Grass**, *Hypoxis hirsuta*, represent the Amaryllidaceae clan. Two charming members of the Iris family are the dainty but vigorous (2) **Blue-eyed Grass**, *Sisyrinchium angustifolium*, and (3) *Iris versicolor*, the common "blue flag" of meadows and marshes. Among the Orchids are (4) **Coral-Root**, *Corallorrhiza multiflora*, which sprouts from decaying leaf mold, the delicate (5) **Showy Orchid**, *Orchis spectabilis*, and (6) **Purple Fringed Orchid**, *Habenaria psychodes*, with spurred and fluted blossoms.



© National Geographic Society

TO POLLEN-BEARING INSECTS, ORCHIDS OFFER POUCHLIKE "LANDING FIELDS"

Among the rarest and loveliest of our native Orchids is (1) **Fairy Slipper**, *Calypso borealis*, which hides in deep woods and bogs. The handsome (2) **Moccasin Flower**, *Cypripedium acaule*, flourishes when transplanted to the garden. Large and relatively sturdy and abundant are (3) **Showy Lady-slipper**, *Cypripedium reginae*, and (4) **Yellow Lady-slipper**, *Cypripedium pubescens*. Like all wild species of this group, the (5) **Grass-Pink Orchid**, *Limodorum tuberosum*, requires plenty of moisture.

Fairy Slipper

Labrador to Maine; west to Mich., Colo., Calif., Alaska

The fairy slipper (1) is named for the Greek goddess Calypso, who was not only beautiful but had a reputation for keeping her affairs concealed from the public eye. Her namesake in the flower kingdom is equally famed for beauty and for secretiveness, since it hides shyly away in deep woods and bogs where only diligent seeking will find it.

In shady spruce woods in the Rocky Mountains it is the earliest harbinger of spring, to appear in troops of several score when the season is favorable, or to be represented in the years to follow only by a lonely straggler here and there. This alternation of abundance with scarcity may be conditioned by the need for replenishing stores of nourishment depleted by excess of blooming.

Moccasin Flower

Newfoundland to N. C.; west to Tex., Minn., Manitoba

Orchids are so generally supposed to be rare and fragile that it may come as a surprise to some to realize that many are quite hardy enough to be grown readily in the garden if care is taken to meet their requirements of cool moisture and somewhat acid soil. Rare they are, of course, especially in comparison with other flowers, but this is partly because they prefer bogs and swamps, which, taken all together, make up but a relatively small area of the country at large.

This remarkably handsome moccasin flower (2) with large rose-purple lower lip and brightly colored sepals is at home in boggy woods of the North and East, as well as in sections of the Middle West. It will bring a quick reward to the home gardener in an abundance of fragrant bloom, if grown under conditions of soil and moisture to which it is accustomed in its native haunts.

The business of pollinating an orchid flower presents certain problems to visiting insects, for the smaller ones may fall into the open pouch and be unable to find their way out again. Larger bees alight on the lip in such a way that the head touches the sticky anthers; the pollen mass is transferred to it and so carried to the ripe stigma of another blossom.

If the lip happens to be "irritable," as is sometimes the case, it is set in motion by the impact of the insect and rises to a position which forces the visitor into contact with the pollen, which is then carried to another flower. There are also other devices in the way of guidelines or fragrance that are of advantage, first in attracting pollinators, and then in making sure that they do the work for which the flower is devised. However, although the method of cross-pollination in vogue among the orchids is one of the most successful known, it seems after all of little importance

in the life history of the flower, since propagation is more often accomplished by means of bulbs than by seeds.

Showy Ladyslipper

Newfoundland to Ga.; west to Kan. and Manitoba

The flowers of the ladyslipper are the largest and most beautiful of our native orchids, though far outshone by the magnificent cattleyas and helias of the Tropics that adorn the florists' shops. They are distinctive but not entirely unique in the possession of a sac or slipperlike lip, which may be less than half an inch long, a veritable slipper of Cinderella, in some of the small-flowered species, or an inch and a half in the moccasin flower (2) or the showy ladyslipper (3).

The latter has large blossoms with inflated lower lip variously tinted with rose purple, and broad white sepals. It is one of the most attractive wild orchids in this country, where it grows with other bog plants in swamps and blooms from June to September. It is fairly simple to grow the bulbs in partly shaded moist spots in the garden.

Yellow Ladyslipper

Nova Scotia to Ga.; west to Neb. and Manitoba

This charming orchid (4) adorns its "slipper" of gold with flaring, twisted "ribbons" of yellowish green splashed and streaked with crimson. It is one of the most widespread and abundant of the native ladyslippers, being found in nearly all parts of the country where there are woods and thickets with leafy mold to suit its preferences. In such a large group of plants so widely separated, however, local differences occur that have been considered by botanists to be deserving of distinctive names.

The yellow ladyslipper *C. parviflorum*, occasionally found in the forests of the West and Northwest, has smaller flowers than those of this yellow ladyslipper, which is more closely restricted to the East and Middle West. Since size is often associated with soil moisture, however, this distinction seems unimportant.

Since gathering plants that spring from bulbs tends toward their eventual extermination, the better way is to enjoy their beauty where found, or to transplant carefully to the garden. Yellow ladyslippers are hardy and will grow in cool, moist leafy mold or rockeries. There seems to be evidence, however, that the hairs on the plants irritate the skin of some individuals, much as poison ivy does.

Grass-Pink Orchid

Newfoundland to Fla.; west to Mo. and Minn.

The pale pink, butterflylike blossoms of this orchid (5) bloom in quick succession along slender stems with grasslike leaves, and although the plants are not common they may be found in favorable habitats in the Middle West, as well as in bogs and wet meadows of northern and eastern States.



WHAT IS IT? BIRD, MAMMAL, OR REPTILE?

One of the strangest creatures on earth is the little duckbill platypus. It has a birdlike bill, webbed feet with horny claws, and fur and tail suggesting a beaver's. This primitive mammal, like many reptiles, lays eggs.



Photographs by Maxwell Hodges

HIGH-STRUNG "PLATTER-PUSS" GOES FORAGING

Found only in Australia and Tasmania, the semiaquatic platypus is extremely shy and wary.

AUSTRALIA'S PATCHWORK CREATURE, THE PLATYPUS

Man Succeeds in Making Friends with This Duck-billed,
Fur-coated Paradox which Lays Eggs and
Suckles Its Young

BY CHARLES H. HOLMES

HIGH on the Australian Alps the winter's snow is melting. The mountain streams are full-flowing and after dusk ripples on the water denote life. Old Man Platypus, who lives a semiaquatic existence, commences his nightly outing for fun and food.

His duck bill, soft as a piece of kid and pliable as rubber, cuts the water like the prow of a boat, front webbed feet giving powerful propulsion to his body, which is furred to the eyes. His back feet are webbed, too, but, for reasons best known to himself, the platypus merely trails his rear extremities.

This time of the year his mate is likely to be in a nest of grass and gum leaves at the end of a twenty- or thirty-foot tunnel in the bank, hatching her eggs. If that be her occupation, the female platypus will have sealed herself in the tunnel for three weeks and will have built up two or three earth plugs about a foot in thickness.

And so the platypus furrowing the placid waters of the mountain stream may be a disconsolate outcast, just mooching about catching tadpoles or shrimps or the juicy white wood grubs that sometimes fall from the wattles lining the river bank (page 277). Or maybe the wandering male is courting other duck-billed folk of the egg-laying variety.

MALE WEARS POISON SPURS

Early colonists in Australia made the acquaintance of the platypus, and what a paradox it proved: a duck's bill; a fur coat instead of feathers; four webbed feet instead of two; poison spurs on the hind legs of the male; the female laying and hatching eggs and suckling the young.

An impossible patchwork creature it seemed, equally at home in the water or on the land, boasting something of fish, fowl, beast, and reptile and richly deserving the name it was given at first, *Ornithorhynchus paradoxus*, or bird-bill paradox.

Naturally the amazed colonists sent a skin to the British Museum. One of its naturalists fingered the rich fur with the broad bill unbelievably, and was inspired to suggest at first that the bill of a duck had actually been grafted onto the skin of a quadruped! (Page 278).

The world wondered and scientists in various countries sought living specimens, but received them dead.

Out of five of the creatures netted in their mountain stream in 1922 and dispatched across the Pacific to the New York Zoological Park, only one survived and then for merely a matter of weeks.

ONE OF THE WORLD'S TWO MOST PRIMITIVE MAMMALS

The lonely platypus which reached New York was placed in a specially prepared tank and artificial burrow, where it excited great interest, for the platypus and the echidna, which also is an egg-laying animal, are the most primitive of all living mammals in the world today. As types, they should have disappeared from the earth millions of years ago, but through time's forgetfulness they remain as living reminders of their reptilian ancestors.

In the New York zoo, the platypus which survived ate heartily. In fact, it ate nearly half its own weight in shrimps every 24 hours. But no living creature had ever been forced to endure such a fierce floodlight of publicity and at the end of 47 days the shy animal felt it had suffered man too long; *Ornithorhynchus anatinus* closed its bloodshot, beady little eyes and, in dying, received even greater publicity.

Today no platypus can be exported alive from continental Australia and the law is most stringent. You cannot touch the wonder animal. If you are found in possession of a platypus, dead or alive, or even of a skin, it means a big fine. In earlier days many a rug made from dozens of platypus skins fetched high prices in other lands, for the fur is thick and beautiful.



Photograph by Maxwell Hodges

"HOW'S THIS FOR A DUCKY POSE?"

Soft as a piece of kid and pliable as rubber, the platypus's flat bill is used for separating food from waste. While diving, the slits containing eyes and ears are tightly shut to keep out sediment.

Rare indeed is a glimpse of a platypus in the wild, but on a fishing trip in the Alp country of Victoria I once saw four at a time.

After a splendid day's sport we were squatting on the river bank, swapping experiences and bragging about the fish we had caught in previous seasons.

Suddenly someone swore he saw a platypus run down the opposite bank and dive into the water. We sat concealed on the bank hoping to see more of them. Our pipes went out. We suffered cramp and were annoyed by leeches.

At last a few dots appeared on the water, floating without movement. Having apparently decided that the coast was clear, four platypuses began to race about after food, now furrowing their way on the surface, snapping up tidbits with a side-to-side wobble of the bill, now submerged. We watched for nearly an hour, but they never came near the bank.

A slight sound and four dots disappeared in a flash. The shy creatures had lived up to their reputation and I despaired of ever seeing a platypus at close quarters.

But something happened which made it possible to observe this strange animal on intimate terms. An Australian, Robert Eadie (page 277), returned to his home-

land after spending many years in South Africa and became absorbed in a young platypus caught on the bank of a stream near his home in the hill country of Healesville, Victoria.

"SPLASH," THE PLAYFUL PLATYPUS

With official permission, Eadie succeeded in taming a platypus, and it lived in captivity for more than four years. He kept it in a specially constructed box tank and covered retreat, and month after month he closely studied his small protégé.

When Eadie trailed worms along the surface, the platypus chased and snapped at them, jumping half out of the water. Eadie discovered that it loved to play, and soon an old mop, drawn about in the tank, sent the platypus mad with delight (page 280). It raced after the mop, grabbed it in its bill, and gripped it with its spurs.

This became a daily game, Eadie lifting the mop out of the water several feet with *Ornithorhynchus* more or less wrapped around it. Then the platypus let go and flopped into the water. A dozen times or so the operation was repeated, for "Splash," as the wonder creature was named, loved that flop into the water.

Splash's sleekness bespoke 150 tadpoles and about twelve ounces of worms daily;



Photograph by Maxwell Hodges

FOR STROLLING ON THE BEACH, SKIN WEBS ON FORELEGS FOLD UNDER

The platypus is usually active at night, playing and feeding in streams or ponds. Bright light nearly blinds it. When swimming in the daytime, it often bumps awkwardly into obstructions.

plus, if you please, two duck eggs slightly cooked and scrambled. He loved his "tummy" in another way, for he rolled over on his back in the water so that the mop could be rubbed on his stomach.

Through the medium of the mop and the tadpoles, Splash got a lot of exercise. The tadpoles were run down in the tank by the excited hunter with not a little professional pride. Sometimes a hundred were put into the pool at one time and the voracious Splash wolfed the lot in short order.

AT MEALTIME SPLASH CAME RUNNING

At feeding time Eadie would whistle and Splash would run out expectantly from his retreat at the magic sound, wondering, no doubt, whether it would be tadpoles, grubs, worms, or duck eggs.

So far as the egg diet is concerned, therein lies a tale. Eadie came home one afternoon and surprised Mrs. Eadie at the pool with the furtive look of a small child detected "in the act." When questioned, she replied that she felt sure Splash was hungry and had given him some egg.

"My goodness, the creature will die, mother," exclaimed Eadie, greatly alarmed.

"Don't you worry, Robert," was the reply, "the wee creature liked the egg, even better than the worms!"

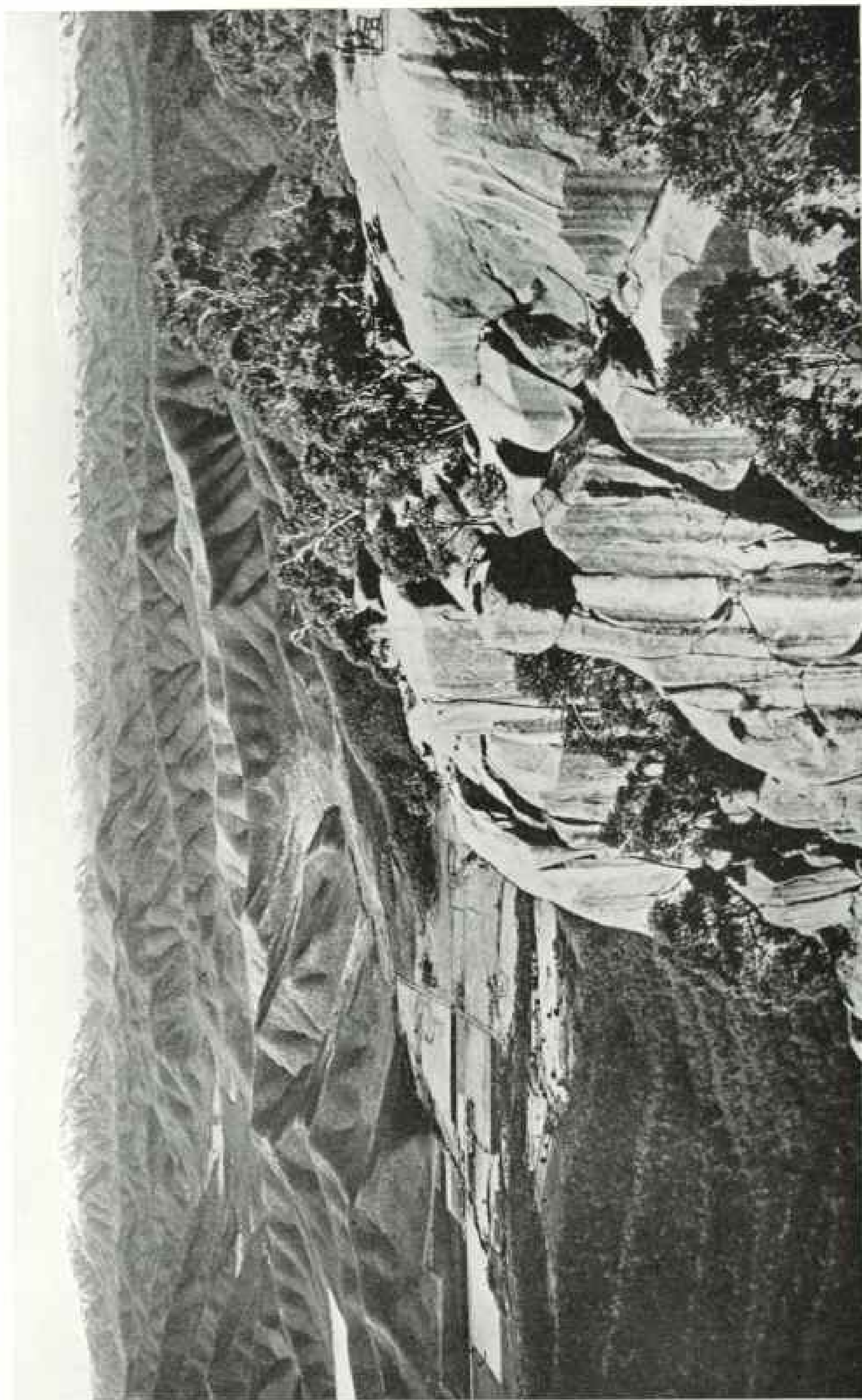
And "mother" was right, for, thereafter, throughout his life, Splash had two eggs every night, beaten up and placed in a vessel of boiling water until the mixture boiled up like milk. It was then let gently into the water, the platypus climbing into the bowl to consume the egg (page 279).

Eadie's first experiment with a platypus was in the Badger Creek Sanctuary at Healesville, where he built an enclosure about thirty feet in diameter surrounding a domed island about six feet high. Complete with artificial burrows and an underwater entrance, and with a mountain creek diverted to flow all around it, this sanctuary rejoiced in the name of "Platypussary." Here the first platypus lived 182 days.

Eadie then installed the second platypus, Splash, in his garden where he could watch over it constantly. Special quarters were built, modeled on the lines of the animal's natural surroundings.

"Burrows" led from a shallow concrete tank to the nesting box and to a turfed area about nine feet square where the platypus did a lot of scratching and burrowing at night. This kept his claws from growing too long and gave exercise.

Burrowing out from the scratching area was prevented by wire netting placed in the ground a few inches below the surface.



Photograph by W. Howie

MELTING SNOWS OF THE AUSTRALIAN ALPS FEED STREAMS THE PLATYPUS FREQUENTS

From a fenced lookout point, (extreme right), spectators gaze down on the mountain-bemmed valleys where lives the duckbill. Sheep raising is an important activity in this district in the States of Victoria and New South Wales.



WHERE FRAGRANT WATTLES SHOWER THEIR GOLDEN BLOOMS

Along the rosy margins of clear, cool streams the platypus feeds. In the earth banks the female digs her nesting burrow, which may be as much as 60 feet long, with its entrance usually just above water level.



Photographs by W. How Jones

MR. ROBERT FADDE, DUCKBILL-KEEPER EXTRAORDINARY

In a tank at Healesville, Victoria, this gentleman kept Splash, a pet platypus, for a record period of more than four years. Two fine specimens now are flourishing in his unique "platypusary."



Photograph by Merrell Hodges

AT FIRST GLANCE, SCIENTISTS THOUGHT, "THERE'S NO SUCH ANIMAL!"

When shown this creature of contradictions, some naturalists were deceived into thinking the bill of a duck had been grafted on the skin of a mammal. Gripped in a man's hand, splash angrily waves webbed flippers.



Photograph from Australian Institute of Anatomy

IN AN UNCOVERED NEST, TINY TRIPLETS LIE CURLED IN SLEEP

The female platypus lays her eggs (usually two) in a reed- and root-lined cavity at the end of the nesting burrow. On her smooth tail they are clasped against the body. Newly hatched young are less than an inch long. The mother's milk is supplied through perforations in the abdominal skin (page 281).



Photograph by Maxwell Hodges.

BASKING IN THE SUN IS SAFER NOW THAT THE LAW PROTECTS HIM.

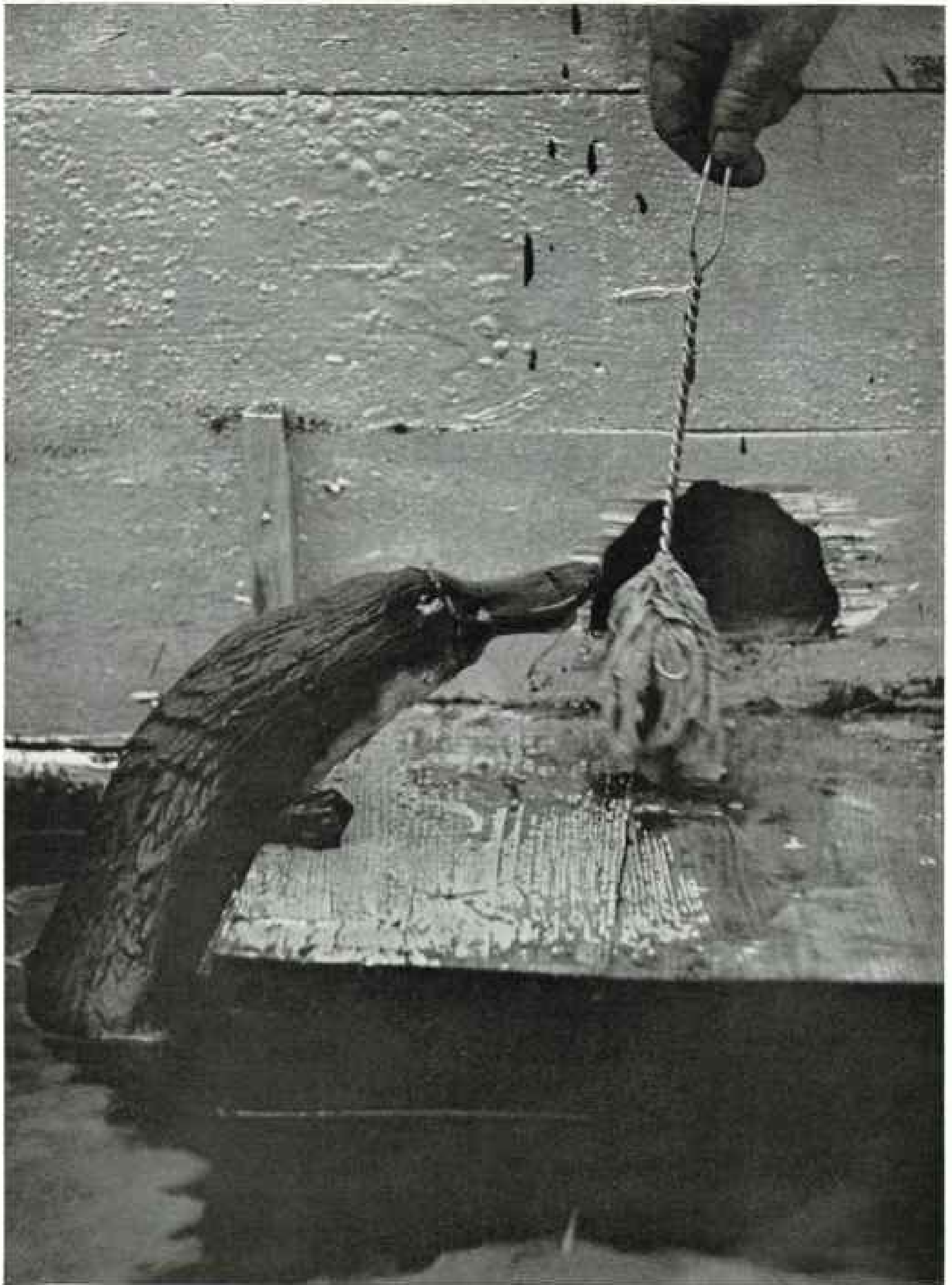
Formerly rugs were made from beautiful rich-brown and grayish-white furs of the platypus. Export of the animal is now forbidden and a heavy fine is imposed for possessing one, dead or alive, without permission.



Photograph by W. Howson.

SPLASH MUNCHES HIS EVENING MEAL OF SCRAMBLED DUCK EGGS.

The wild duckbill lives on aquatic insects, crustaceans, tadpoles, grubs, and worms. Mr. Eadie supplemented this diet with two duck eggs which were slightly cooked and lowered into a submerged bowl. The pet ate about a third of his own weight a day (pages 275 and 282).



Photograph by Murwell Hodges

PLAYTIME IN THE "PLATYPUSSARY"

Mr. Eadie exercised Splash with a small mop which drove the little animal mad with delight. When the "teaser" was lifted several feet above the water, he would cling to it, then drop with a resounding plop. Hind legs of the males are equipped with hollow spurs. Glands supply them with poison, which can be ejected in real combat. A burrow entrance has been cut in the boards of the tank side (page 274).



Photograph by W. Robert Moore

UNDER WATER, THE DUCKBILL CAN HOLD HIS BREATH FOR FIVE MINUTES

He uses the dog-paddle technique when swimming, propelling himself chiefly with his front legs. Hind ones usually trail under the broad tail.

The water was changed every morning and the whole tank hosed out, for the platypus must have clean water.

Splash was captured on Saturday, February 11, 1933, and died in 1937. Eadie has had two others for the past year.

FISHERMAN POISONED BY PLATYPUS

The hollow spur on each hind leg of the male platypus is connected to a gland secreting a rather virulent poison. At Healesville a case was recalled in which a platypus spurred a strong, healthy man. He was fishing one night and the platypus took the bait. When the fisherman tried to take the animal off the hook, the spurs were jabbed into his arm from both sides.

The arm swelled up to twice its normal size; one side of the man's body swelled and his temperature became very high. All the symptoms of snake venom were present and it was about seven days before the man recovered.

The bill of the platypus, soft as a piece of kid, is one of the most sensitive organs known, since it is used in lieu of eyes in hunting food. When the platypus dives, he draws a flap of skin over eyes and ears and seeks his food with a right and left

swinging motion of the head as he goes through the water (page 274).

The vision of the platypus is so directed that it sees little or nothing straight in front. It looks up at an angle, this fact probably indicating that it has always had to look upward to be on guard against enemies. The animal will swim right into any object in the water. In the rivers, it comes up to breathe every few minutes; it does this silently, hardly disturbing the water.

One platypus I saw on land moved with great rapidity despite its short, stumpy limbs. When fully grown, the platypus is about two feet in length, of which about six inches is tail. Its hearing is acute.

The young platypus nuzzles at the breast of the mother, stimulating the milk glands so that the milk is ejected through the perforated skin and can be licked up by the young. Afterward there is no sign on the animal whatever to indicate where the liquid was ejected.

Early stages of keeping the platypus are extremely difficult because its nervous system is so highly organized that specimens have been known to die in the hands of their captor when taken out of the river.

The difficulty is to induce the platypus

to take food. Splash took no food for 11 days and 11 nights, then began eating his master out of house and home. Despite his 11-day fast, he was still alert and active, indicating a reserve of food in the form of fat. During the first month he was badly frightened, but he gradually became entirely friendly.

EATS DAILY A THIRD OF ITS WEIGHT

Supplying enough food is a real problem in keeping the platypus, since it is fed twelve ounces of worms and grubs daily; that is, it eats about a third of its own weight each day. The latest addition to the sanctuary is a "wormery" consisting of manure plots covered with sacks, and if more of these creatures are placed on show, one can readily imagine an appeal to visitors to bring worms and grubs. Even at present, Eadie receives supplies of them from places many miles distant where woodcutters and others, who have heard of friendly little *Ornithorhynchus*, remember its voracious appetite.

When the supply of worms was difficult to maintain as the drier weather came on, substitutes were tried. Meat of all descriptions, liver, sheep's brains, fish large and small, were offered, but the platypus would not touch them. The liver and other meat were cut in strips to resemble worms and mixed with them, but the platypus tossed them aside with his bill.

He wouldn't touch shellback snails; he wouldn't touch frogs—two were put into the tank and left there, but were not eaten. He would eat freshwater prawns, but apparently was not fond of them. He wouldn't eat vegetable matter, grass, or roots, but would swallow beetle larvae found in the water.

The platypus has no teeth and cannot eat anything with tough tissue. This explains why meats are not eaten and also suggests that the framework of frogs prevents the platypus from eating them.

He will not overeat; he leaves any surplus. His food is all brought up to the surface of the water, in cheek pouches, where it is "chewed" with the water going in and out of his bill all the time. Dirt is always fed with the worms, as it has been found by scientists that there is always a quantity of dirt in the stomach of any platypus examined. It seems not to interfere with the digestion of food.

One day the platypus did not come out of his box at the usual time and was found

curled up in a corner, apparently in a dying condition. When handled and placed on the ground, he simply rolled onto his back. Then he was placed in the water and soon bubbles of air floated to the surface, indicating that he was drowning.

Thereupon, for no particular reason except that the day was cold, the platypus was placed in his box in front of a fire, and in a few minutes he was trying to get out, as lively as ever.

About a week later the same thing occurred. He was not disturbed and he remained for three days and three nights before coming out and going for his food as usual.

Another fortnight elapsed and the same thing happened again, the platypus remaining dormant from Monday evening until Saturday afternoon. He came out as bright as he could possibly be, indicating that his sleeping periods were merely a form of hibernation.

STRANGE CLUCKS AND HISSES

When a dog snuffled around the box and even, on occasions, when people were standing too near, the platypus made a growling noise somewhat after the style of a broody hen, a sort of clucking. He was also noticed occasionally to make a kind of hiss, like a gander, and sometimes, but not frequently, a little fluid was ejected from the bill.

When in the pool, Splash was on the move all the time, and was not a bit frightened even though as many as ten people might be gathered around the box, talking and laughing as they looked on. When Eadie whistled and held a handful of worms near the water, the platypus turned and, with his front legs paddling rapidly, hurried along, almost standing on the tip of his tail in his endeavor to reach the worms. His webbed feet beat the water in a flurry to help him maintain the upright position. The bill opened and shut in the same quick way as that of a duck collecting its food out of a muddy pool.

Thousands of visitors have traveled to Healesville, about 40 miles from Melbourne, to make the acquaintance of Splash and his successors. Thanks to Robert Eadie, man is steadily gaining a greater knowledge of one of the world's strangest and shyest animals, the living fossil, *Ornithorhynchus anatinus*, and who knows but that the next few years may see this paradox of Nature happily established in the zoos of the world.

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON, D. C.

GILBERT GROSVENOR, President

ROBERT V. FLEMING, Treasurer

HERBERT A. POOLE, Assistant Treasurer

LYMAN J. BRIGGS, Chairman; ALEXANDER WETMORE, Vice-Chairman, Committee on Research

JOHN OLIVER LA GORCE, Vice-President

GEORGE W. HUTCHISON, Secretary

THOMAS W. MCKNEW, Assistant Secretary

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND

Assistant Editor

MELVILLE BELL GROSVENOR

Assistant Editor

McFALL KERBEY

Chief of School Service

LEO A. BORAH

Editorial Staff

CHARLES MARTIN

Chief Photographic Laboratory

FREDERICK SIMPICH

Assistant Editor

ALBERT H. BUMSTEAD

Chief Cartographer

JAMES M. DARLEY

Research Cartographer

E. JOHN LONG

Editorial Staff

FREDERICK G. VOSBURGH

Editorial Staff

FRANKLIN L. FISHER

Chief Illustrations Division

MAYNARD OWEN WILLIAMS

Chief Foreign Editorial Staff

W. ROBERT MOORE

Foreign Editorial Staff

LEONARD C. ROY

Editorial Staff

INEZ B. RYAN

Research Assistant

BOARD OF TRUSTEES

ROBERT V. FLEMING

President and Chairman of the Board, Riggs National Bank

WALTER S. GIFFORD

President American Telephone and Telegraph Co.

C. HART MERRIAM

Member National Academy of Sciences

LYMAN J. BRIGGS

Director National Bureau of Standards

GEORGE R. PUTNAM

Commissioner of Lighthouses, Retired

THEODORE W. NOYES

Editor of The Evening Star

GEORGE W. HUTCHISON

Secretary National Geographic Society

L. O. COLBERT

Rear Admiral, Director, U.S. Coast and Geodetic Survey

CHARLES EVANS HUGHES

Chief Justice of the United States

LEROY A. LINCOLN

President, Metropolitan Life Insurance Company

WILLIAM V. PRATT

Rear Admiral U. S. Navy, Retired

DAVID FAIRCHILD

Special Agricultural Explorer, U. S. Department of Agriculture

ALEXANDER WETMORE

Assistant Secretary, Smithsonian Institution

H. H. ARNOLD

Major General, Chief, U. S. Army Air Corps

GILBERT GROSVENOR

Editor of National Geographic Magazine

J. HOWARD GORE

Prof. Emeritus Mathematics, The George Washington University

JOHN J. PERSHING

General of the Armies of the United States

CHARLES G. DAWES

Formerly Vice-President of the United States

CHARLES F. KETTERING

President, General Motors Research Corporation

GEORGE OTIS SMITH

Formerly Director U. S. Geological Survey

ELISHA HANSON

Lawyer and Naturalist

JOHN OLIVER LA GORCE

Associate Editor of the National Geographic Magazine

GEORGE SHIRAS, Jr.

Formerly Member U. S. Congress, Faunal Naturalist and Wild-Game Photographer

F. K. RICHTMYER

Dean, Graduate School, Cornell University

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded fifty-one years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use, generous remuneration is made.

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 crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches have solved secrets that have puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1905, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted \$25,000, and in addition \$75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The world's largest ice field and glacial system outside the Polar regions was discovered in Alaska by Bradford Washburn while making explorations for The Society and the Harvard Institute of Exploration, 1937-8.



**YOU'RE LOOKING AT
AMERICA'S MOST ACCURATE
SMALL WATCH...**

Lady Hamilton

AT LAST... a small watch you can really trust! You'd never in the world expect such an exquisite, tiny little Tom Thumb of a watch to encompass the accuracy of a Hamilton. Yet that accuracy is there as surely as the name Hamilton—famed for generations as "America's Fine Watch."

If ever a watch made a woman feel smaller, younger, and more feminine, it's the new Lady

Hamilton. See the charming styles in which it comes at your jeweler's today. (Style illustrated above is the LUETTA, described below.)

Hamilton makes only high-grade watches, with 17 or more jewels and precious metal cases. Hamilton prices range from \$37.50 to \$5000. Made in U.S.A. Write for illustrated folder. Hamilton Watch Company, 983 Columbia Ave., Lancaster, Pennsylvania.



HAMILTON
The Watch of Railroad Accuracy

Two Lady Hamiltons (left & center): VICTORIA, 17 jewels, 14K gold, natural or white, 14K applied gold numeral dial, 14K gold fittings, \$60.
LUETTA, 17 jewels, 14K natural gold, 14K applied gold numeral dial, 14K gold fittings & factory-set numeral dial, \$50

FOR MEN (right): BOWMAN, 17 jewels, 14K gold-filled, Applied gold numeral dial, \$52.50

"Mention the Geographic—It identifies you."



Time Out for America's Vacation!

AMERICA amazes the world with its far-flung holiday travel. A whole nation in movement on land, in water and air in quest of healthy change and excitement!

Office and store, workshop, mill and school, release millions of vacationers!

Good luck, you fishermen! Sunny trails, you woodland wanderers! Athletes, winning scores to you! Round blue seas to sail on, you navigators!

More vacations and better and longer—that is America's almost unanimous dream. And a good dream to bring true for the future too.

Why not *guarantee* your vacations from 55 on? Talk it over with the representative of The Mutual Life Insurance Company of New York. Learn from the one who will call how to set aside a few cents from every dollar of today to protect tomorrow's needs, through *life insurance*.

"PLANNING FOR INCOME AT 55, 60 OR 65" is The Mutual Life's 20 page booklet with a really useful message for you. A Mutual Life representative has your copy or it can be obtained by writing to the address below.

*The Mutual Life
Insurance Company of New York*

DAVID F. HOUSTON, President

34 Nassau Street, New York

FIRST POLICY ISSUED

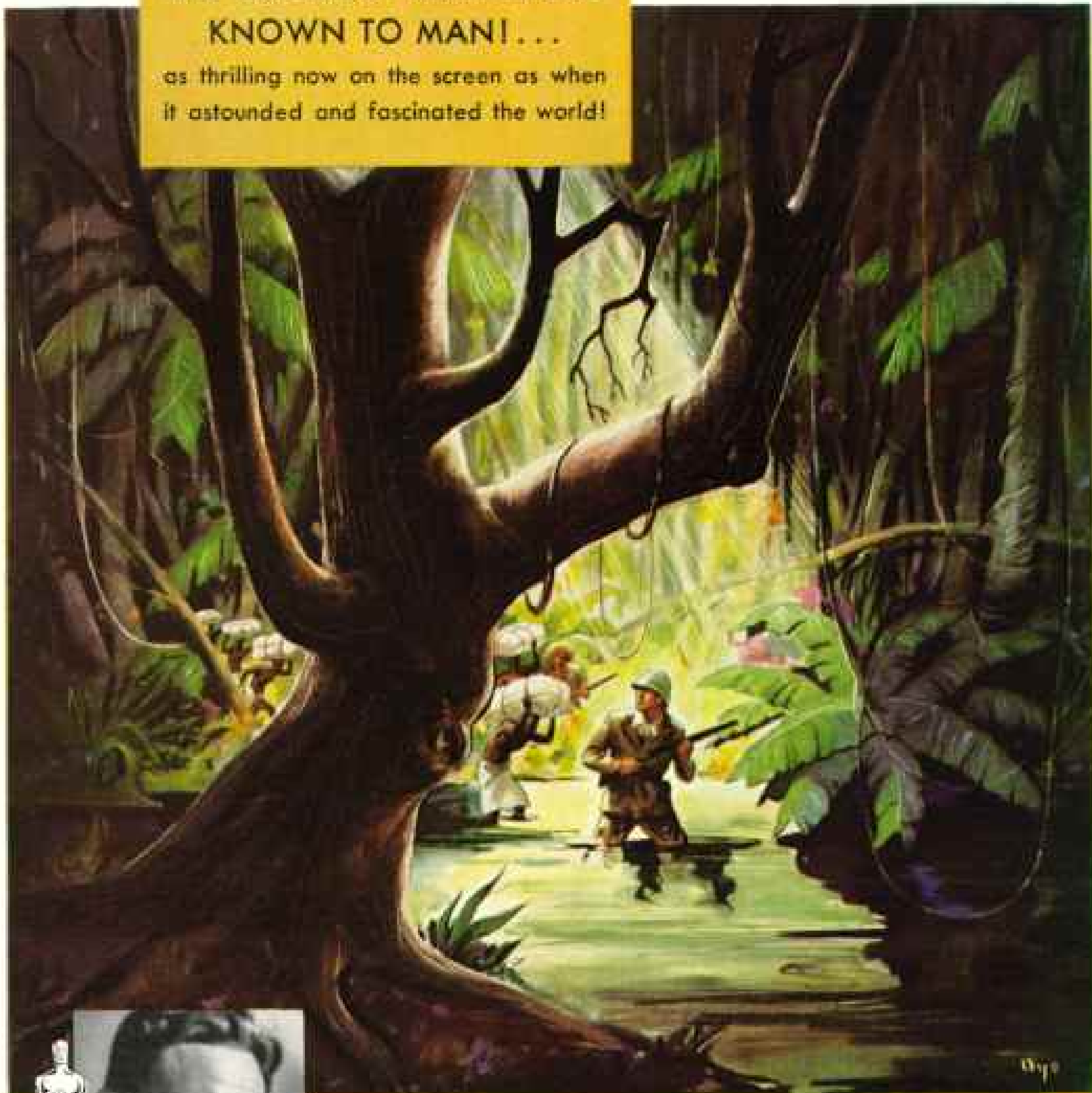


FEBRUARY 1, 1843

"Mention the Geographic—It identifies you."

THE GREATEST ADVENTURE
KNOWN TO MAN! . . .

as thrilling now on the screen as when
it astounded and fascinated the world!



Another masterful
performance by Spencer
Tracy, twice winner of
the Academy Award!



Twentieth Century-Fox presents
DARRYL F. ZANUCK'S Production of

STANLEY and LIVINGSTONE

starring

SPENCER NANCY RICHARD
TRACY • KELLY • GREENE

with WALTER BRENNAN • CHARLES COBURN • SIR
CEDRIC HARDWICKE • HENRY HULL • HENRY TRAVERS

Directed by HENRY KING

Associate Producer Kenneth Macgowan • Screen Play by Philip Dunne and Julien
Josephson • Historical Research and Story Outline by Hal Long and Sam Hellman



*Avoid Money worries
when traveling*

CARRY AMERICAN EXPRESS TRAVELERS CHEQUES

No matter where you journey, your trip can be enjoyed all the more if you know that your travel funds are safeguarded with American Express Travelers Cheques.

No need to worry about the danger of carrying "loose cash." These familiar blue cheques are acceptable anywhere and spendable anywhere. They are your own "personal funds," bearing your own name. When you purchase them, you place your signature in the upper left-hand corner of each cheque. To spend them, you countersign them in the lower left-hand corner. No one can spend them but you! If lost or stolen, uncountersigned, their value is refunded in full.

And they afford you the courtesies of American Express Travel Service abroad, at offices the world over, for mail, cables and local information; moreover, at principal frontiers, depots and piers, English-speaking couriers are stationed to assist you in every way.

In denominations of \$10, \$20, \$50 and \$100. The cost is only 75¢ for each \$100. For sale at Banks everywhere.

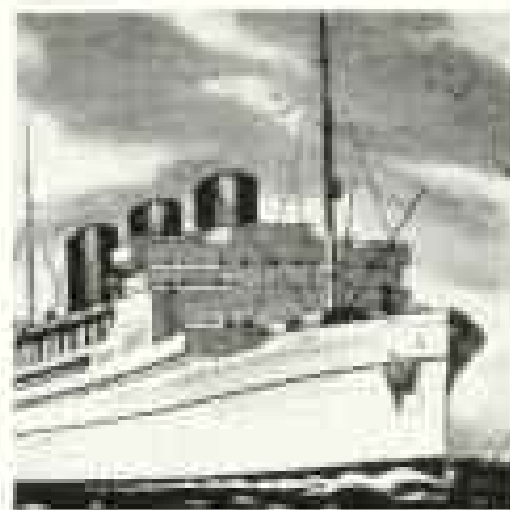
**AMERICAN EXPRESS
TRAVELERS CHEQUES**

Sally Sails West

...TO THE
FAR EAST



"What a surprise this Pacific crossing has been. The *Empress* showed me how to live! Hardly an hour passes without some little unexpected service ...and what grand deck sports and parties! I think I'll stay aboard and go right on to Manila."



"That day ashore in Hawaii was a high spot in my young life." Sail from Vancouver and Victoria...or connect at Honolulu from California. Details, reservations from your travel agent or any Canadian Pacific office in the United States and Canada.

Canadian Pacific

Since 1886

...SERVICE on the Pacific

HAWAII • JAPAN • CHINA • MANILA

"Mention the Geographic—It identifies you."

**AROUND THE
WORLD WITH
LOCKHEED
NO. 2**

Over Bali and the Timor Sea to Sydney



MIRRORED IN TROPIC WATERS is a luxurious Lockheed transport on a tri-weekly trip from Bandoeng, Java...over famed Bali and romantic islands of the picturesque Timor Sea...to Sydney, Australia.



THIS 3,898 MILE ROUTE will complete Royal Dutch Airlines' new fast (2½ days) service from Amsterdam. This oldest airline also serves principal European cities—flies Lockheeds in South America.



ROYAL DUTCH AIRLINES, noted for meticulous care in every phase of operation, has selected Lockheed aeroplanes...a tribute to American aviation based on the longest experience in air transportation.

...why the World's Oldest Airline chooses Lockheed



PERFORMANCE WITH DEPENDABILITY is demanded by Royal Dutch Airlines. Lockheed's modern methods permit construction geared to airline problems. For example, anodization (above) protects against corrosion...is one of many such technical advances by Lockheed.



EVERY DAY A NEW LOCKHEED is completed—final result of highly organized production utilizing modern facilities for insuring dependability.



LOCKHEED



Look to
Lockheed for Leadership

THE SAME CHOICE HAS BEEN MADE BY 28 AIRLINES

Throughout the world Lockheeds are providing fast, dependable service...from Alaska to Australia...over all six continents. Everywhere traveler preference for Lockheed transports is increasing. Wherever you go—whenever you can—fly Lockheed.

LOCKHEED AIRCRAFT CORPORATION

BURBANK, CALIFORNIA • REPRESENTATIVES THROUGHOUT THE WORLD

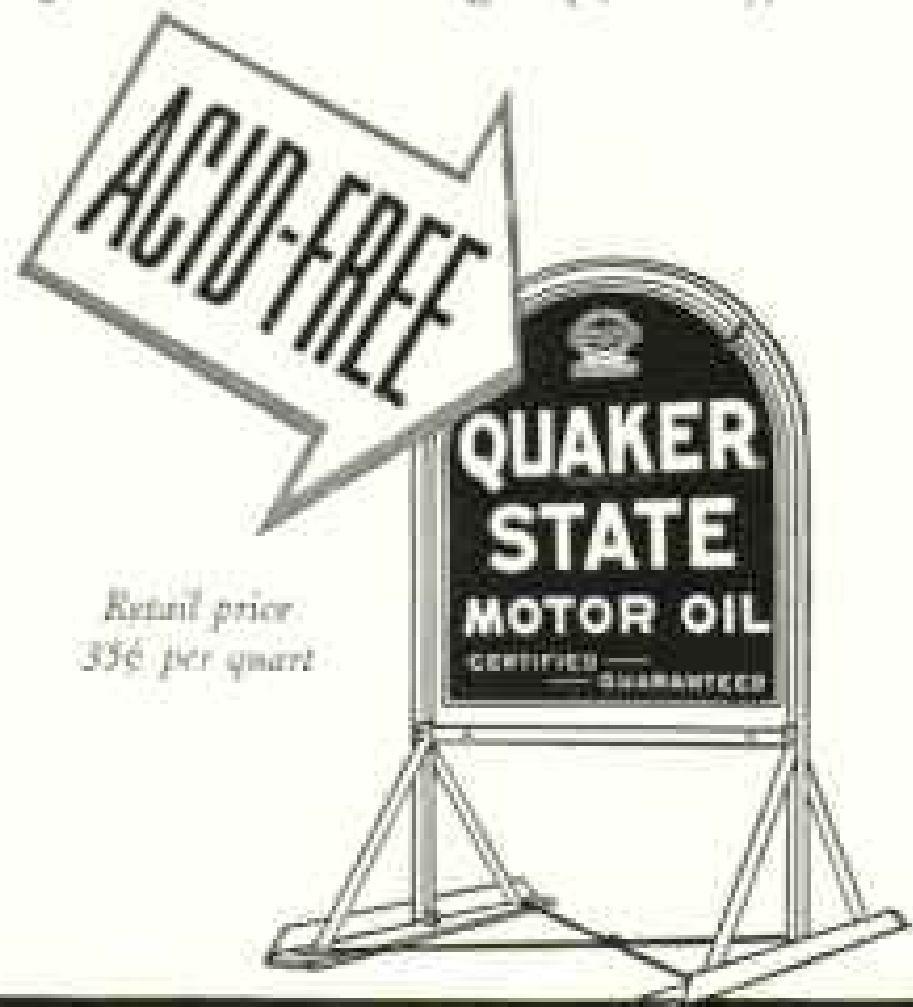
"Mention the Geographic—It identifies you."

You insist on
PURITY
for her!



Babies and motor cars! Their well-being depends on how you treat them. You make certain that everything for her is of the utmost purity. Experience proves it's sound practice to select lubrication for your car on the basis of purity, too!

Quaker State Motor Oil is *acid-free*. Each drop of oil is rich, heat-and-wear resisting lubricant... so pure that you need never worry about motor troubles due to sludge, carbon or corrosion. Make *Acid-Free Quaker State* your choice from today. Quaker State Oil Refining Corp., Oil City, Penna.



Keep Alert, Energetic!

Eat
**Horlick's Malted
Milk Tablets**



IF YOU feel you need more energy for your daily tasks, take a tip from explorers, hunters, aviators. Eat Horlick's Malted Milk Tablets *regularly*. Busy people everywhere help keep their vitality up by eating these delicious tablets, plain or chocolate flavored. They provide quick food energy and a wholesome pick-up between meals. Can be carried conveniently in pocket or purse.

In every tablet is concentrated nourishment from full-cream milk, nutriment extracted from wheat and malted barley, minerals, proteins and natural vitamins—and other things which have caused physicians to recommend Horlick's for over 50 years. Ask for Horlick's at the fountain also.

For a sample of the delicious, candy-like Horlick's Malted Milk Tablets, send a 3-cent stamp to Horlick's, Dept. N-8, Racine, Wis., or Montreal, Can.

HORLICK'S
NOW AT NEW LOW PRICES!

Plays Anywhere Outdoors or Indoors
No "Plug-In"



New! Lightweight
PHILCO
"Little Pal"

ONLY
\$19.95
CHARGES WITH BATTERIES

REALLY PORTABLE!

Self-powered; needs no connection—no aerial, ground or "plug-in." Your "Little Pal" wherever you go, outdoors or indoors...traveling, at the beach, boating, outings.

- Nearly **HALF** the size!
- **FULL** performance!
- **TWICE** the battery life!

Personalized! Identification tag for your name and address attached to the radio.

AT ALL GOOD RADIO STORES

"Mention the Geographic—It identifies you."

Other tires "GROW" when inflated, but this new "G-100" FIRMS DOWN!

*You'll get a brand new thrill
from this lighter, nimbler "G-100"*

WE want to give you the low-down on something really new in tire engineering that endows our new streamlined "G-100" All-Weather* with far longer wear than previous tires.

Up to now all tires have "grown" when inflated, expanding the tread and making it more susceptible to wear—just as a rubber band breaks quicker under prolonged stretching.

But not in the new "G-100"! A combination of new tire shape, new cord angles, new construction technique causes this amazing tire to *compact* as the air goes in. Compressed, the tread literally "makes a muscle"—becoming firmer, tougher, more resistant to cutting, scuffing and wear!

By long test on today's fast-gunning, quick-braking cars—alongside our best previous tire—this new "G-100" All-Weather averages **33% LONGER TREAD MILEAGE.**

You get this step-up in a more nimble, easier-riding tire that *weighs less*—yet its new shape puts 11% more rubber on the road for sure-footed traction. And it's mightily armored against bruises and blowouts

with more durable low stretch Supertwist* cords in every ply.

It looks just as handsome as it performs—with clean-cut, sleekly sculptured sidewalls to match modern car styling. If you want something really standout, it's the tire-buy of the year!



LOOK AT THE DIFFERENCE



PRESENT TIRES

Expands



NEW "G-100"

Contracts

Dotted outline shows shape of tires before inflation; solid section after. Note how the new "G-100" actually compacts in overall diameter—firms down—compressing the tread to make it more resistant to cuts and wear.



*A Continental Product of
The Greatest Name
in Rubber*

*Trade-marks of The Goodyear Tire & Rubber Company

THE GREATEST NAME

GOODYEAR

IN RUBBER.

MORE PEOPLE RIDE ON GOODYEAR TIRES THAN ON ANY OTHER KIND

"Mention the Geographic—It identifies you."

DAISY WILL TELL



"JUST LOOK AT THAT HANDSOME MAN!"



"OF COURSE, HE'S A BARBASOL USER!"

HOW SHE LIKES A BARBASOL FACE

It's really something to rave about—a smoother, cleaner, fresher-looking Barbasol Face.

Why go on with old-fashioned methods that tend to bite and burn, may coarsen and age the skin?

Try modern Barbasol. See for yourself how much more efficient and pleasant it is.

See how much quicker and cleaner your shaves—how much smoother and softer your skin, after you've shaved...

[Certainly, no half-cut stubble—a shave that lasts all day.]

That's because Barbasol contains no harsh irritants. Only gentle ingredients, beneficial oils, for which your face will be most grateful.

Barbasol is sold at all drug stores. Large tube, 25¢. Giant tube, 50¢. Family-size jar, 75¢. Five scalpel sharp Barbasol Blades, 15¢.

For Modern Shaving



No Brush • No Lather • No Rub-In

"Mention the Geographic—It identifies you."



Every variety of good fishing

Discover
THE VACATION YOU'VE ALWAYS WANTED—IN
NORTH CAROLINA
Variety Vacationland

Come now to North Carolina for the vacation of your dreams. Breathe this sparkling, invigorating air. Revel in every vacation diversion. Drive America's finest highways. Choose from hotels, inns, cottages, homes. Rates to suit you. Mail coupon.

Dept. of Conservation and Development, Governor's Hospitality Committee, 2136 State Office Bldg., Raleigh.

- GORGEOUS SCENERY
- GOLF
- FISHING
- SWIMMING
- HIKING
- RIDING TRAILS



Department of Conservation and Development

2136 State Office Bldg., Raleigh, N. C.

Continents: Please send me official booklet.

"NORTH CAROLINA, VARIETY VACATIONLAND"

"OUTDOORS IN NORTH CAROLINA"

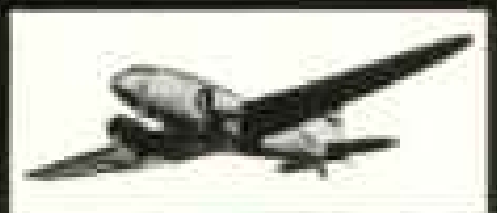
"WHAT'S GOING IN NORTH CAROLINA"

(Check appropriate box)

Name _____

Address _____

ADVICE TO WIVES—



IF YOUR HUSBAND TRAVELS, do you know he can eliminate many a night away from home—by flying TWA!

A NEW YORK MAN can leave Chicago 1 p. m., on TWA's "Sky Rocket"—be home for dinner! Fare . . . \$44.95

New York to Los Angeles—overnight—via TWA, fastest coast-to-coast! . . . \$149.95

10% DISCOUNT ON BOUND TRIPS!

Write TWA, Kansas City, for Free Booklet on TWA Service to both Ports via Grand Coulee and Boulder Dam.



Shortest, Fastest Coast-to-Coast

The National Geographic Directory of Colleges, Schools and Camps



Boys' Schools

ADMIRAL BILLARD ACADEMY

New London, Conn. Only Naval preparatory school in New England. Accredited. Prepares for college. Coast Guard Academy, Annapolis, Merchant Marine, Naval Officers and uniforms. Cadets from 16 States. 11 acres on private sea beach. Catalog.

ADMIRAL FARRAGUT ACADEMY

GRADUATES in 52 colleges. Prepares for U. S. Gov't Academies. Accredited. All sports. Junior School. Moderate rates, no extras. Summer camp. Catalog. Near Adm. S. S. Robinson, U.S.N. (Ret.), Supt., Registrar, Box 1, Toms River, N. J.

AUGUSTA MILITARY ACADEMY

Preparatory for leading colleges. Gym, pool. All sports. Troop of 30 riding and cavalry horses, 700 acres. 7th year. Reasonable rates. Catalog. Col. T. J. Keller or Maj. C. S. Keller, Jr., Fort Defiance, Va.

BLAIR ACADEMY

Excellent preparation for college. Small classes. Wide choice of sports and student activities. Golf course. Swimming pool. Careful health supervision. 6 miles from New York. Address Charles H. Breed, Headmaster, Box 17, Blairstown, N. J.

THE BOLLES SCHOOL

ACCREDITED — prepared for College Boards or Government Academies. 14th to 12th Grades. Splendidly equipped fireproof buildings on St. Johns River. Year-round athletics. Military and Naval training. For mailing address Col. Roger D. Painter, Pres., Jacksonville, Fla.

BORDENTOWN MILITARY COLLEGE INSTITUTE

Preparatory. Accredited. Business and General courses. Experienced, inspiring teachers. Boys taught how to study. Healthful location. Seven miles from Trenton. All sports. Junior school. 5th year. Catalog. Registrar, Box 658, Bordentown, N. J.

CARSON LONG INSTITUTE

Boys' Military School. Educates the whole boy—physically, mentally, morally. How to learn, how to labor, how to live. Prepares for college or business. Character building emphasis. Write for catalog. Box 21, New Bloomfield, Pa.

CRANBROOK SCHOOL

INDEPENDENT BOYS' preparatory school. Junior department. Beautiful, modern. Music, arts, crafts, sciences, hobbies. All sports. Single rooms. Individual attention. Graduates in 90 colleges. Near Detroit. Registrar, 4040 Lone Pine Road, Bloomfield Hills, Mich.

CULVER MILITARY ACADEMY

on Lake Michigan. Educates the whole boy. College preparatory. Junior College work. 8th grade. 68 graduates in 113 colleges. 1900 acres. All sports. Infantry, Cavalry, Artillery, Band. Moderate cost. Catalog. 89 Pershing Ave., Culver, Ind.

ELGIN ACADEMY

BALANCED program prepares boys for leading colleges, scientific schools. 97% of graduates in colleges. High scholarship. Individualized attention. Gym, all sports. Art, shop, pool. Music. Heavily endowed. Moderate rate. 840 year. Catalog. Earl G. Leinbach, A.M., 100 Academy Place, Elgin, Ill.

EMERSON SCHOOL FOR BOYS

In beautiful Exeter, 30 miles from Boston. Hawthorne House. Boys 14-17. Effective Study. Emerson Residences. Boys 11-14. Social Training. The Cottage. Boys 7-11. Physical Care. Edward Everett Emerson, A. B., Hdqrs., Box 660, Exeter, N. H.

FISHBURNE MILITARY SCHOOL

ACCREDITED preparation for college. West Point, Annapolis or business. Military training develops leaders. Supervised study, small classes. Sports for all hobby clubs. Band. 60th year. Catalog. Col. M. H. Hodgins, Box N-3, Waynesboro, Va.

FLORIDA PREPARATORY SCHOOL

On Halifax River. Hunting and fishing. Specialize C. E. B. examinations. Separate Jr. School. Classes average 4. 300 bathing. Outdoor classes. Water and land sports. Address: Paul N. Brubeck, Daytona Beach, Fla.

FORK UNION

HONOR SCHOOL. Small classes. Accredited. ROTC. Supervised study. Prepares for college or business. Junior school—small boys. Home-mother. Athletics. Swimming. 4th year. Catalog. Dr. J. J. Wicker, Fork Union Military Academy, Box N, Fork Union, Va.

GRAHAM-ECKES SCHOOL

COLLEGE Preparatory. C. E. L. H. center. Ocean front. Ideal climate all year. All sports. Limited enrollment. Co-educational, separate units for boys and girls. Art, music, drama. Lower School. 10th yr. L. N. Margolis, (Harvard), Headmaster, Box G, Daytona Beach, Fla.

Boys' Schools

GREENBRIER MILITARY SCHOOL

25th Year. Accredited. Preparation for College. Lower School. Modern fireproof building houses all activities. Near White Sulphur. Alt. 2300 feet. All sports. Summer camp. Catalog. Maj. D. T. Moore, Registrar, Box N, Lewisburg, W. Va.

HARRISBURG ACADEMY

Provides best educational facilities. Graduates in 36 colleges and universities. Modern buildings. New campus, new gym, swim, pool, all athletics. Moderate rates. Est. 1784. 2 year Junior College course in business training. Arthur E. Brown, Box 127, Harrisburg, Pa.

HOWE SCHOOL

EPISCOPAL school preparing for college. Episcopalian family. Individual guidance. Sports. Military Junior School. 25th year. Moderate rates. Barrett B. Bouton, M.A., Supt. Catalog. 989 Academy Place, Hows, Ind.

THE HUN SCHOOLS: JUNIOR AND SENIOR

Health curriculum from 1st grade through college preparation. All sports. Separate campus for Junior School. Tutorial method in Senior School. Summer Session Aug. 10th-Sept. 10th. John G. Hun, Ph. D., Head, 112 Stockton St., Princeton, N. J.

KENTUCKY MILITARY INSTITUTE

A SCHOOL with a winter home in Florida. Preparation for college under ideal climatic conditions all year. Oldest Private Military School in America. For illustrated catalog, address: Col. C. B. Richmond, Pres., Box N, Lynden, Ky.

LAKE FOREST ACADEMY

A NATIONAL college preparatory school for boys. Write for booklet on "The Richards Plan in Education," which is different, grips the boy's interest, is an incentive to hard work, gets unprecedented results. 10th yr. John Wayne Richards, Hdqrs., Box N, Lake Forest, Ill.

LA SALLE MILITARY ACADEMY

ACCREDITED college preparation under Brothers of the Christian Schools. Small classes. Well-equipped buildings on 160 acres. Pool and ocean swimming. Golf. Jr. Dept. 10th year. Moderate rates. Catalogue. Rev. Brother Ambrose, F. S. C., Box G, Oakdale, L. I., N. Y.

MILFORD

PREPARATION for leading colleges. Individual and small group instruction. Studies and extra-curriculum fitted to the needs of each student, permitting boys to enter at any time. Lower school for boys 11 to 16. Summer session. Catalogue. William D. Pearson, Headmaster, Milford, Conn.

MISSOURI MILITARY ACADEMY

High School and separate Junior School. 11th year inspires boy to best efforts by teaching How to Study, H.O.T.C. Small classes. Prepares for college or business. Write for catalog: Col. C. R. Strickling, M. M. A., 989 Main St., Mexico, Mo.

MORGAN PARK MILITARY ACADEMY

PROGRAM for personal development of every boy. Prepares for better colleges. Develops leadership. Near Chicago. All sports, riding, 6th year. Lower and junior schools. Catalog. Col. H. D. Abells, Box 789, Morgan Park, Ill.

MOSES BROWN SCHOOL

HELP and inspiration for each boy, a century-old tradition. Known for successful college preparation. Arts and crafts hobbies. Secluded 25-acre campus. BELMONT, residence for younger boys. L. R. Thomas, Headmaster, 279 Hope St., Providence, R. I.

NEW YORK MILITARY ACADEMY

Cornwall-on-Hudson, New York
The School of Distinction
Only 50 miles from New York, high scholastic standing, three types of courses, unsurpassed school and sports equipment.
Write the Commandant for catalog.

PEDDIE

SPECIALIZES in preparing boys for college. 98 graduates in last five years have entered Harvard, Yale, Princeton, and similar colleges. 100 acres. 10 modern buildings. Junior school. All sports for all-ages. Summer session. 10th year. Catalog. Wilbour E. Saunders, Box B-N, Hightstown, N. J.

THE PENNINGTON SCHOOL

DISPATCHES boys effectively for college. Character development a fundamental aim. Modern equipment. Small classes. Crafts shop. All sports. Lower school. 10th year. Catalog. Francis Harvey Green, Litt. D., Box N, Pennington, N. J.

Boys' Schools

RIVERSIDE

The nation's largest military preparatory school.

Two plants—excellent accommodations and more than 100,000 ft. Fall and Spring in the invigorating climate of Blue Ridge Mountains; Winter at Hollywood (near Miami), Florida. Aviation, ocean sports, golf, two gymnasiums, tiled swimming pool, tennis, etc. Individual attention of faculty who live in same buildings and eat at same tables with cadets; Separate Junior School. The economy, record of achievement, and patronage of program appeal to parents. 1944 covers every possible expense. Write for Catalogue —

GENERAL SANDY BEAVER, President
Box N-2
Cainesville, Georgia

6 MONTHS IN BLUE RIDGE MOUNTAINS

3 WINTER MONTHS IN FLORIDA

ST. JOHN'S MILITARY ACADEMY

INSPIRING military discipline helps your son develop confidence, leadership. Balanced program of conference study, remedial. Accredited. All sports. 10th year. Catalog. 1389 DeKoven Hall, Delafield, Wis.

SAN DIEGO ARMY AND NAVY ACADEMY

Favorable location by the beach. Preparation for college. Annapolis, West Point. Real study program. Joyful Spring. 2nd year. Boys 16 to 20. Catalogue. Address: Maj. John L. Davis, Box 7, Carlsbad-by-the-Sea, Calif.

STAUNTON MILITARY ACADEMY

Distinguished for excellent academic, military and athletic training. In beautiful, historic Shenandoah Valley of Virginia. High altitude. Unexcelled health record. Modern fireproof buildings. Separate Junior School. Visitors cordially welcomed.
COL. EMORY J. MIDDOUR, Supt.
Box D-8 Staunton, Virginia



STONY BROOK

"CHARACTER before Career" aims to develop the whole boy—mentally, physically, spiritually. Modern buildings. Spacious campus. In beautiful north shore of Long Island, 45 miles from N. Y. World's Fair. Address: Frank E. Goebel, Litt. D., Box N, Stony Brook, Long Island, N. Y.

SUFFIELD ACADEMY

1808-1908. College Preparatory and General Courses. Junior School for younger boys. Teaching how to study emphasized. Enrollment permits low rates. John F. Schorschowsky, Headmaster, 58 High Street, Suffield, Conn.

TENNESSEE MILITARY INSTITUTE

Tennessee preparation for better colleges. Develops sound study habits, good character. Mature faculty. Personal attention. All sports. 6th year. Limited enrollment. Moderate rate. Catalog. Col. C. R. Endsley, Supt., Box 147, Sweetwater, Tenn.

TODD SCHOOL

Boys—5 to 20. Accredited—10th yr. Vitalized Individual College Preparation; and progressive Lower School. Shop, Drama, Swimming, Riding, Trip N. Y. World's Fair to our "Land Yacht". Hour from Chicago. Catalog, or write: Roger Hill, Prin., Box G, Woodstock, Illinois.

TOME

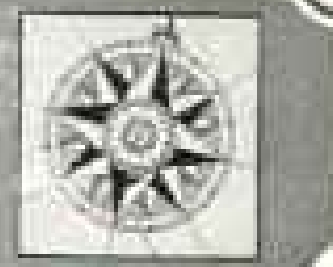
OFFERS boys fully accredited college preparation. Flexible general and business prep courses. Personal attention. Lower school. All sports, workshops. 26-acre campus on Susquehanna River. Alumni controlled. Catalog. Frederick S. Henry, Box D, Port Deposit, Md.

TRI-STATE COLLEGE

B. S. Degree in Civil, Electrical, Mechanical, Chemical, Aeronautical, Radio Engineering in 2 years. Those who lack high school may make up work. Living costs, tuition low. Enter Sept., Jan. March, June. Catalog. Bertus Hoody, Pres., 1489 College Ave., Angola, Ind.



The National Geographic Directory of Colleges, Schools and Camps



Boys' Schools

"At the Nation's Shrine"

VALLEY FORGE

Preparatory for college or business. Boys 12 to 20. Highest academic standards. Golf, Polo, all other sports. Fourteen fire-proof buildings. Cavalry & Infantry R.O.T.C. For catalog Address Box M, Wayne, Pa.

WENTWORTH MILITARY ACADEMY

Junior College, 4th yr., Near Kansas City. High school and 2 yr. college. High Scholastic standards. Accredited. All sports. Gym, stadium, riding, swimming. Music, debating. Country Club. Catalog, Col. S. Sellers, 880 Washington Pl., Lexington, Mo.

WESTERN MILITARY ACADEMY

College preparatory and lower school. Accredited. Ages 11 to 18. Individualized instruction. Modern fireproof buildings. Two gyms. Tile-lined swimming pool. Three athletic fields. Cadet Club. Catalog, Col. R. L. Jackson, Pres., Box N-8, Alton, Ill.

WILLISTON ACADEMY

UNIVERSAL educational opportunities at modest cost. Over 200 graduates in 40 colleges. New recreation center, gym, pool. Experienced, understanding masters. Separate Junior School. Address, A. V. Galbreath, Headmaster, Box 21, Easthampton, Mass.

Colleges for Men

Pennsylvania Military COLLEGE • PREP SCHOOL

West Point of the Keystone State—13th year standard four year college courses and accredited preparatory program. Separate activities and academic work by experienced faculty and capable military staff. Infantry, Cavalry, Band, Senior R.O.T.C., extra-curricular activities. Specify which catalogue.

REGISTRAR, Box N, Chester, Pa.

Girls' Schools

THE ANNA HEAD SCHOOL

EST. 1877. Accredited College-preparatory and Lower School. Swimming, hockey, riding, tennis, the year round. Spacious grounds and gardens in college town. Address Mr. and Mrs. T. R. Hyde, 2540 Channing Way, Berkeley, California.

ARLINGTON HALL

JUNIOR COLLEGE and 4-year high school. Strong Academic work. Excellent Music and other Dept. Virginia hills, 15 minutes from White House. Modern buildings, 100-acre wooded campus. All sports—indoor riding arena. Carrie N. Sutherland, M.A., Pres., Washington, D. C.

ASHLEY HALL

ACCREDITED college preparatory and general courses in atmosphere of historic Southern culture. Music, dramatics, home economics, art. Outdoor sports; riding, pool. Lower school. Write for catalog. Mary Vardine McBea, L. H. D., Principal, Box N, Charleston, S. C.

CENTENARY JUNIOR COLLEGE

FULLY accredited 12-yr. mileage. Transfer, vocational courses. Liberal and fine arts, secretarial, home economics, dramatics. All country sports, pleasant social life. N. Y. C. advantages. Catalog, Robert J. Treavor, D.D., Pres., Box 29, Hackettstown, N. J.

EDGEWOOD PARK

College preparatory, advanced courses in liberal and fine arts, secretarial, science, medical asst., home ec., dramatics, journalism. Costume design, interior decoration, merchandising. All sports—riding. Modest rates. Catalog, Box N, Briarcliff Manor, N. Y.

ERSKINE

JUNIOR COLLEGE Courses for Advanced Students. Liberal Arts, Fine Arts, Business. Two years study. Secretarial, Drama, Art, Music departments. Riding, Tennis, Fencing, Golf. Excellent faculty. Ideal location. Write for catalog. Euphemia G. McClintock, Director, 111 Beacon Street, Boston, Mass.

FAIRFAX HALL

STANDARD scholastic work. 2 years college, 4 years high school. Secretarial, Fine Arts. In Shenandoah Valley near Skyline Drive. Attractive buildings, large campus. All sports. Private stable. Indoor and outdoor pools. Catalog on request. Wm. B. Gates, Pres., Box B-N, Park Station, Waynesboro, Va.

Girls' Schools

GREENBRIER COLLEGE

FOR GIRLS. WASH. D. C. Junior College and Preparatory. Founded 1812. In the Alleghenies. Art, Music, Dramatic Art, Secretarial, International and Social Activities. Modern fireproof dormitory. Address French W. Thompson, Pres., Dept. N, Leesburg, W. Va.

THE GRIER SCHOOL FORMERLY BIRMINGHAM

COLLEGE Preparatory and General Courses for girls 12-18. Located in Pennsylvania Alleghenies. Art, music, secretarial 200 acres for all sports. Excellent riding. Gym and Pool, 8th year. Write for catalog. T. C. Grier, Director, Box 48, Birmingham, Pa.

HOUSE IN THE PINES

NEAR Boston. College Preparation, Junior College course with study abroad. Secretarial course, art, household arts, music. Riding. Write for Junior College or Preparatory School catalogue. Gertrude Cornish Milliken, Principal, 120 Pine Street, Norton, Mass.

KING-SMITH STUDIO-SCHOOL

SPECIALIZED study in Music, Art, Dramatics (new little theatre), Dancing, Languages and Literature, Creative Writing; Domestic and Secretarial courses. Individual programs, all subjects elective. Artistic home atmosphere. Catalog 1757 New Hampshire Ave., Washington, D. C.

KINGSWOOD—CRANBROOK

GRADERS 7-12, postgraduate. College preparatory and general courses. 20 acres on lake near Detroit. Unusual opportunities in arts, handicrafts, sciences, Music, dramatics, sports. Secretary, 156 Cranbrook Road, Bloomfield Hills, Mich.

LASELL JUNIOR COLLEGE

TEN miles from Boston. Two-year courses for high school graduates. Academic, Home Ec., Secretarial, Merchandising, Art, Music. College Preparatory. All sports—riding, Coking. Guy M. Winslow, Ph.D., 123 Woodland Rd., Auburndale, Mass.

LINDEN HALL

JUNIOR College and School for Girls. Cultural and Vocational. Music, Home Economics, Secretarial Studies. Fine and Commercial Art, Interesting Activities. All sports. Preparatory and General Courses. Beautiful Campus, Riding, Swimming Pool. Moderate Tuition. F. W. Stengel, D.D., Box 68, Lititz, Pa.

LOW-HEYWOOD

THROUGHOUT college preparation. Small classes, smart scholarship. General course in cultural subjects. Art, Music. Stimulating activities. 12 acre campus for sports. Riding at Ox Ridge Hunt Club. Mary Rogers Roger, Box G, Stamford, Conn.

OAK GROVE A FRIENDS SCHOOL

EMPHASIZES Preparation for College and Graduate Living. Music, Art, Dramatics. Graduate Course Bot. Science, Upper and Lower Schools. Joyous Outdoor Life. Riding included. New Fireproof Buildings. Mr. and Mrs. Robert Owen, Box 140, Vassalboro, Maine.

OGONTZ SCHOOL

ACCREDITED. Thorough college preparatory and general elective courses preparing for Ogontz Junior College. Secretarial, home-making, dramatics, music, art. All sports, riding, golf. Rydal Hall, separate Junior school. Catalog, Abby A. Sutherland, Ogontz School P. O., Pa.

PENN HALL JR. COLLEGE

ACCREDITED 2-yr. College; 4-yr. Prep. School (Girls). Part of May at Ocean City. Music, Art, Drama, Home Ec., Int. Des., Costume Design, Int.-Journalism, Secretarial, Connecting baths. Sports. Riding. Catalog.—Box W, Chambersburg, Pa.

RYDAL HALL

Home school for younger girls 6-14. Kindergarten through grammar grades. Home influence, careful guidance of each child's natural tendencies. Music, dancing, crafts, dramatics, nature study. French daily. Ten miles from Philadelphia. Catalog, Abby A. Sutherland, Ogontz School P. O., Pa.

SAINT AGNES

EPISCOPAL boarding school emphasizing through college preparation. General courses, with electives in music and art. Dramatics, dancing. Delightful country location. Outdoor sports, including riding. Catalog, Miss Blanche Pittman, Principal, Albany, N. Y.

SOUTHERN COLLEGE

GIRLS taught how to study. Jr. College and High School. Inspiring Faculty and Social Life. Golf, Riding, Swimming, Country Club, 7th yr. Eight Diploma Courses. Also Club Woman's Course, Radio Work, Hobbies, Beauty Clinic. Catalog and views, address Box N, Petersburg, Va.

SOUTHERN SEMINARY

ACCREDITED Jr. College and High School. A School of Character. Blue Ridge Mts. of Va. Music, Art, Drama, Home Ec., Merchandising, Phys. Ed., Secretarial, Social Training. Sports. 3rd year. For catalog write Robert Lee Durham, Pres., Box H, Buena Vista, Va.

Girls' Schools

WALNUT HILL

PREPARATORY and general courses. Excellent contact with leading colleges. Music, art. 30-acre campus 17 miles from Boston's cultural advantages, 2 miles from Wellesley College. All sports, riding, skiing. Founded 1898. Hester B. Devine, Principal, 26 Highland Street, Natick, Mass.

WARRENTON COUNTRY SCHOOL

NEAR Washington. College preparatory, cultural courses. French the language of the house. Teaches girls how to study, brings them nearer nature, inculcates ideas of order and economy. Miss. Lee M. Bouigny, Box N, Warrenton, Va.

Colleges for Women

MARYLAND COLLEGE FOR WOMEN

BACCALAUREATE degrees, certificates. Liberal Arts, Home Economics, Music, Kindergarten Training, Speech, Secretarial, Fine Arts, Present social life. Sports. Riding. Suburban to Baltimore. Write for Catalog. Box N, Lutherville, Maryland.

Home Study Course

CALVERT SCHOOL

Give your child a superior education from Kindergarten to High School.

If your child is not near a good school . . . must make up lost time . . . requires individual attention . . . must travel with you . . . can progress faster than his school group . . . He needs Calvert School Home Instruction Courses.

Write today for the new Calvert Catalog. See how school has been made easier and happier for more than 20,000 children.

Calvert School
Donald Willis Goodrich, Headmaster
38E Tuscany Road, Baltimore, Md.

Vocational

ALVIENE SCHOOL OF THE THEATRE

SEVEN YEAR. Graduates—First Actress, Lee Tracy, Una Merkel, Peggy Shannon, Zita Johann, etc. Stage, Screen, Radio, Stock Theatre training. Appearances, N. Y. Debuts. Write Sec'y Landi for Catalog. 86 West 85th St., New York.

AMERICAN ACADEMY OF DRAMATIC ARTS

Founded 1891 by Franklin H. Sargent
The foremost institution for dramatic training

FALL TERM BEGINS OCT. 26

For catalog of all courses address the Secretary, Room 211

Carnegie Hall, New York

INSTITUTE OF MUSICAL ART

OF THE JULLIARD SCHOOL OF MUSIC
EMMET HUTCHINSON, President; OSCAR WAGNER, Dean; GEORGE A. WEDGE, Director of Institute. All branches of music. B.S., M.S. degrees. Catalog, 120 Claremont Ave., New York, N. Y.

Katharine Gibbs SECRETARIAL

TWO YEAR COURSE—College and cultural subjects, with thorough secretarial training.
ONE YEAR COURSE—Intensive secretarial training. Also SPECIAL COURSE for COLLEGE WOMEN. Delightful residences in Boston and in New York. For catalog address: Assistant Dean
BOSTON NEW YORK PROVIDENCE
86 Marlborough St. 250 Park Ave. 155 Angell St.

LEWIS HOTEL TRAINING SCHOOLS

WASH. D. C. in-qualified hotel position. Placement Service free of extra charge. New day classes start Sept., Oct. Catalog Free. Lewis Hotel Training Schools, Div. RTP-1198, Washington, D. C.

SARGENT COLLEGE

OF PHYSICAL Education, of Boston University. 4-year B.S. course in Physical Ed., includes thorough instruction in land and water sports at Peterborough, N. H., camp. In university city. 5th year. Catalog, Ernst Hermann, Dean, 50 Everett St., Cambridge, Mass.

Do your Feet
trouble you?

Foot trouble sometimes seems to develop suddenly, although the cause may actually have been present for a long time.

The most common foot trouble is the flattening of the long arch that extends from the heel to the big toe—known as "flat foot" or "fallen arch." It is usually caused by "toeing out" or by improper shoes, either of which may put a severe strain upon this arch. When overstrained the arch flattens. One of the first symptoms is a pain in the calf of the leg.

Another common ailment, often accompanied by a troublesome callus, is a painful condition in the ball of the foot. This is frequently due to the sole of a shoe that bends down under the ball of the foot and up at the sides.

Much serious foot trouble may be avoided by wearing shoes and stockings that give satisfaction throughout the day. Shoes can be stylish *and* comfortable. Here are five points to consider in connection with foot comfort:

Is each shoe roomy above the toes, but snug at the heel and over the instep?

Are the shoes a little longer (by inside measurement) than your feet?

Does the sole under the ball of the foot lie flat?

Are you sure the shoes are not too pointed, nor too thin-soled?

Are your socks or stockings too short or too long for the foot?

Excessively high heels, especially the extremely narrow variety, may be responsible for many sore feet, contracted toes, calluses, and even for poor posture among women. Yet a sudden shift to low heels may also cause trouble. The muscles should be accustomed gradually to a lower heeled shoe.

Persons who suffer from severe foot defects should consult a competent foot specialist without delay. Correct treatment and properly constructed shoes can generally restore the foot to full usefulness and may also aid your posture.

In addition, you can do much to improve your posture by holding your body correctly—the back



straight, the chin at a right angle with the neck, the shoulders level and the chest up.

The Metropolitan booklet "Posture from the Ground Up" contains valuable information on the care of the feet and proper posture. It also tells how to overcome many foot ailments and how to safeguard children's feet. A post card or the coupon will bring you a free copy.

METROPOLITAN LIFE INSURANCE COMPANY
One Madison Avenue, New York, N. Y. Dept. 839-N

Please send me, free, a copy of your booklet "Posture from the Ground Up."

Name _____

Address _____

City _____ State _____

Plan to visit The Metropolitan's Exhibits at
THE NEW YORK WORLD'S FAIR and THE GOLDEN GATE
INTERNATIONAL EXPOSITION IN SAN FRANCISCO

**METROPOLITAN LIFE
INSURANCE COMPANY**

FREDERICK H. ECKER, Chairman of the Board
LEROY A. LINCOLN, President
ONE MADISON AVENUE, NEW YORK, N. Y.

Copyright, 1939, by Metropolitan Life Insurance Company



QUICKER STOPS..LONGER MILEAGE

The *wrinkle's* the reason



THE ONE AND ONLY TIRE
with the
SQUEEGEE
wrinkle

IT'S THIS *wrinkle* THAT
REVOLUTIONIZED NON-SKID DESIGN

No wrinkle when running (left). Silent riding, slow, even wear. When brakes are applied (right), the flexible ribs wrinkle into squeeze-action, grip in every direction for a quick, straight stop.

SQUEEGEE-WRINKLE Generals stop you, quick and straight every time. They will be a constant reminder, many times a day, that you have made a sound investment in *safety*.

As the seasons roll 'round, the *long mileage* of General's quiet running, slow wearing, flexible tread will be a revelation in the *economy* of riding on America's Top-Quality Tire.

On every score, Generals are miles ahead. Extra strength; blowout resistance; easier steering; low pressure cushioning and comfort; complete peace of mind . . . these are other "extras" you get in Generals at today's low prices.

THE GENERAL TIRE & RUBBER CO., AKRON, OHIO

In Canada — The General Tire & Rubber Co., Ltd., Toronto, Ontario

©COPYRIGHT 1949 THE G. T. & R. CO., AKRON, OHIO

You're miles ahead
with **GENERAL**



THOUSANDS OF EXTRA MILES

Tire engineers have known for years: eliminate the wear-producing spots and knobs and you increase *mileage*; but what about *traction*? General solved it with the patented, *wrinkle-action* tread . . . flexible ribs that are *straight* when rolling. Result: thousands of added miles.



RECORD LOW CHANGE-OVER COST

Generals never come as new car equipment but your General Tire dealer or car dealer can arrange to put them on your new car . . . at the lowest change-over cost in General's history. Year after year, "More new car buyers change-over to Generals than to any other tire."

FOUNTAIN SERVICE

DRINK
Coca-Cola

“Let’s get
a Coca-Cola”



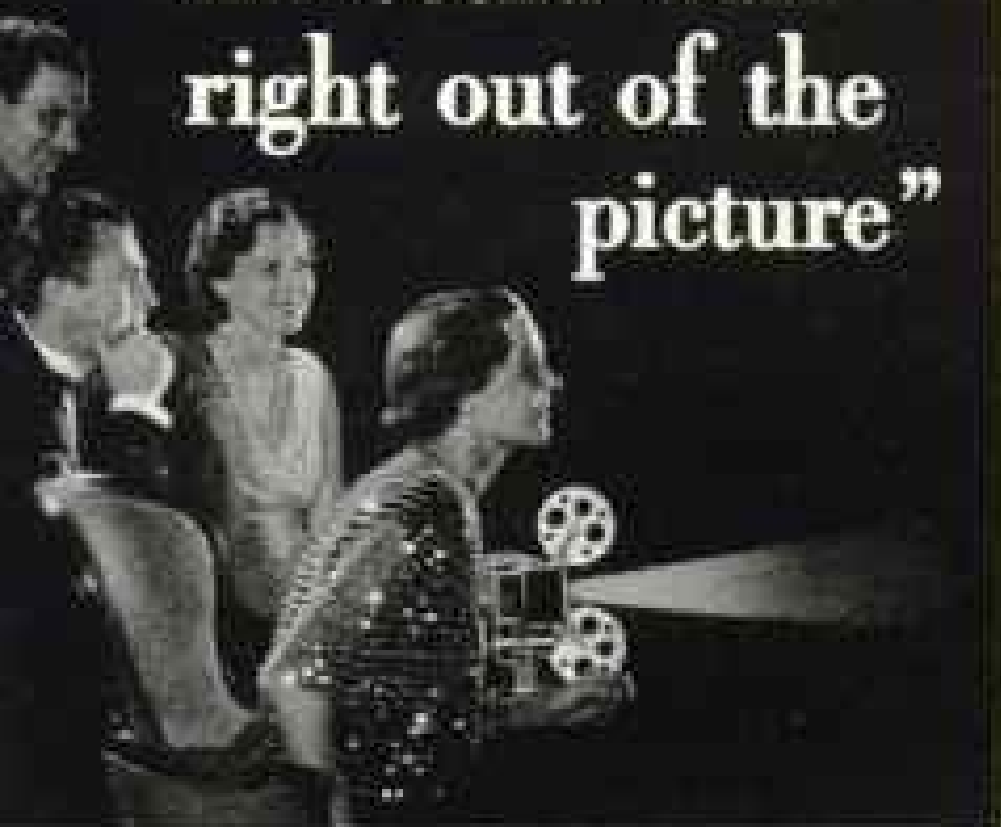
COPYRIGHT 1955, THE COCA-COLA COMPANY

It's a lucky thirst that meets an ice-cold
Coca-Cola...at America's favorite meeting
place, the soda fountain. Coca-Cola has
the taste thirst goes for. It leaves you with
an after-sense of complete refreshment
...making a pause *the pause that refreshes.*



COLD...ICE-COLD...AT BRIGHT
AND CHEERFUL FOUNTAINS

"Seems as if
she could walk
right out of the
picture"



This summer—don't fail to bring back some Kodachrome color movies of your vacation.

There's a fascination about Kodachrome color movies that holds you spellbound when you see them flash on the screen. Their beauty. Their reality.

That stretch of sand glowing in the sunlight—you can almost feel the heat waves rising from it. People seem vividly alive. Your Kodachrome Film catches every subtle hue of tree and flower, earth and sky—even the delicate tints of a child's face.

If you haven't yet taken Kodachrome color movies—get started this week. They're easy to take—just load your Cine-Kodak with Kodachrome instead of black-and-white. No extra equipment.

Ask your dealer to show you some of his sample reels. Only actually seeing them will give you any idea.

All these movie cameras take pictures in Kodachrome, as well as black-and-white. You can use Kodachrome Film with any of the following home movie cameras: Cine-Kodak Eight, the economy movie maker, Model 20, at the new low price of \$29.50; Model 25, at \$42; Model 60, at \$67.50. Cine-Kodak "E," the low-priced "sixteen" that has so many high-priced camera features, \$39.50. Cine-Kodak "K," the world's most widely used 16 mm. home movie camera, \$80—the new low price. Magazine Cine-Kodak, 3-second magazine loading, \$117.50 . . . Eastman Kodak Company, Rochester, N. Y.



FROM A KODACHROME ORIGINAL

Going to the New York Fair? Be sure to take your Cine-Kodak. Stop at the Kodak Building, where Eastman experts will advise you what to take and how to take it. See the Cavalcade of Color—the Greatest Photographic Show on Earth.



Kodachrome Film EASTMAN'S FULL-COLOR HOME MOVIE FILM

"Where shall we stay?"

ARKANSAS

Hot Springs National Park

Arlington Hotel and Baths. Artistic, curative benefits. Waters owned and recommended by U. S. Govt. Golf, Fishing. Write for folder.

CALIFORNIA

Lake Arrowhead

Lodge & Tavern. Beautiful mountain lake setting. Golf Course, Tennis, Riding, Skating. 2 1/2 hours from Los Angeles. Robert Fuchs, Manager. Associate.

Los Angeles

The Ambassador. Twenty-two acre Playground in heart of City. All Sports, Plunge, Beach, Lido, Coconut Grove for Dancing. European, \$5.00 up.

Riverside

Mission Inn. California's historic hotel. In lovely Riverside. Art treasures. All sports. American or European Plan. Rooms \$2.50 up. Write for Folder.

Santa Monica

Miramar Hotel. Mid beautiful gardens, atop the Palisades on the Pacific. Hotel rooms, bungalows and apartments with hotel service. A or E plan.

DISTRICT OF COLUMBIA

Washington

Continental Hotel. Facing the beautiful Capitol Plaza opp. Union Station. All outside rooms, some air-conditioned. Garage. Coffee Shop. From \$2.50.

The Dodge Hotel. On Capitol Hill opposite Union Station Plaza. Celebrated cuisine. No smoking. Single from \$2.50, double from \$4.50. Director K. P. Abbott.

Hay-Adams House. 18th St. N. Opposite the White House. Completely air conditioned. Single with bath from \$4. Double from \$4.50. Superb Cuisine.

Wardman Park Hotel. Washington's largest. Surrounded by parks. Tennis, swimming, dancing nightly. Cool, quiet. Near everything. Rates from \$4.

MAINE

Poland Spring

Poland Spring House. New England's most famous hotel. Merrim House. Famous since 1774. Home of renowned Poland Water. Every sport.

MARYLAND

Baltimore

The Belvidere. Baltimore's most luxurious hotel. Modern appointments, spacious rooms, superior food and service. Convenient location. Rates begin at \$2.50.

MASSACHUSETTS

Cape Cod—Osterville

Oyster Harbors Club Hotel. 2 1/2 hours from Boston. Donald Ross Golf Course, tennis, riding, yachting, bathing, (70° water). *Folder.* C. W. Watson, Mgr.

MINNESOTA

Rochester

Arthur Hotel. European. \$1.75 up. Fireproof—Modern—Comfortable. Cafe, Room Service Gratis. One Block to CLINIC. An Arthur L. Roberts Hotel.

MISSISSIPPI

Pass Christian

Inn By The Sea and Cottages. Pass Christian, Miss. Always open. On private bathing beach. All sports. Paved roads. Climate Ideal. Near New Orleans.

NEVADA

Lake Tahoe—Glenbrook

Glenbrook Inn and Ranch. On most famous lake in West. Excellent golf, motoring, lake and mountain sports. One hour west of Reno on Route 50.

NEW JERSEY

Atlantic City

Marlborough-Blenheim. Central Boardwalk, overlooking ocean and city park. 22 years' ownership management. *Folder.* Josiah White & Sons Co.

Ocean City

The Flanders. Directly on boardwalk. American plan. 2 sea water swimming pools. 200 rooms with baths. New York Office—60-6th Ave. Circle 5-446.

Princeton

The Princeton Inn. Facing golf course and College. Amer. plan. 100 rms. J. Howard Brown, Mgr. New York Office—60 Fifth Avenue. Circle 5-446.

Spring Lake Beach

The Monmouth. Directly on Ocean. Private Beach Exclusively for Guests. Smartest Resort Hotel on North Jersey Coast. *Folder.* J. J. Farwell, Mgr.

NEW YORK

Albany

De Witt Clinton. A Knott Hotel. New, well appointed. Faces Capitol Park. Splendid meals; attentive service. Come, we'll make you happy.

Bronxville

The Gramatan. High, cool country setting; only 20 minutes from city and World's Fair. Near parkways; no traffic. Restricted clientele. \$5 up. *Folder.*

Lake Minnewaska, Ulster County

Wildmere House. Three hours from New York, U. S. Route 44. Lake and mountain scenery. Spruce skin protected. *Folder.* George H. Smiley, P. O. Box 10.

Long Island—Montauk Point

Montauk Manor. Clubs; rates \$7 up with meals; all sports; sea fishing; duck ranch; New England ferry; fast trains to World's Fair; M. H. Watson, Mgr.

New York City

The Barbizon. Lexington Ave. 38th St. New York's most exclusive hotel for young women. Cultural environment. *Folder.* \$12.50 up, daily \$2.50. *Folder.* "G".

Barbizon-Plaza. New skyscraper hotel overlooking Central Park at 6th Ave. Double from \$4 single, \$2 double. Continental breakfast included. *Folder.* W.

The Commodore. Right at Grand Central Terminal. Subway entrance in building direct to New York World's Fair. 200 outside rooms with bath from \$4.

The Plaza. Facing Central Park. Air conditioned rooms available. Subway at Hotel direct to the New York World's Fair. *Folder.* Henry A. Ross, President.

Savoy-Plaza. Overlooking Central Park. Air conditioned rooms available. Subway direct to World's Fair at the door—5th Ave. 57th to 67th Sts.

Hotel Seymour. 30 W. 42d St. Near Fifth Ave., theatres, shops, art galleries. *Folder.* City, Quiet, refined surroundings. Rates Grand Double, rates \$15.

The Vanderbilt Hotel on Park Ave. at 41st St. A distinctive address. An internationally famous hotel. Single from \$4, double from \$7, suites from \$15.

The Waldorf-Astoria. Park Avenue, 67th to 70th Streets. This is now the most extensively air-conditioned hotel in the world.

George Washington. 3rd St. & Lexington Ave. All rooms with bath, from \$2.50 single, \$5.00 double. Write for *Folder.* "G" and supervise map of New York.

Watkins Glen

Glen Springs Hotel. High above magnificent Finger Lakes. Natural Neuberger Baths. Splendid cuisine. Golf. N. Y. Phone 415-6199. Wm. Leffingwell, Pres.

Recommendations for Membership

IN THE

NATIONAL GEOGRAPHIC SOCIETY

* The Membership Fee, which is for the Calendar Year, includes Annual Subscription to THE NATIONAL GEOGRAPHIC MAGAZINE

DETACH HERE—OR NOMINATE BY LETTER IF YOU PREFER NOT TO CUT THIS PAGE

Secretary, National Geographic Society,
Sixteenth and M Streets, N. W., Washington, D. C.

1939

I nominate for membership in the National Geographic Society:

(1) Name _____ (Occupation) _____

Address _____

(2) Name _____ (Occupation) _____

Address _____

(3) Name _____ (Occupation) _____

Address _____

Name of Nominating Member _____

Address _____

"Where shall we stay?"

PENNSYLVANIA

Hershey

Hotel Hershey. One of America's finest. Magnificent setting. Open year around. European and American plan. Four Golf Courses. All outdoor sports.

Philadelphia

Bellevue-Stratford. "One of the Few World Famous Hotels in America." Rates begin at \$1.00. Claude H. Bennett, General Manager.

Pocono Mountains—Buck Hill Falls

The Inn. Stop off here on your way to and from N. Y. World's Fair, 4 hrs. away. Utmost in sports. New York Office, 69 Fifth Ave. Circle 5-3028.

VIRGINIA

Virginia Beach

Cavalier Hotel and Beach Club. Open all year. Golf, tennis, riding, fishing, swimming pool. Roland Eaton, Managing Director. Write for Booklet "G."

Williamsburg

Williamsburg Lodge.—New unit of Williamsburg Restoration, Inc. offers inexpensive accommodations in this historic city. John D. Green, Mgr.

BERMUDA

Isvereste. Directly on the water; bathing, sailing, fishing. Attractive rates. General Agent of Bermuda Hotels, Inc., Dept. N, 590 4th Ave., N. Y. C.

CANADA

Quebec—Montreal

The Ritz Carlton . . . Famed for its service, cuisine and distinctive clientele. Location unsurpassed.

Quebec—Murray Bay

Mancir Richelieu's brilliant resort on the St. Lawrence. All sports. Open to Sept. Apply 715 Victoria Square, Montreal or travel agents.

Established 1868

Judd & Detweiler, Inc. Printers

Eckington Place and Florida Avenue
Washington, D. C.

This Magazine is from our presses

Champion-International Company

Manufacturers of the paper used in

THE NATIONAL GEOGRAPHIC MAGAZINE

and other high-grade coated paper

Office: Mill

LAWRENCE, MASS.

DID YOU READ THIS 26 YEARS AGO?

A Sparkling Clean Water-Closet Bowl

can now be had in every home. Sani-Flush will remove all discoloration without scouring or touching the bowl with the hands. It positively will not hurt the plumbing connections.

Sani-Flush



Cleans
Closet
Bowls
Quickly—
Easily—

This is an old-time advertisement. For more than 26 years, Sani-Flush has been the easiest and best known way to clean toilets. (Also cleans out auto radiators.) See directions on can. Sold by grocery, drug, hardware stores. 10c and 25c sizes. The Hygienic Products Co., Canton, O.

Burpee's CROCUS

All Colors Mixed

Choice Bulbs, Special Offer—

Blue, purple, white, yellow, also striped. Postpaid.

10 Bulbs 10c; 100 for \$1

All you want at this low rate!

Guaranteed to bloom. Order early!

Burpee's Fall Bulb Book free

—highest quality, low prices,

to plant freely this fall. Write today.



10 BULBS

10¢

100 for \$1

BIG DOLLAR VALUES

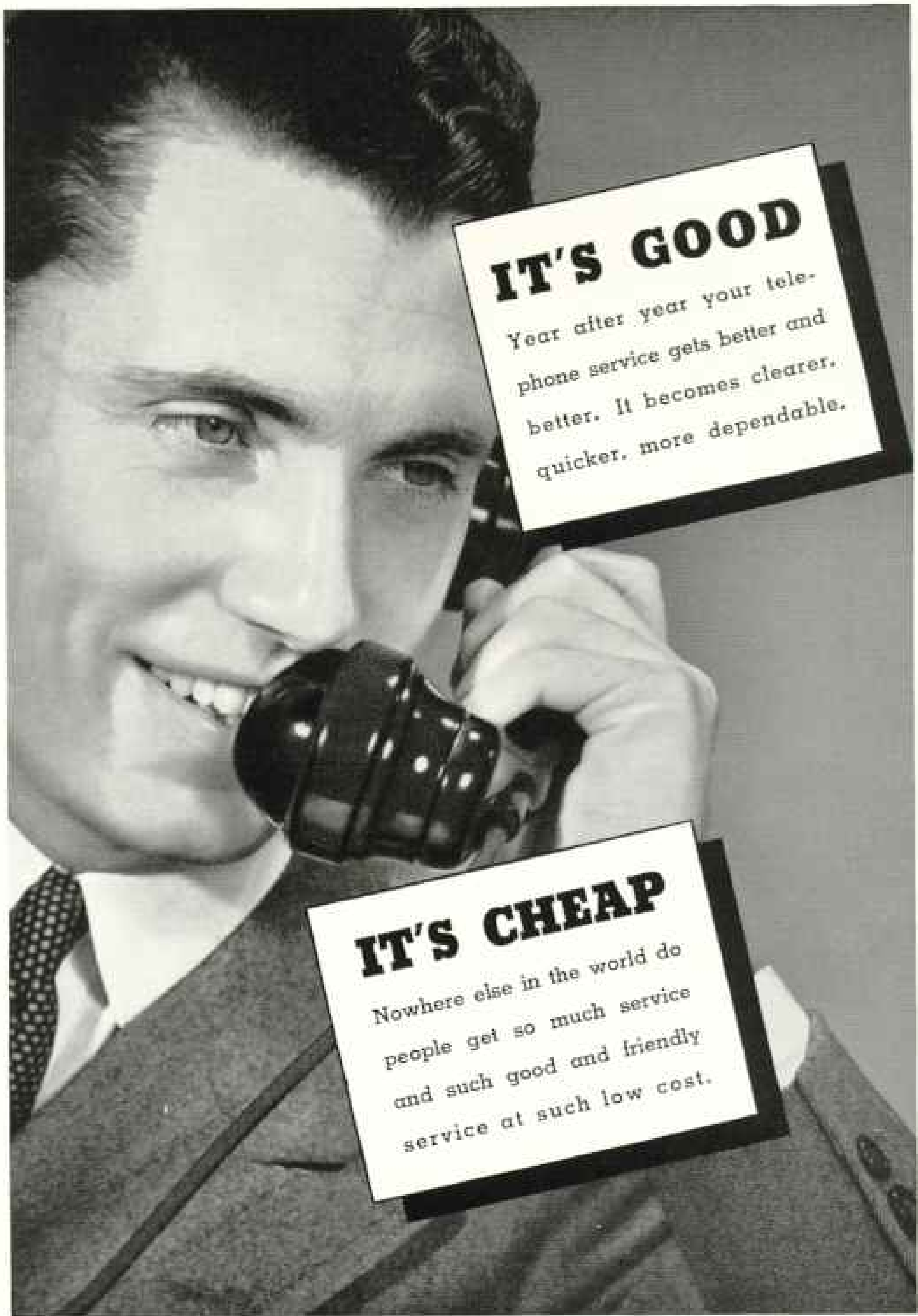
- 25 Giant Darwin Tulips, all colors, mixed \$1
- 25 Giant Trumpet Daffodils, many colors, mixed \$1
- 20 Red-Capped Daffodils, assorted . . . \$1
- 15 Large Hyacinths, mixed \$1
- 15 Regal Lilies \$1

Any Six \$1 Lots \$6!

NEW FALL BULB BOOK FREE

W. Atlee Burpee Co., 208 Burpee Bldg., Philadelphia

"Mention the Geographic—it identifies you."



IT'S GOOD

Year after year your telephone service gets better and better. It becomes clearer, quicker, more dependable.

IT'S CHEAP

Nowhere else in the world do people get so much service and such good and friendly service at such low cost.

**BELL
TELEPHONE
SYSTEM**



The Bell System cordially invites you to visit its exhibits at the New York World's Fair and the Golden Gate International Exposition, San Francisco.

THE WORLD'S GREATEST ARTISTS ARE ON VICTOR RECORDS.



In your own home . . . concerts
more brilliant than in the
world's most famous halls—on

Victor Records



Automatic Record Changing RCA VICTROLA U-123

Price includes \$17.50 in
Victor or Bluebird Records

Combines Victor Record and radio entertainment. Has Automatic Record Changer and Electric Tuning. Price includes \$17.50 in any Victor or Bluebird Records you choose, trial subscription to Victor Record Review—and Victor Record Society membership \$129.95*

*Trademarks "Victrola," "RCA Victor" and "Victor" Reg. U.S. Pat. Off. by RCA Mfg. Co., Inc.

PLAY VICTOR RECORDS THROUGH YOUR RADIO



R-100

Get \$22.95 value, in Victor or Bluebird Records and RCA Victor Record Player, for \$14.95

Get \$14.95 (list price) RCA Victor Record Player . . . \$7.50 in any Victor or Bluebird Records . . . other Victor Record Society benefits . . . for \$14.95, RCA Victor Record Player can be connected to any modern A.C. radio at little or no expense; plays records with tone comparable to that of radio.

You can buy RCA Victrolas on C.I.T. easy payment plan. Any radio instrument is better with an RCA Victor Master Antenna. *Price Co., Camden, N. J., subject to change without notice. For finer radio performance—RCA Victor Radio Tubes.

Soon the great musical season will open in the capitals of the world . . . brilliant concerts by artists, orchestras and opera companies will draw tremendous audiences. But none of these concerts can equal the brilliance of concerts you can hold any night or day in your own home, on Victor Records. For you can choose from all the world's greatest artists, and hear them one after the other . . . Flagstad, Toscanini, Richard Crooks, Heifetz, and Rachmaninoff, for instance, *all on one program!* An RCA Victrola provides the most superb reproduction of Victor Record music. RCA Victrolas that combine Victor Record and radio entertainment begin as low as \$19.95*.

MUSICAL MASTERPIECE OF THE MONTH

"PETER AND THE WOLF," Orchestral Fairy Tale (Prokofoff). Played by the Boston Symphony Orchestra, Serge Koussevitzky, conductor; Richard Hale, narrator. Album M-566 (AM-566 for automatic operation), 6 sides, with descriptive booklet, \$6.50.



RCA Victrola

COMBINES RECORD AND RADIO ENTERTAINMENT
A SERVICE OF THE RADIO CORPORATION OF AMERICA