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THE NATIONAL GEOGRAPHIC MAGAZINE

Cotton: Foremost Fiber of the World

By J. R. HILDEBRAND

FOR long-time performance in changing boundaries and annexing colonies, consider—not bombing planes and machine guns—but a vegetable fiber so fragile that all Scarlett O'Hara's five petticoats might literally be gone with a gust of wind. And so delicate, medieval explorers reported, that the Hindus made it into a cloth which became invisible when bathed in morning dew!

It isn't precisely fragile, at that, for a strand of cotton is stronger than a thread of wrought iron of the same size. Its grip on world politics reaches farther in time and area than steel, troops, petroleum, or even dictators.

Cotton transplanted myriad black men from Africa's steamy Slave Coast, and almost split our Union in two. It founded cities in the modern sense, manufacturing settlements where people left their home looms and spinning wheels to cluster around big factories during the Industrial Revolution in England.

In virtually every world area where the Machine Age has arrived, weaving has introduced it—in Flanders, Old England, New England, British India, Japan—and now our own cotton-growing South has swiftly taken up manufacturing cotton, too.

The tenuous "white gold" helped fortify Gibraltar and dig the Suez Canal for Britain's cloth route to cotton-clad India. It promoted London's naval support of our Monroe Doctrine to feed Manchester mills with a steady stream of bales from Dixie.

A Tricky Twist of Nature

Nature designed this world-pervasive seed hair to help scatter seeds "just like the fairy parachutes of the milkweed." A botanist with a magnifying glass will show you how a tiny tube filled with oil runs the length of the filament while it ripens. At maturity the oil conveniently flows back into the seed and the tube collapses into a sort of spiral spring.

These twisted walls of practically pure cellulose lend themselves to spinning because they are surprisingly strong and clutch each other. Hence cotton provides more clothes and cloth for mankind than all the world's other textiles put together.

As for the seeds, Mississippi in 1857 passed a law requiring gin owners to destroy them, so they would not clog or contaminate streams.

Raw Materials from a Miracle Seed

Now magic chemistry has transformed the "cottonseed nuisance" into a series of major industries. Order French pastry, salad dressing, or potato chips, and you probably buy cottonseed oil. The meal and cake residue after oil extraction helps feed the cattle that yield your steaks and milk.

"Why, cotton even makes wool!" exclaimed a GEOGRAPHIC photographer, when he saw these by-products fed to sheep.

How amazingly inventive genius overawes fiction!

Generals of Alexander the Great brought news to Europe of a "vegetable wool" which grew in tufts of trees of India. Rewrite historians elaborated this report and seriously described "plants bearing fruit within which there is a lamb having fleece of surpassing beauty."

Words die hard. Actual calico from Calicut, muslin from Mosul, and dimity from Damietta killed off the mythical medieval zoophyte, but to this day the British speak of "cotton wool."

Hulls of the seed go into baseballs, handles for hairbrushes, and horse collars.

Linters help make shatterproof glass that protects you while you ride on part-cotton tires to see a newsreel recorded on made-of-

Photograph courtesy Engineer Board

Cotton for Camouflage

Experimental suits of printed cotton and rayon for the United States Army are made like work uniforms, but designs have not been definitely determined. Colors may have to be changed with the seasons to blend with spring greens and autumn browns. Tryouts also are being made here at Fort Belvoir, Virginia, with cotton instead of burlap for "chicken wire," nets, and other camouflage.

linter film showing war havoc wrought by explosives of linters.

It's all very confusing, this Nature's miracle seed which becomes shirts, salad dressing, smokeless powder, bookbinding, fertilizer, and face cream until one breaks down, in the mind's eye, the major raw materials a fluffy cottonseed contains—lint, linters, hulls, oil, and meal.

On the average, every 500 pounds of cotton baled have yielded also some 900 pounds of seed, and from these seeds are cut from 75 to 90 pounds of linters (Color Plate I).

Raw cotton is the lint which is baled to be manufactured into multitudinous yarns, threads, and fabrics, from dresses and beehive veils to curtains, kimonos, kites, pillowcases, handbags, and heel pads.

In cotton's golden age of plantation glory only the lint was sold; seed was waste except for planting and a few that were home-crushed to make a "beauty meal" which ante-bellum belles used instead of the modern mudpack.

Nowadays the seed goes to a crusher where first the short and fuzzy fibers which the gin forgot, known as "linters," are cut off for plastics, guncotton, varnish, mattresses, writing paper, and even for cellulose to make cotton's new rival, rayon.

Each week the Rochester, New York, plant of the Eastman Kodak Company uses 80 tons of cotton linters.

Of prime interest just now is the enormous use of linters in the making of smokeless powder. Also, as nitrocellulose, linters go into dynamite, strong right arm of engineering, to blast the way for faster trains, swifter auto travel, and for building big dams. Cotton even helps make your brass alarm clocks because dynamite bores into the deep shafts of Lake Superior copper mines and tears out profitable pockets of zinc ores around Joplin, Missouri.

Shoes, Ships, Cabbages, Kings

Whirling knives tear the hulls off the kernels. The hulls go their separate ways to makers of bran for cattle, blotting paper, household utensils, packing material, and fountain pens.

They use sterilized Chinese human hair cloth in the presses that crush the kernels into cake and meal as the valuable crude oil drips into settling tanks. No other fiber can stand

the heat and pressure of 5,000 pounds to the square inch.

Queen of the Cotton Wonderland is this protean kernel. Literally it gets into shoes (as finishing), ships (as pitch), sealing wax (as an emulsion), and cabbages (as fertilizer).

And the "fine linen" of Biblical kings has been translated "cloth" in revised versions of the Scriptures because it is suspect of having been cotton.

The cake and meal of the kernel may be destined as food for horses, hogs, and poultry, as well as soil rejuvenator, and also as table crackers and birthday cakes.

But the end product, cotton crude oil, is the chemical genie which outsmarts the Alice of any fictional wonderworld. With it they make bread spread and soap, auto cup grease and piecrust, oil to pack sardines and to emulsify medicine, cosmetics, and roofing tar.

There is no problem surplus in cottonseed and linters; there have been times within the year when supplies were only a few weeks ahead of demand.

"The day may come when we will be raising cotton for the seed, and the lint will be a by-product," remarked one cotton economist.*

It's a long, long trail sometimes that cotton winds. Mountain men of our Carolinas settled scores of made-to-order mill towns to furnish fibers for English looms. Thence tons of woven fabric normally flow to India so swarthy natives may wear cool garments to work with the jute that the United States buys to wrap more cotton bales to ship abroad.

Now, with war threatening this cotton-jute circuit, a New Orleans factory turned out last year a million cotton wrappings, or patterns, to encase cotton bales (page 148).

On a map of the United States continue the line between Virginia and North Carolina straight west to the region of sky-blue Mon-

Photograph by H. P. C. Melville

A Little Cotton Goes a Long Way in an Arawak Costume

Near this British Guiana matron's home are cotton plants ten feet tall, from which she collects seeds when the bolls burst. After removing the lint by hand, she pulls it into long, loose strands. Then she winds a strand around her left wrist, fastens the other end to a small spindle which she revolves by rolling it rapidly with her right hand downward along her right thigh. From the thread she may make binding for arrow shafts, aprons, loin cloths, or hammocks.

* Early in November, 1940, a farmer who took his raw cotton to the gin would have received 9.35 cents a pound for his lint, and a fraction over one cent for his seed with linters attached. However, the larger grower, by delinting and crushing his own seed, received for the oil 4.75 cents a pound, 1.4 cents for the meal, 4.24 cents for the linters, and slightly less than half a cent for the hulls. Should raw cotton's price level cease being pegged by government loans, and seed product prices continue to rise, a 500-pound bale of lint may bring less than the 900 pounds of seed removed therefrom.

AP Photograph from Pictures, Inc.

A Cotton Capsule Contained 1940's Historic Draft Number—158

Opaque blue containers about an inch and a half long look like oversize capsules for quinine. They were made to order from cotton linters by the Celluplastic Corporation of Newark, New Jersey. Similar cylinders are used in many States for selecting jurors. Here Lieutenant Colonel Charles R. Morris, who performed the same service in the World War Draft, is blindfolding Secretary of War Stimson. President Roosevelt waits to begin reading by radio to the Nation the fateful numbers affecting 16,500,000 men.

terey Bay, California. In every State south of that line—nearly one-third the mainland area of our country—cotton grows, and in 11 of those States it is a lifeblood crop.

This broad belt affords three major requirements for cotton cultivation: nearly seven months of frost-free weather, ample field labor, and abundant rainfall—or now, irrigation, as in Egypt, historic Dixie of the Nile.

So vast is the water surface of all the leaves in a field of cotton that evaporation may reach 50 tons a day on one acre. Therefore, irrigation has contributed to more cotton being grown west of the Mississippi River than east of it. As cheap water pours through man-made ditches of parched parts of Texas and the arid Southwest to grow more cotton, and war constricts exports, surplus bales pile millions high in warehouses.

Moreover, for many years the United States grew around two-thirds of all the cotton in the world. Recently planting elsewhere has increased until, in 1939, the United States' crop of nearly 12 million bales was exceeded by the 14 million bales of the next big five cotton-growing countries.

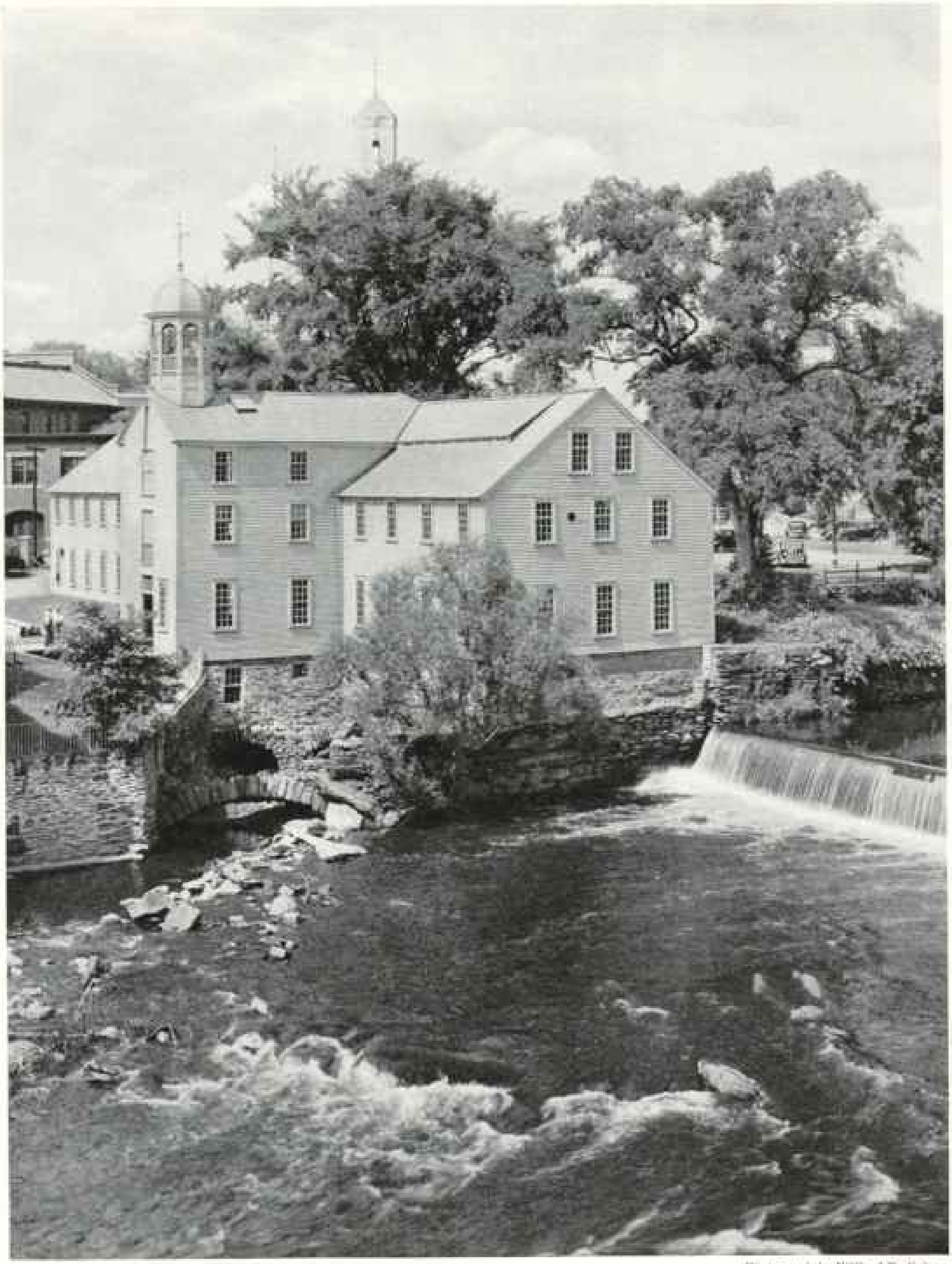
India and Russia each grew about 4 million bales. From 551,000 bales reported ten years ago, Brazil has jumped to fourth place with 2,105,000 bales, passing China and Egypt.

For these reasons mills build laboratories and distant universities enlist more research men to find devious new uses for cotton other than for clothing four-fifths of the human race and for helping bed, bathe, and blow the noses of civilized mankind.

Not New Under the Cotton Sun

Speeding through cotton fields in an air-conditioned train, I read an old chronicle which told how, three centuries before Christ, Persians hung blue-and-white purdahs stuffed with cotton in their harems to abate heat so fierce that "lizards and serpents could not cross the streets at noon quickly enough to prevent their being burned to death midway"!

Also how Hindus of Marco Polo's day had cotton cloth "fine as webs of woven wind," seductively transparent, "but the merchants are not permitted to transport it, for the governor is obliged to send it all to the Great Mogul's seraglio."



Photograph by Willard R. Culver

The Rhode Island Shrine of America's Cotton Industry

Chief objection to Samuel Slater's "visionary" mill at Pawtucket in 1793 is expressed in the historical novel from which *The Howards of Virginia* was filmed. "Spinning machines!" exclaimed Captain Warren. "Time'll come when a woman won't have nothin' to do when a man's away to sea." Early cotton Americana are being collected for a historic and industrial museum to be housed in the restored mill.

Photograph by J. Baylor Roberts

There Are Styles in Overalls, Too

Down where the blue denims begin, a factory scout rounds up living models when this Greensboro, North Carolina, company puts out a new line for children. Juvenile sizes begin with "two years"; adult regulars run to 50 inches' waist measure. Work clothes, such as those of gasoline-station attendants, use much cotton.

Next day at the offices of the National Cotton Council at Memphis I heard an inventor explaining a new fire-resistant cotton insulation for houses (page 145). Later, in New York at the Cotton-Textile Institute, I leafed over exclusive designs for fine-spun cotton evening gowns to sell in New York shops for upwards of $200.

On the face of it, $200 evening gowns would not seem an important factor in using more cotton—not until you browse among New York's garmentmakers and see how fashions are born.

"Start at the top and work down," was a fashion expert's advice. "Go see the big-name designers who are to the United States what the *couturiers* were to peacetime Paris.

"Then study how their exclusives are adapted by the volume makers for the department stores and specialty shops. Keep on to the quantity manufacturer. He follows these same trends for the chain store, mail order, and neighborhood trade, which buys from catalogues or samples."

The advice was good, but starting "at the top" had its difficulties. It is easier to interview "inaccessible" Wall Street magnates, or see Cabinet officers in wartime, than to approach a designer in August busily engaged in evolving next spring's snappy numbers. Every visitor is suspect. At one place a guard leafed through pamphlets his own employer had given me before I could depart.

At the streamlined mass-production end of the fashion trail, in enormous cutting rooms electric machines slice sleeves and gores from long layers of a hundred or more bolts of cloth. Massive mounds of the forty-odd ticketed pieces for a single $1.48 house dress are hauled away to contractors for machine-sewing.

Gleam in a Designer's Eye Grosses a Million Dollars

After these rounds, still feeling like a fifth column fashion pirate, I sought out a garment industry research man. Together we tried to work out a case history of a specific cotton street dress which first blossomed forth in the pastel-tinted window of an upper Fifth Avenue luxury-trade store.

The "creation" shown there had emerged after weeks of designing, modeling, cutting,

Photograph by Willard R. Culver

Two Indian Footprints in the Sands of Cotton's Long, Long Time

Oldest hank of yarn in the National Museum's historic cotton collection was found by a National Geographic Society Expedition, led by Neil M. Judd in 1923, to Moki Canyon, Utah. According to the tree-ring calendar worked out by another Geographic expedition, this cotton headband from Mesa Verde National Park, Colorado, was made about the time of William the Conqueror. It was used by Indians long before the white men came, to carry heavy loads, as in the silhouette.

hand-sewing, and embroidering. Two dozen of them sold for $100 apiece.

Several manufacturers adapted the same style and textile, and distributed some 6,000 in the specialty shops to the charge accounts tune of $39.50. Many more makers and machines produced at least 22,000 featured in newspaper advertisements at $14.50.

Ultimately, in the cash-and-carry field some 240,000 melted away before feminine blitzkriegs at "Friday specials" and other sales.

Our mathematics showed that some designer here had a fashion idea that netted a chain of makers, middlemen, and retailers a gross of more than a million dollars, and used up some 536 bales of cotton from nearly 1,200 acres.

Mary Lewis, who superintended the World of Fashion Exhibit at the New York World's Fair, is generally recognized as a pioneer in taking cotton out of the kitchen.

"You ask about new uses of cotton," she said. "Do you realize how new cotton is for women's outer garments except house dresses and kitchen aprons?

"In 1928 I designed a street dress of cotton, and no mill would make the cloth I wanted. I had to buy the cloth from the makers of men's shirts.

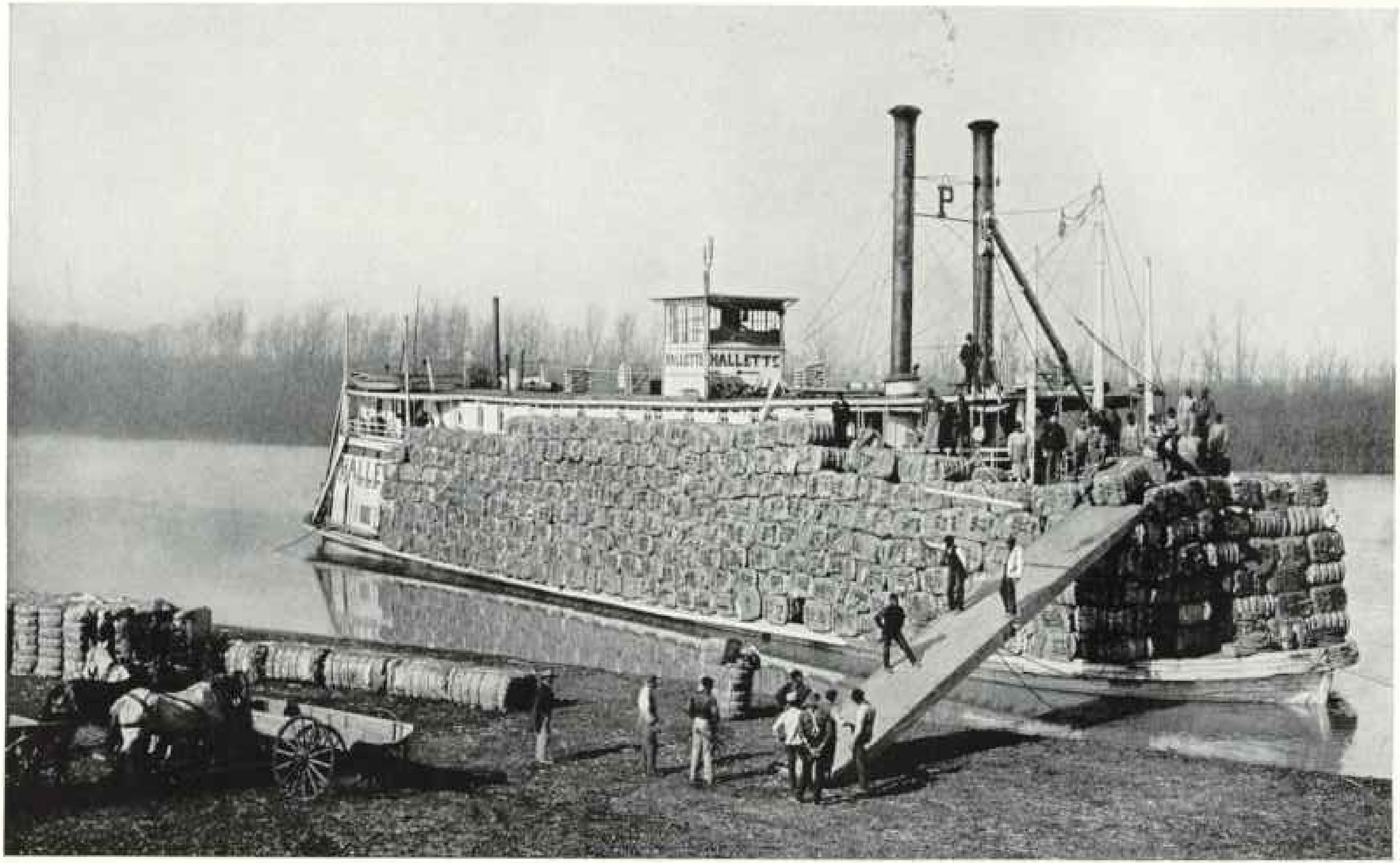
"Next year they still said there would not be enough orders to warrant changing over machinery. I got the goods from London.

"Now American mills are turning out some of the finest cotton fabrics in the world for the entire range of women's clothes, from sport, spectator, and street, to afternoon and evening wear. Already, being cut off from Paris has meant more cotton dresses sold in the United States."

Here's How a Fashion Is Born

"Paris doesn't know cotton well," designers say. "We like it because of the latitude of cloth designs and weaves which cotton permits, and it is durable and washable."

One amazing example of how fashion is born is the *dirndl*, the vogue for which used up thousands of bales of cotton and netted various makers millions of dollars.



Photograph from J. Mack Moore

A Packet That Is No More Unloads Cotton from a Plantation No Longer There

Earnings of such floating palaces were enormous, but their life was often brief because many sank on snags and bars or were destroyed by fires and explosions. The stern-wheeler *Hallette* is unloading at Vicksburg her top-heavy cargo from the Jefferson Davis plantation, Brierfield, once on the mainland Davis Bend. The restless Mississippi bored a new channel and left the gracious plantation on present-day Palmyra Island, overgrown with cottonwood, willows, and weeds.

Photograph by Willard R. Culver

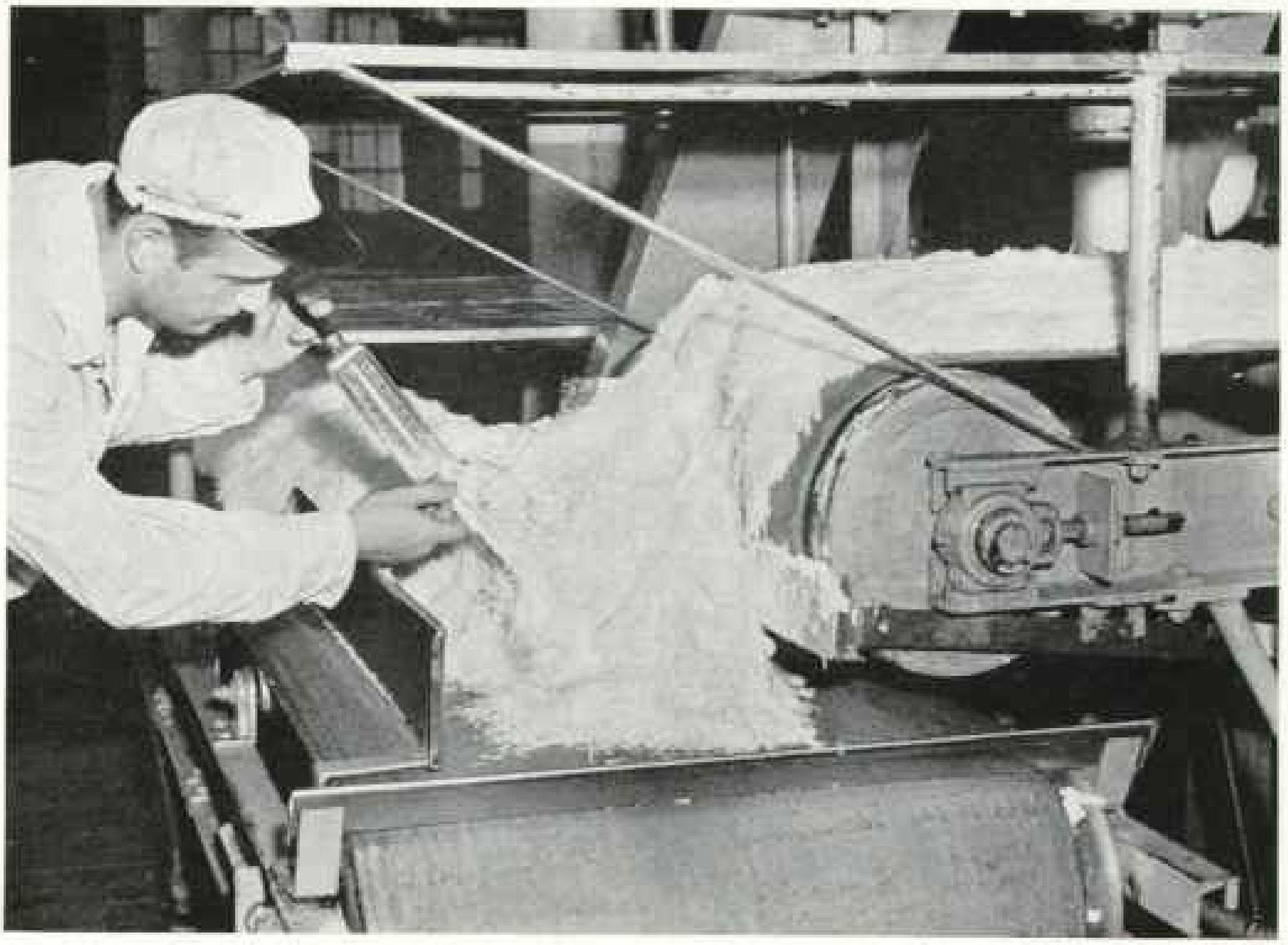
Fireproofed Cotton Insulates Houses Now

Old as the purdahs of India is the use of cotton to keep temperature uniform. The Biblical Book of Esther records that Ahasuerus gave a feast in his Shushan palace "where were white, green, and blue hangings" (Chapter I).

© Kurt Lubinski

To Show Wartime Loyalty She Wears Her Jubilee Print

From Dixie came raw cotton woven in 1935 at an English mill to commemorate the 25-year reign of King George V and Queen Mary. From Manchester the cloth traveled overseas again to the sultry Gold Coast of West Africa.



Photograph by Willard R. Culver

"Feeling the Pulse" of Cottonseed Emulsion on Its Way to Become Margarine

Temperature control is essential as the solidified flakes pour into the chill roll to insure proper plasticity.

"Any woman will know that name, even if you don't," a designer smiled.

"After the first World War, the Salzburg Musical Festivals were resumed and attracted the tide of American travel. Dozens of folk costumes of the Austrian farm girls were brought back to the United States, and some of the so-called peasant-costume makers put them in the foreign specialty shops.

"They caught on in a big way when attention was drawn to the Tyrol by the honeymoon there of the Duke of Windsor. That was in June, 1937, and immediately a Fifth Avenue store featured them in the windows. The bright young promotion manager of that store cast about for a name, learned that the word 'dirndl' was colloquial for 'country girl,' so she called the costumes 'dirndls.'

"Even after the peak of enormous sales passed, the flaring dirndl skirt still influenced style."

From the college campus, from Hollywood movie studio, from the daily news, designers get their ideas. Youth tied a handkerchief around its head, and hoods came into vogue.

Some ten years ago Patou took six young American girls—called flappers then—to Paris, and put them to wearing gowns in the silhouette of that era with waistline down over the hipbones. The healthy young things just couldn't be bothered, so they tied the belts around their normal waistlines and women have been more comfortable ever since.

To Friend Husband the shortening of women's skirts by two or three inches may be the subject of jest about female fashion whims, or a quip that women's knees really are joints and not an entertainment. But to millmen such a trend is immediate cause for calculation of how the change will affect their sales of gray goods (unbleached cloth).

Wife may well reply, "And how about those cuffs on your cotton slacks? That was a promotion which netted a single mill an increased output of 3,648 yards of cotton cloth."

Fashion City, Within a City

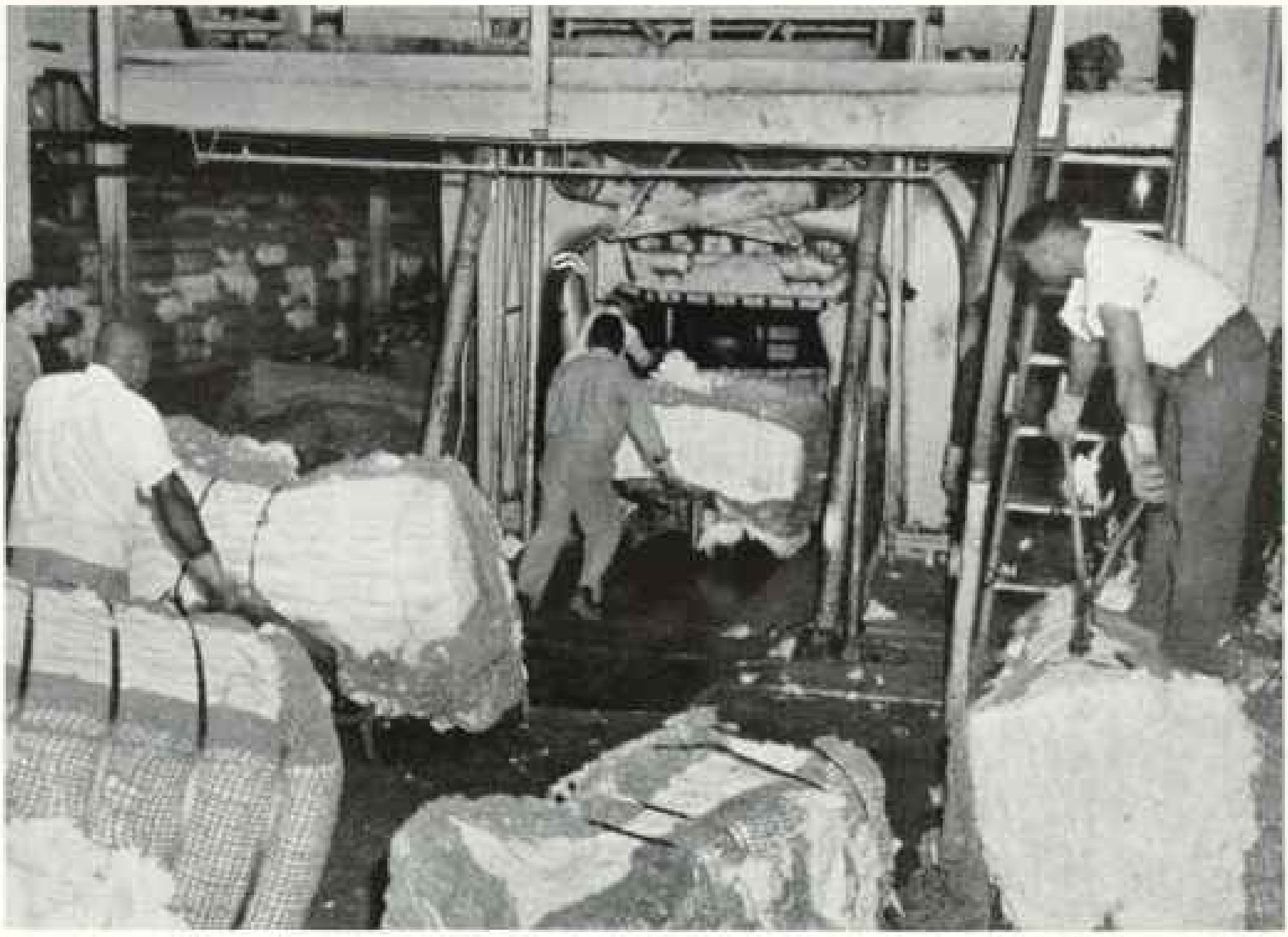
At Broadway and 36th Street, New York City, is the hub of a fashion world where style is no mere whimsy, but investment in several billion dollars' worth of realty and sales of some 600 millions of dollars' worth of women's outer garments annually.

Walking along West 36th Street on July

Photograph by Ray Chapin

Away Out West in the New Land of Cotton

Pickaninny, banjos, and bales are like those you might see at New Orleans. But this cotton is California-grown and awaits ship loading at Long Beach. In recent years the fiber has ranked fourth among the State's crops. A single-variety law permits planting in some areas only Acala, developed from a wild Mexican type to withstand the hot sun of the irrigated San Joaquin Valley.



Photograph by William R. Osler

For Shipping, Fluffy Cotton Is Packaged in Bales Weighing 500 Pounds

A hydraulic plunger rises in the press box from below to form a bale about 54 inches long, 46 inches wide, and 27 inches thick. Six steel ties girdle the bulging content. Usually bales are wrapped with jute, but now cotton-cloth bagging is being encouraged by government subsidy (page 139). When exported, and sometimes for shipping by rail, bales are compressed to still smaller size known as "high density."

18, 1940, you would have seen New York newspapers at the back of the stands proclaiming "Roosevelt Nominated." But out front, in higher piles, were daily papers of the textile trade. The page-one, 3-column headline of Women's Wear Daily, with five times the circulation of William Allen White's nationally known Emporia Gazette, announced: "Unbalanced Silhouette Draped to Right—With Fullness to the Left."

Move every other industry and all the shipping away from New York, and you still would have a big textile city of some half a million people.

This fashion city within a city is sharply zoned by established custom. On the west side of Seventh Avenue are the "quality" houses; on the Broadway side are the "popular priced" manufacturers. So clear-cut is this distinction that you enter one skyscraper from the Broadway side and use one set of elevators to reach the "qualities"; you enter from the number-street side and use another set of elevators to reach the "populars."

The area below 36th Street is known to the trade, with no disparagement, as "Chinatown." There are the quantity producers for "bargain basements" and chain-store sales. Along 47th Street are makers of the more expensive and "exclusive" dresses.

A preview at one of the exotic showrooms of even a medium-priced house has the pomp, circumstance, and nervous tension of a Hollywood premiere.

Buyers sit on divans or in thronelike booths with pad and pencil to watch the models parade by as each designer explains the "points" of his "number." He has dictated notes for salesmen days before; the "script" then has been edited as carefully as a censored war-zone dispatch.

The buyers, who have come by train and plane from Wichita, Dallas, Albany—from anywhere east of the Rockies—wear orchids presented by the firm, and often outdress the chic models. In July and January they throng the better hotels; many come once a month now.

At some houses no sales are made at invitation previews. Two hundred or so styles are

Photograph by Willard R. Culver

Speedier and Bigger, a Modern Gin Works on the Principle of Eli Whitney's Original

Here seed cotton drops off conveyors which have sucked it from wagons in the shed. The operator sees that it falls evenly into the gin stand where saws, whirling 300 to 400 times a minute, tear off the fibers (lint) and pull them through openings too small for the seed to pass. The lint is then brushed off the saw teeth, sucked into a fluffy bat, and tamped mechanically into a press box to await baling (opposite page).

shown; twenty or thirty of these seem to "click." In a few days orders come in, and the "line" for the season is fixed. The "duds" are discarded.

From Junior Misses to Stylish Stouts

Back in the chaotic designing rooms of such houses you see the men and women, highly paid but nameless to their vast public, sketching ideas and snipping pieces of cloth to try them out on headless and legless model forms.

On the upper floor of a cavernous building many blocks away I saw how one firm makes more than 12,000 forms a year for the garment trade—and discovered an unexpected use for raw cotton.

On a living model who has been measured for size is fitted jute sacking impregnated with plaster of Paris. From that a cast is made to mold papier-mâché forms. The forms are covered with canvas over thick layers of cotton padding and mounted on wire "skirts."

"Why the cotton padding?" I asked.

"So designers can stick pins in the forms. You can stick thousands more pins in our forms than any of our competitors'," the manufacturer boasted.

Such standard forms sell for around $20 apiece; but "specials" costing $150 or more are figures of actresses, debutantes, and Park Avenue matrons who have modeled for made-to-order forms to save time required for personal fitting at their dressmakers.

Down among the quantity garmentmakers, where profits are as fractional as a fiber, you get an epic picture of American ingenuity and streamline production.

A deceptively simple house dress that wholesales for 67 cents involves the chemistry of bleaching and dyeing, the physics of finishing, engineering problems of spinning and weaving, also the economics of ginning, storing, and transport, and the complicated agronomy of growing and breeding cotton.

Each represents inventive genius ranging from boy-tutor Whitney's "saw-tooth gin," through humble weaver Hargreaves' spinning jenny, barber Arkwright's "water frame," and apprentice Watt's steam engine first hitched to cotton machines, to million-dollar

Photograph by Willard R. Culver

When It Works, Scores of Thousands Will Be Out of Work

For both social and mechanical reasons, the International Harvester Company calls this cotton-picking machine "experimental." Revolving spindles with surface barbs catch the ripe cotton and wind it around them. Rubber "doffers" remove the lint from the spindles and carry it to a big hopper, much the same way dirt is picked up and blown into a vacuum-cleaner bag. The machine picks an acre an hour.

research laboratories of 1940. In one factory I saw them turning out cotton dresses at the rate of 36 a minute.

"Your price varies with the price of cotton?" I asked.

"Oh, no. Wholesale price always 67 cents; they cost 65 cents to make. That leaves me two cents' profit apiece," explained the manufacturer.

"When cotton goes up, then wages go down?"

"Not at all. No pay cuts here; no strikes."

"Then what *do* you do when raw cotton soars?"

"Maybe I cut an inch or two off the zipper; maybe I leave a flower or so off the shoulder."

Not a Hand Needle in a Dress Stack

Here single cloth orders run to 2½ million yards; one department store has bought 30,000 garments at a time. Patterns are laid out like jigsaw puzzles to save every square inch as the electric cutter slices through 420 layers of cloth.

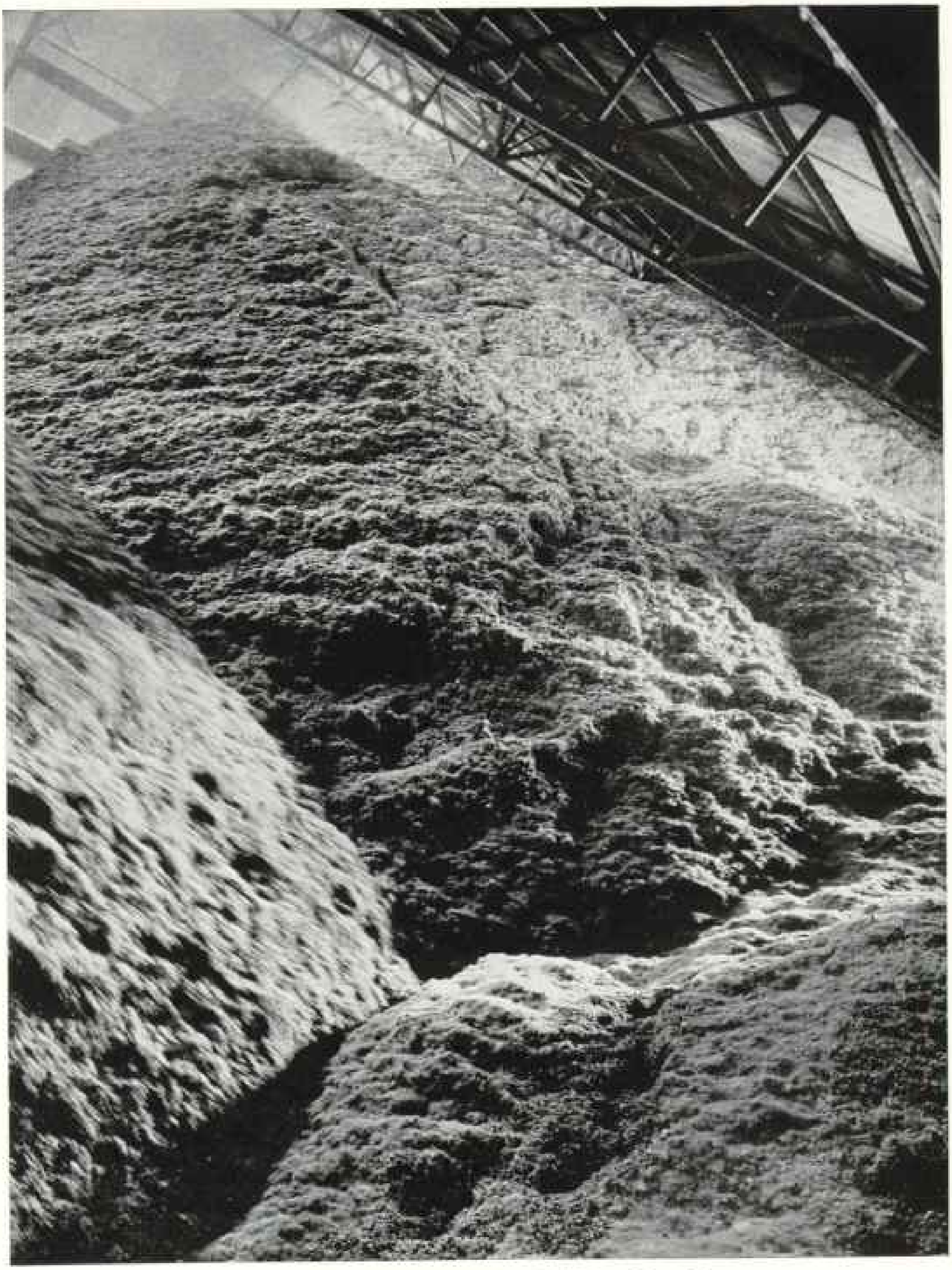
Four hundred sewing machines hum like a Gargantuan bumblebee, and there isn't a hand needle in sight. Every dress eats up from 50 to 70 yards of thread.

The thread that mother buys for mending has 150 yards to the spool; here industrial thread comes off cones wound with *seven miles* of thread. Big spools and little spools are made of selected wood, usually birch, which doesn't splinter and nicks at the edge without splitting to anchor the thread end (Plate XII).

"How do you get the thread that matches the cloth?" was the natural next question.

That inquiry led to the colorful headquarters of an organization that serves practically every woman in the United States, but few of them ever heard of it.

To the layman the tints and hues of a dress



A Mountain of Cottonseed for Fabulous New Uses

Ten thousand tons of ginning throwoff that formerly would have been waste await delinting and crushing. This steel seedhouse at Abilene, Texas, holds twice that much. First the hairy fibers, or linters, will be removed. Then the hulls will be cracked off and oil extracted from the valuable meat, or kernel. A mere list of the manifold uses of linters, hulls, oil, and meal these seeds yield would contain more words than this article (page 137).

department may seem a buyer's whim or a manufacturer's guess. However, unless the shopper is going in for expensive specialties her choice is governed by the season's color charts of the Textile Color Card Association of the United States as rigidly as Eve's selection of fig-leaf green was limited by the verdure of the Garden of Eden.

It all began when Margaret Hayden Rorke called upon Herbert Hoover, then Secretary of Commerce, to complain that all degrees of red and blue were showing up on American flags.

Soon a governmental Color Committee prescribed standardized colors in the flag, and it still functions to specify colors used in uniforms and insignia of the Army, Navy, and Marine Corps.

Mrs. Rorke went back to New York to get out the first Standard Color Card of America, which contained 106 color samples, key numbers, and, what was harder, names for each. These were arrived at by questionnaires and prolonged conferences with millmen and manufacturers. Coral, for example, henceforth ceased to represent any gown shade from deep pink to orange.

Now there are new supplementary color cards every spring and fall, and a glance through these shows how they often bear on events and geography (Plate XVII).

"Byrd Blue" and "Mesa Green"

There was "Byrd blue" when the Admiral's Antarctic expedition "sailed into the blue"; "George Washington buff" the year of the Bicentennial; and the "Down Rio Way" series following President Roosevelt's trip to South America featured "tropic peacock," "samba green," and "rumba rose."

War clouds over Europe brought back the blues in 1939: "French Army blue," "cadet blue," "Lafayette blue," and "St. Cyr blue." The subsequent vogue for American travel warranted a special American Landscape card featuring "mesa green," "plantation tan," "rainbow red," and "desert mauve."

These are all color designations of cotton and other textiles; now there are cards for colors of shoes, stockings, hats, gloves, and handbags. There is no compulsion about using them, but the manufacturer who breaks away risks the saddest word the merchant hears: "It doesn't match."

Even the "ensemble," with its new sales appeal to color-conscious American women, is not left to chance. Many a shopper who thinks she is choosing her own harmonizing shades is being tactfully aided by a salesgirl armed with the season's Color Coordination Chart which shows "accent shades" of millinery, shoes, bags, hosiery, and gloves alongside the costume color.

The Rainbow-collar Class

Color is salesman, too, for some 460 million yards of cotton goods that go yearly into making men's and boys' shirts in the United States.

It wasn't more than 25 years ago that theatrical-wise folk in New York could spot Florenz Ziegfeld, famed producer, by his inevitable and then conspicuous blue shirt.

Now the "white-collar man" literally is the rainbow-collar-and-shirt man, as miles of broadcloth, Oxford, madras, chambray, and percale roll through textile color presses to take the fast dyes perfected by American chemists since the last World War.

In men's shirting, as well as in their undergarments, cotton still is very much king because of the fiber's capacity to absorb up to 14 times its own weight of moisture and to resist the alkalis of laundry soaping.

Younger folk who laugh at the stiff, detached collars shown in period movies of the Gay Nineties are apt to think the attached collars and cuffs of the present-day shirt are modern. It's the other way round.

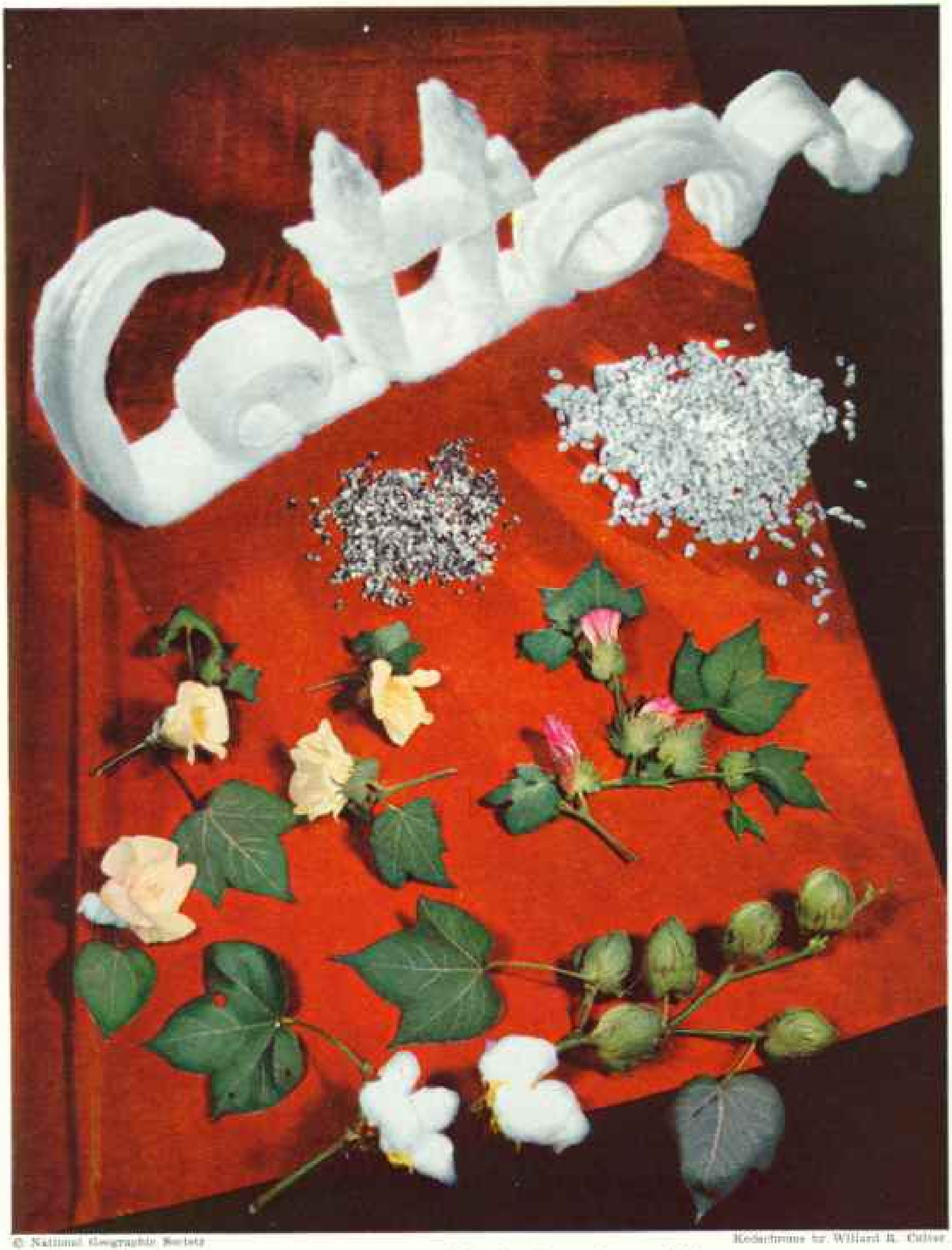
In Troy, New York, the city that collars helped build, there lived more than a hundred years ago a Beau Brummell blacksmith who demanded a clean shirt every day. His wife rebelled at laundering so many shirts and starching their attached collars, so she snipped off the collars, stitched them at the bottoms, and compromised on a fresh collar a day.

In 1827 a retired clergyman, the Reverend Ebenezer Brown, started cutting collars from shirts by wholesale, had women sew the bottoms at home, and the collar industry was born.

Until the end of the last World War Troy was the collar-and-cuff capital of the world (page 167). Then soldiers, used to khaki shirts, came marching home, and their liking for "one-piece shirts" prevailed. Cartoons of distracted males searching for collar buttons and cuff links faded out and, as one manufacturer put it, "we had to start making shirts to sew on to our collars."

The Tale of a Shirt

In pre-Civil War photographs of Troy you see a modest 4-story building of "George B. Cluett, Brother and Company, Linen Collar Manufacturers." Today, in Troy, is one of 21 spacious plants of Cluett, Peabody and Co., which annually uses up for shirts enough



 Kodachrome by Willard R. Culver

Cotton—From Bud toward Cloth, Dynamite, and Piecrust

Evolution of cotton from plant to myriad uses begins with the blossom (yellow on this upland variety), which develops into a pink flower the second day and falls off. Then appears the green boll, which bursts open with fluffy fiber, or lint. After ginning removes the hairlike lint, the seed still retains short fuzz, or linters (upper right). Delinting leaves the bald seed (center).

© National Geographic Society

They Breed Cotton Now to Avoid Blowouts

The Pima variety, of long and strong staple, here grows on tall "trees" in Litchfield Park, Arizona, named for the president of The Goodyear Tire and Rubber Company, which uses it in tires (Plates IV, V).

Kodachromes by Willard R. Culver

A Sharecropper's "Scale of Living"

For fifty years Uncle Dave and Aunt Lizzie have planted cotton on Scott Plantation, Mississippi, biggest in the world. One year when floods broke the levee they were rescued from their cabin roof.

Kodachrome by Willard R. Culver

"A Sit-down Strike?" Asked a Yankee, "No, Now the En-*gine* Does the Work," Replied a Picker

Some say that's how the word "gin" originally was born—a contraction of the drawling negro pronunciation of "engine." The color of the wagon identifies the plantation from which each load of seed cotton has come to this Anguilla, Mississippi, gin yard. From the open door weighed bales of lint are hand-trucked for railway car loading. An overhead suction pipe carries the seed to a storehouse.

Kodachrome by Willard R. Culver

In This Arizona Land of Irrigated Cotton, the Mexican Pickers Sing Spanish Serenades, not Spirituals

The flat, fleecy field near Phoenix is a ranch, not a plantation, and weighing in is at the truck, not at the gin, as in the Deep South. Workers are not sharecroppers; about half are permanent employees, the rest are migrants. Backdrop for this Litchfield Park ranch is the White Tank range.

Kodachrome by Willard R. Culver

From the Land of the Pharaohs to Phoenix Reads the Pedigree of This Arizona Cotton

Here, as in Egypt, where the Nile was Nature's irrigation ditch for growing crops when slaves built the Pyramids, the fiber is stored beneath sunny skies. This Pima variety is descended directly from Egyptian seed. White patches in the neat bales show where samples were cut.

Kodachrome by Willard R. Culver

A Sharecropper's Delta Cabin—Source of Cotton, Mammy Songs, and Deep South Problem No. 1

Rent, mule, implements are provided by the owner—then it's "share and share alike" at picking time, after deducting rations at the plantation store. Meat, meal, molasses, and other supplies are charged to the cropper's annual account.

 Kodachrome by Willard R. Culver

She Cards and Spins Her Own as Her Grandmother Did Before the Mills Came

This literal "spinster" started learning her art when she was yet too small to turn the big wheel, so her mother had a platform built in their log cabin in the North Carolina mountains near Tryon. Her earliest recollections are of tumbling off her perch in the dimly lit room.

"Male and Female Created He Them"—Both in One Cotton Flower

At one stage in cross-pollination the breeder washes the emasculated blossom by blowing water through a glass tube to make sure no invisible male parts remain.

Kodachromes by Willard R. Culver

The Birth of a New Cotton Breed

To the female flower attached to the plant (right) is transferred the powdery pollen from a "father flower" detached from a desirable plant. The new generation will have characteristics of the male parent.

cloth to make a yard-wide cotton carpet which would reach from New York to Honolulu.

"Ever count the buttons?" I asked.

"Sure," said the auditor. "Last year, 72,396,684."

"Anyway, you can't stretch buttons to the moon," I joked.

"No, but some graph-minded soul calculated that's enough to string a necklace around the State of Connecticut, with sufficient dangling over to encircle Rhode Island."

A shirt, one may think, is a simple thing. Here one kind has 31 separate parts, not counting 8 buttons and a label. There are 13 operations involved in making the 6-part collar. Back of that is all they do to the cloth.

"Come see the 'hell box' and the 'torture rack'," suggested my guide.

Into a fiery furnace smaller than a shirt box goes a sample of each fabric, where it must stand 400° Fahrenheit for 30 seconds. Then it is clamped between two vises which tear it apart. If it can't stand 25 pounds' pull per linear inch, it is rejected. The third test is in a darkroom where a picture magnifying each thread 13 times is thrown on a screen. If the weave isn't right, 13 is some mill's unlucky number.

There are dramatic moments in preparation for cutting. At one stage giant ribbons race across jets of flame just fast enough to singe off the fuzz but not to burn the cloth. If the machine slows up, the cloth may burst into flame (Plate XVIII). There also is the matter of piling a 14-mile strip of cloth, all coiled like a cable, into a massive kettle to be pressure-boiled for eight hours.

Inventors' Names in Cotton Vocabulary

In Lancashire nearly a century ago a calico printer filtered a caustic soda solution through cotton cloth to make the fibers stronger and take dyes better. Years later manufacturers found that if this operation is performed under tension, and the fabric washed while still under tension, it will have a lustrous sheen. The English experimenter was John Mercer; the process is mercerizing.

At Troy you can talk with the dynamic, keen-humored man whose employees call him by his first name, now indelibly fixed in the glossary of textiles, Sanford L. Cluett, inventor of Sanforizing.

His major invention in cotton history removed annoyances thousands still recall of having shirts return from the laundry with collars too small for the neck, dresses abbreviated after washing so petticoats show, and slacks that climb kneeward in the rain.

At the Cluett, Peabody plant, as at scores of others using the licensed process, one can follow the steps which determine how much goods will shrink in their lifetime of laundering, and then shrink it to that size before making it into clothing, shirting, underwear, or sleeping garments.

First, laboratory experts measure a sample of the fabric; then they wash it until it is thoroughly shrunk. The amount it shrinks in length and width is tabulated so the foreman can set a $30,000 machine to effect its "potential wash shrinkage."

It takes a blueprint to show how a massive Sanforizing machine works, but the principle is simple. All through stages of weaving and finishing, yarns are under tension and therefore stretched from their normal shape and position. In washing, yarns return to normal and the fabric shrinks.

Sanforizing adds nothing to the fabric, and takes nothing away; it merely pushes together the yarns to the extent they would be "relaxed" by laundering.

As you walk half a mile or more to see all operations of making a shirt, you are amazed at the enormous variety of trick sewing machines. One that sews on 4-hole buttons must automatically hit each hole with exact precision. Another springs a surprise by first stitching a buttonhole, always leaving the loose thread end underneath, then neatly cutting the hole between the stitches.

A Fiber Jam—and a Boom

Down South you hear about the cotton crisis—about the almost 13-million-bale crop of 1940, plus the 9-million-bale carry-over, third biggest jam of cotton ever stored in warehouses. Also of the diminishing exports, which in the past have reached as high as 60 per cent of American production, cut to no man yet knows how little in 1941.

But pass the neck of the cotton bottle in Worth Street, New York City, over to the manufacturing side, and there business is booming. In Worth Street it is estimated that 70 per cent of the thousands of miles of gray goods, or unbleached cloth, are bought by merchants and converters to be finished or dyed by the trade.

A figure chart would diagram incredibly long cotton-cloth ribbons of all weaves and widths rolling into Worth Street's cotton-hungry maw from mills of Maine to Georgia.

Therefrom would unwind never-ending streams of variegated fabrics in crazy-quilt patterns to makers of myriad goods: from boxing gloves and diapers to tires, dolls, hammocks, ear muffs, balloons, brassieres,

Photograph by Edwin L. Wisherd

A Monument to "the Worse of Two Weevils"

The gray weevil crossed the Rio Grande in 1892, wrought havoc throughout the United States Cotton Belt, but compelled the South to diversify crops and improve cotton breeds. Hence the inscription, "In profound appreciation of the boll weevil and what it has done as the herald of prosperity," on this curious memorial at Enterprise, Coffee County, Alabama. Then came the pink bollworm, also from Mexico, into south Texas in 1916, whence it traveled eastward, entailing more millions of dollars' worth of damage.

lamp shades, piano key pads, pajamas, water wings, curtains, typewriter ribbons—and 16 printed pages more of items in the list of cotton uses.

Such a chart would be figurative, because the buying and selling of cotton cloth, like the trading in cotton bales, are done largely by sample and specification (pages 177-8).

National defense and American travel have swollen the surge of orders in cotton goods factories.

A National Geographic representative sought permission to make photographs in one of the world's biggest flag plants, located in New Jersey. The president of the company was most willing; he had helped provide information for The Society's *Book of Flags*.

"But you will have to give me a few days to sell this idea to my production manager," he apologized. "See that sheaf of orders? I'm prodding him to catch up with them while I sit here writing letters explaining the delay. It will take tact to slow him down while you compose a picture.

"Of course we have lost the business of making flags for the Swedish Navy and the Austrian Army. It is full speed ahead now on the Stars and Stripes."

"And then the Fourth of July is coming," the visitor chimed in.

"Guess again," the official corrected. "Think of all the graves of all the service men in all the wars since the Revolution. Decoration Day brings the biggest demand for Old Glory."

"What proportion of your flags is made of cotton?" I inquired.

"Year after year our cotton and wool flags run about fifty-fifty (Plate XIII). A much smaller proportion of silk flags is used for ceremonies and interior decoration.

"Don't forget the special flags," he added. "They are nearly all cotton."

"Special flags? I don't understand."

"Think of the flags for signs—for 'anniversary sales' and 'dollar days' in stores, for organization parades, for national conventions, and in 1940 for the political campaign.

"Better business means more made-to-order flags for advertising, for meetings, and more marine flags for private yachts and craft of all kinds."

Makers of tents and tarpaulins went on

Photograph by Richard H. Stewart

Brazil "Bush Cotton" Is Bagged, Not Baled; "Headed," Not Trucked

Deftly balancing their loads of 175 to 200 pounds, men carry the bags to the gin at Patos, Brazil. Office of this gin of the Anderson, Clayton Company, of Houston, Texas, was headquarters for the expedition of the National Geographic Society-National Bureau of Standards to observe the total eclipse of October 1, 1940.

Photographed at Pepperell Mills

A Little Baby Laughs to See Such Sport on Its Cotton Carriage Cover

Wool figures are appliqued to the cloth by enormous machines, but hand operators must trim long ends.

Photograph by R. Aulliing Stewart

Instead of Creaking Carts and Patient Mules, Camels Carry Egypt's Cotton to the Gins Along the Nile

Photograph from Hamilton Wright

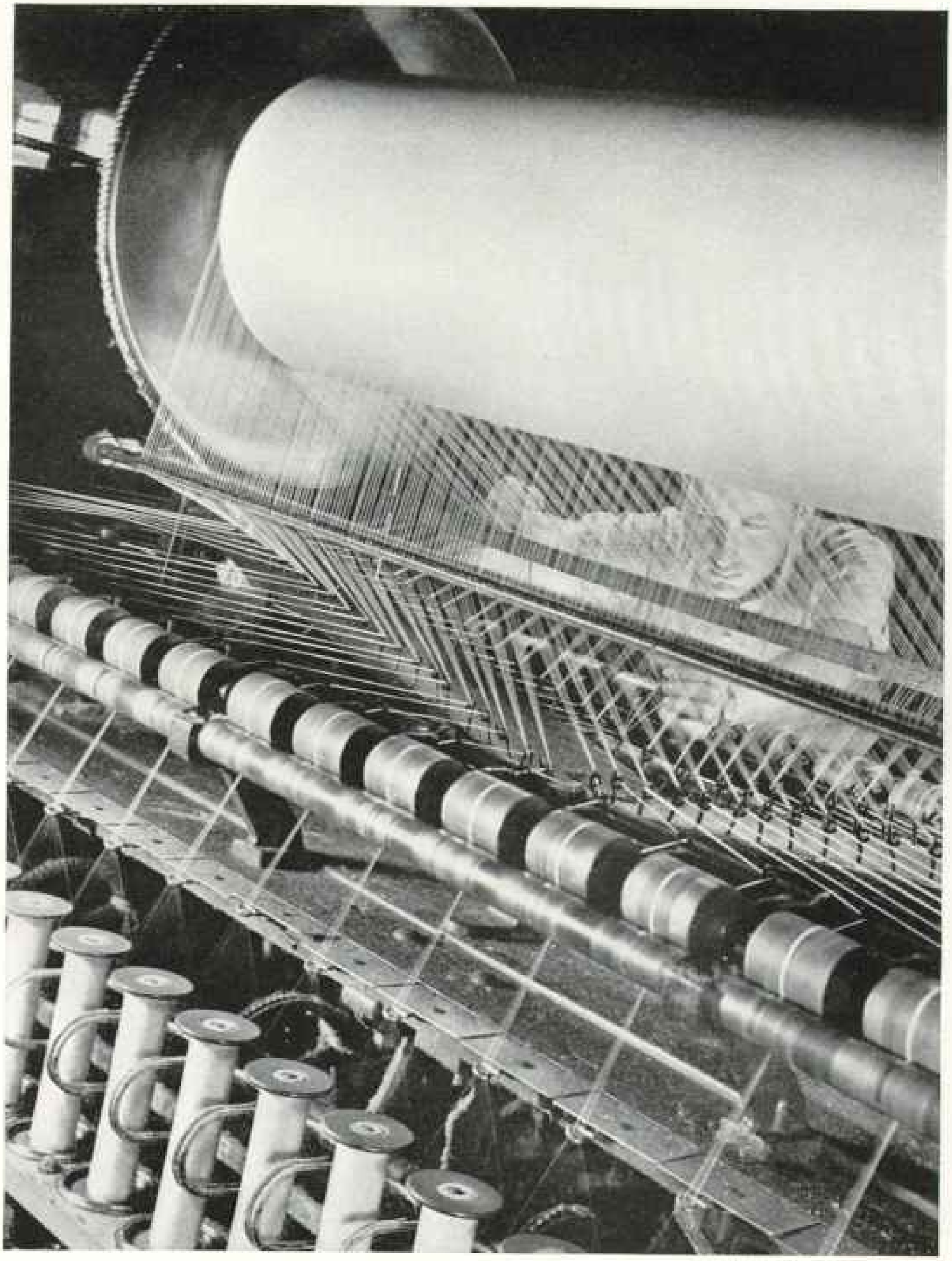
Along the Fertile Nile, Buyers for Britain Sample and Weigh Egyptian Long-staple Cotton Spread on a Cotton Cloth

Normally, London buys many such bales to resell in remote Gastonia, North Carolina, where it is carded and combed for lacemakers in Philadelphia.

Photograph by Elizabeth R. Hibbs

In Lofty Valleys of the Andes a Peruvian Cultivates Cotton Today As Did Cultured Incas Long Before Pizarro Came

The New World's commerce with Europe began when the crew of Columbus exchanged trinkets with the Indians of San Salvador for "large balls of yarn made of (cotton) fleece." Cortés sent to Charles V cotton cloth decorated "with furs of hares" from Mexico.



Photograph by Willard R. Culver

Big Rubber Companies Make Tire Cord in Their Own Mills

A major improvement in tiremaking was the substitution of rubber-insulated cotton cords laid parallel, instead of woven fabric which rubbed at each thread crossing. Here at the Barnesville, Georgia, mills of the General Tire and Rubber Company five yarns are being twisted into one ply. Tires use more than half a million bales of cotton annually (page 168). Conveyor belts represent another "concealed use" of cotton in combination with rubber.

Photograph by Willard R. Culver

Cotton Collars Chronicle Men's Styles from Sir Walter Raleigh to Clark Gable

(1) Popular in 1913; now obsolete. (2) Suffragettes wore this early in 1900. (3) "String Collar" was detachable, but a century ago collar buttons were rare. (4) "Betsy Ross" was brought out in 1911, and worn mostly by nurses. (5) "Tandem Collar" was an English vogue about 1880. (6) "Coachman 6" is of 1900 vintage, and still worn. (7) A century ago, this was wound twice around the neck and fastened with tape. (8) "Ruff Collar" worn in Sir Walter Raleigh's day. (9) Smallest ever made; worn by Tom Thumb. (10) Biggest, made for another circus performer, the Russian Giant. (11) For policemen, long before the traffic-guardian era. (12) "Tyfold" of the years when Evangelist Billy Sunday railed against "high collars that look like a whitewashed fence around a baseball ground." (13) Other "period collars," all now obsolete. These collector's items are from the museum of Cluett, Peabody and Company, at Troy, New York (page 152).

two shifts months before the orders from National Guard expansion and selective service cantonments.

These two products normally use nearly a quarter million bales of cotton. Many more thousands of bales were consumed last year in camping out and in hauling supplies in tarpaulin-covered trucks to hotels and camps, because European war diverted more American travel to America.

The recent vogue for slacks, beach robes, and sun suits has added appreciably to cotton consumption. When one scans the acres of epidermis exposed to the health-giving sun on any big bathing beach, it seems incredible that as recently as 1928, when the Bureau of Home Economics put out its first bulletin on making sun suits for children, Department of Agriculture officials thought it wise to obtain a ruling from the Public Health Service that reasonable exposure of juvenile skin to the sun was not injurious!

However, cotton growers are not pinning all their hopes to increased sales of known products and defense orders to move the enormous surplus of raw cotton. At stake is not merely the sale of a commodity but the welfare of an estimated 12 million Americans whose livelihood comes directly or indirectly from cotton.

Some two million growers, from the Carolinas to California, haul hundreds of kinds and grades of raw cotton to more than 12,000 gins, after which it is baled and

stored in about 5,000 warehouses to await orders from 1,460 United States mills and, normally, about half that many abroad.

New uses, especially industrial uses, are developing under the streamlined research of Government laboratories, of the cotton associations, and of State experiment stations.

No longer, as Oscar Johnston, practical plantation manager and president of the National Cotton Council, puts it, is the South relying on "faith, hope, and parity," or patriotic appeals to buy "charity bales." Instead, it is applying microscope, test tube, and production skill to fiber, fabric, and factory.

Visit laboratories of the Wellington Sears Company, pioneers in cotton research, and you see industrial applications of cotton few laymen realize.

When that company, in 1931, made duck for the new sails of the restored U. S. frigate *Constitution*, it recalled a historic use of cotton back in the twilight of history when primitive man first "bent on" crude wind propellers to hollowed-out logs.

Steam supplanted many sails but not other marine uses of cotton. It takes more cotton than Columbus or Magellan ever had to supply tarpaulins, deck covers, canopies, and deck chairs for one ocean liner, not to mention curtains and upholstery for the staterooms, and sheets, pillowcases, tablecloths, napkins, and other so-called "linen" stores.

"No use trying to rent until we get our canopies. Rush them," recently wired a New York apartment owner.

Modern canopies, city stepchildren of the desert tent where dwelt Jacob, the "plain man" of Genesis, are expanding to the big areas of waterproof duck that shelter baseball diamonds, yacht decks, football fields, and tennis courts.

Cotton mills have spent thousands of dollars trying to find why a blanket keeps you warm. They assert that the amount of air confined in a fabric, and not wholly the kind of fiber, provides the insulation (Plate XXIII). Therefore they have invested in napping machines wherein rollers with tiny wire claws catch in filling yarns and lift the free ends of the fibers to hold the dead air.

Not so familiar are many other functions of cotton fabric. Cotton helps deliver your newspaper, laundry, and breakfast cereal because of its uses in machinery.

It would be hard to print a newspaper without fabric "leaders" to get the first web of paper through the press. In a laundry mangle shirts and socks ride endless cotton belts under a hot cylinder before ironing.

After serving in agricultural machinery as "aprons" to carry wheat, corn, and other products to be harvested, cotton appears again as bagging for potatoes, grains, sugar, and more recently as open-mesh sacks to display oranges, peaches, and apples.

In "Linen" and "Rubber" Products

In addition to uses of fabrics as such, industry is finding ways to combine cotton with other materials to make new products.

Here again, as in household "linen" which is most often cotton, the modest fiber loses its identity. Rubber footwear and rubber garments, hose for fire engines and garden, belting, tubing, and insulated wires—all may contain anonymous cotton. Rubber tires use up more than half a million bales of cotton a year (page 166).*

Sustained high auto speed on new "dream highways," such as that from Harrisburg to Pittsburgh, and long night rides of trucks and buses, have led tire companies to spend big budgets on men and intricate machines to put a cotton fiber through its tensile tricks. Cotton mills, too, race to keep yarn for tire cord up to the heat-resistant strength chemists have developed in rubber.

When the Goodyear Tire and Rubber Company, in 1935, rubberized nearly 2⅔ acres of cotton fabric for the National Geographic Society–U. S. Army Air Corps stratosphere balloon that ascended 13.71 miles, it illustrated an expanding demand for precision weave of highest-quality fiber for airplanes, airships, blimps, and balloons of many uses, from war to weather observation.

A leader in developing heat-resistant cotton yarn, the Bibb Manufacturing Company of Macon, Georgia, now announces a product designed to meet specifications for parachute harness, bomb slings, gunners' belts, and other military and naval requirements hitherto fulfilled only by high-grade linen largely imported from the Axis nations.

Another Georgia mill, Callaway's, wove a thousand bales of cotton, which is half a million pounds, for the backbone of the 9.6-mile rubber conveyor belt system, longest ever made, that hauled sand and gravel to build the Shasta Dam in California.

Newer than wedding cotton to its vegetable ally, rubber, are the myriad molded products using cotton fabrics with Bakelite, Micarta, and various other synthetic resins, which have grown to enormous volume.

* See "Our Most Versatile Vegetable Product" (Rubber), by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, February, 1940.

Kodachrome by Willard R. Culver

1940's "Maid of Cotton" Wears the "Ermine of the South"

Mary Nell Porter, Memphis debutante, flew nearly 12,000 miles to model an all-cotton wardrobe of new fashions. Every conceivable pattern, from sunflowers to scarabs, had been worked into cotton cloth except the boll, so the Geographic photographer helped the National Cotton Council design this evening gown.

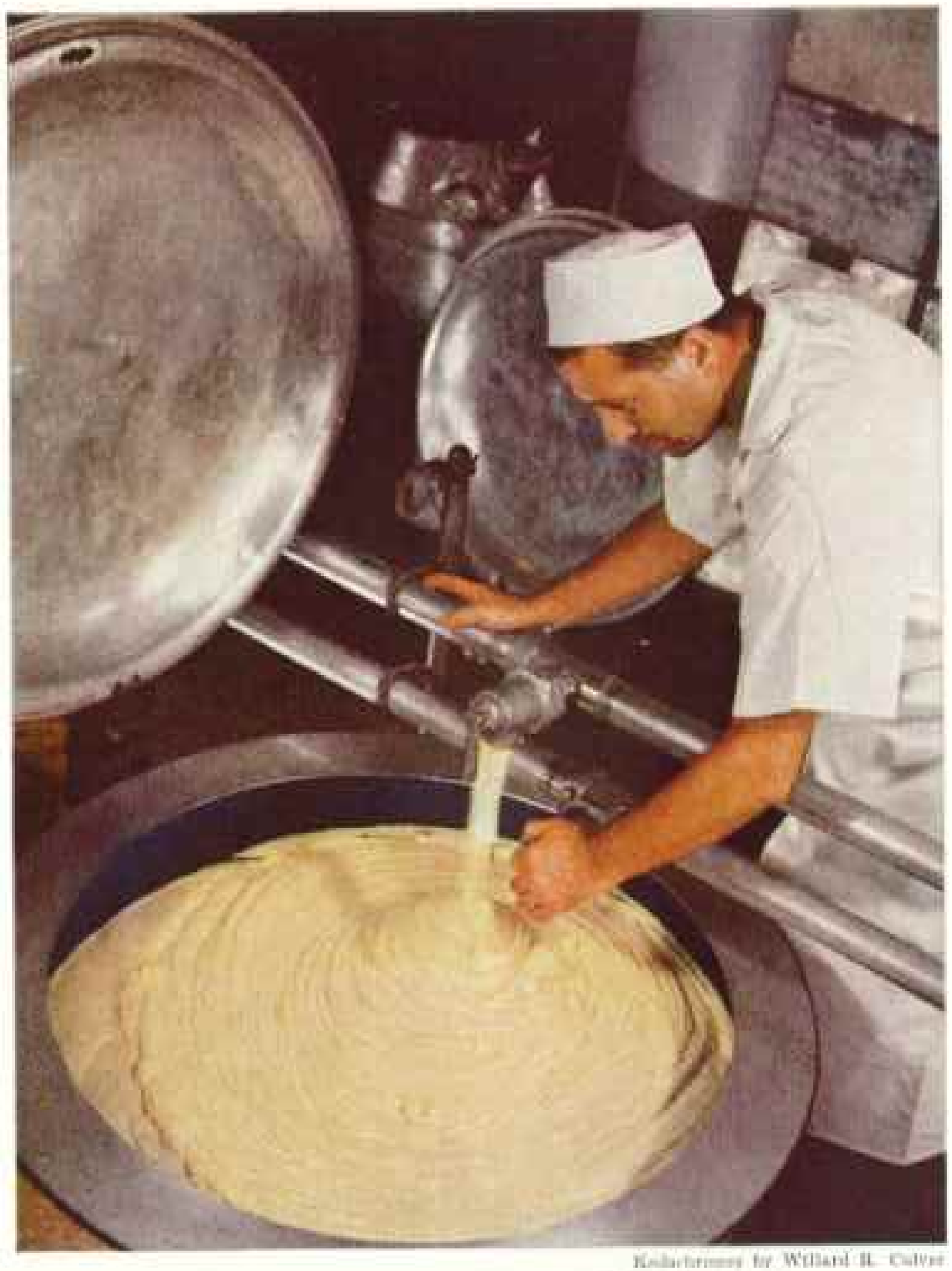
 Reduction by Willard R. Culver

Fiber Becomes Coarse Lap Roll, Thumb-thick Sliver, and Gossamer Card Web, to Make a Towel

These are major stages raw cotton traverses to be sheerest voile or stiff tarpaulin. Various bobbins are machine stages of operations formerly performed by hand.

These Pictures Recall a City and an Earl

A chef adds pickle relish and pimentos to a mayonnaise base to make spread for a sandwich, named for the fourth Earl of Sandwich. From the large glass containers flows cottonseed oil.



Kodachromes by Willard R. Culver

Golden Mayonnaise Pours into a Glass-lined Hopper

Originally this sauce, one story goes, was called bayonnaise, for Bayonne, France. Now it is made with a cottonseed-oil base here at the Bayonne, New Jersey, plant of The Best Foods, Inc.

Kodachrome by Willard R. Culver

"Run Quick, Child, and Get Me a Spool of Thread"

This juvenile command has been spoken in every civilized tongue, because the sewing machine has been one of the first machine tools of homes in remotest places, and spools are found in almost every woman's work basket. Luster of the strands, made of both American and Egyptian cotton, is the result of mercerizing, a process which also imparts an affinity for dyes. The skeins are embroidery floss.

Cotton Makes Half of All the American Flags That Cotton Follows

From Puerto Rico, then across the United States mainland from the Carolinas to California, and far out in the Philippines, cotton grows.

Kodachrome by Willard R. Culver

Cotton Is Dyed, Cut to Petal Pattern, and Stuffed with Raw Cotton, to Manufacture Roses

"They seem real; they only lack scent," said a visitor. "We put that in, too, but people didn't like it," replied the Providence, Rhode Island, maker. Only lilies of the valley defy imitation.

Kodachrome by Willard R. Culver

Coeds Make Their Own from Cotton Their Fathers Grew and Their Classmates Wove

Girls from several North Carolina colleges created around-the-clock fashions—nightgowns and hostess pajamas, too—for the thirteenth annual style show at the North Carolina State College Textile School at Raleigh. All the garments were made up as part of the day's work in home economics courses.

Design for Living—Tennis, Street Wear, Housework, and Evening Gowns—All of Cotton

Every stage in the evolution of a dress in a New York wholesale garment house you may see here at Meredith College, Raleigh, North Carolina. Girls draw original designs, cut patterns, fit the parts on model forms, then sew and wear their "exclusive numbers."

Cotton Ahoy! Sails, Sport Togs, Towels, and Deck Duck
The sails are from the Wamsutta Mills, New Bedford, Massachusetts, started in 1847 with whaling capital.

Kodachromes by Willard R. Culver

Instrument and Fingers of High Precision Tie Thread Ends on a Cone Winder

Not only name, but all semblance of its fibrous and seedy self is lost when cotton enters linoleum, phonograph records, roofing pitch, radio tuning knobs, artificial leather, and auto upholstery.

Wall Street of lint, or raw cotton, finance is Front Street, in Memphis, a major inland cotton market of the world. The Memphis Exchange trades in "spot cotton" but not in "futures" as do the New York and New Orleans Exchanges, with their mysteries of "hedging" and "straddling" (page 178).

Here cotton bales are bought and sold for immediate delivery, yet you could spend days in downtown Memphis and never see a bale of cotton. No longer do packets race the river with every cranny of deck space piled top-heavy with bales (page 144). No longer are these bales hauled up the levees by singing darkies on two-mule tandem drags and stacked in the middle of cobblestoned streets.

The only baled cotton you see on Front Street now are the "snakes" made up from the waste swept from sample rooms and sold for manufacture into mops, kitchen rugs, and bath mats (Plate XXI).

Buying and Selling Cotton Unseen

Long rooms, sun-lighted by sloping panes facing north, like mammoth photographic studios, open off Front Street at sidewalk level. Inside you see men pulling tufts of cotton between thumbs and forefingers all day long (page 179). They pull, then judge and bid on the basis of the fiber length, whiteness, and cleanness of the samples.

Others wait outside until the bargaining is concluded; it isn't good form for the second buyer to enter unless the first buyer invites him in.

Buyers, brokers, even bankers, go about the streets in long cotton dusters. In hotel dining rooms and club lounges you see tufts of cotton clinging to business suits.

Looking at the ferrule-like objects in men's vest pockets, I asked, "Why does everyone here carry a slide rule?"

"Those aren't slide rules," my companion laughed. "They are pocket brushes. As you go around you will notice whisk brooms tied to our best mahogany desks."

"A clothesbrush couchant and two fists rampant pulling at tufts of cotton ought to be the industry's coat-of-arms," an old-timer chimed in.

There was more truth than mere joking in what he said. King Cotton has its aristocracy here, and throughout the South. There is a subtle distinction about being "in cotton" in Dixie—from planter and millowner to sampler and quotation runner.

"Is your boy going into business or into cotton?" I heard one factor ask another whose son was about to graduate from a famed school of business administration.

Buying cotton sight unseen is characteristic of an industry wherein, from gin to mill to manufacturer, the financial right hand and the bulky commodity left hand make their separate gestures.

After his cotton is ginned the grower gets a warehouse receipt. This receipt literally is "good as gold" at banks and stores.

Some Bales Become Antiques

Back of every receipt, somewhere, is a bale of cotton. But the bales go one way, the receipts another, and the twain may not meet again until years later a mill starts spinning the cotton. Most warehouses are bonded, and the receipts are printed on safety paper like that used in checks.

Because the receipts circulate freely as collateral it is not unusual to find bales five, ten, or even fifteen years old in warehouses.

In 1938 a firm at Fayetteville, Georgia, bought two bales ginned in 1891. One bale of this cotton weighed exactly what it did when ginned; the other had lost only three pounds.

Experts declared the fibers had deteriorated in no way. There was only one difference between the 49-year-old cotton and that ginned in Georgia today—the staple was seven-eighths of an inch, whereas the average today is about one inch.

Years of careful breeding, seed selection, improved cultivation, and hundreds of thousands of dollars have gone into adding that average one-eighth of an inch.

"Why did you keep these bales nearly half a century?" the seller was asked.

"I always have used my barn as a bank," he explained. "When I needed money I just hauled some cotton to town."

The cotton did not change, but its current price varied widely over its nearly twoscore and ten years.

The day it was ginned in 1891 it would have brought 12½ cents a pound. Only two years later the owner did sell other bales for 4⅞ cents. In 1918 it would have brought 45 cents.

The Fayetteville bales are not the oldest known. One from Harris County, Georgia, was first exhibited at the St. Louis World's Fair in 1904 as "the oldest in the world." It was picked in 1870 by a negro sharecropper and turned over to the plantation owner "in part payment on a mule."

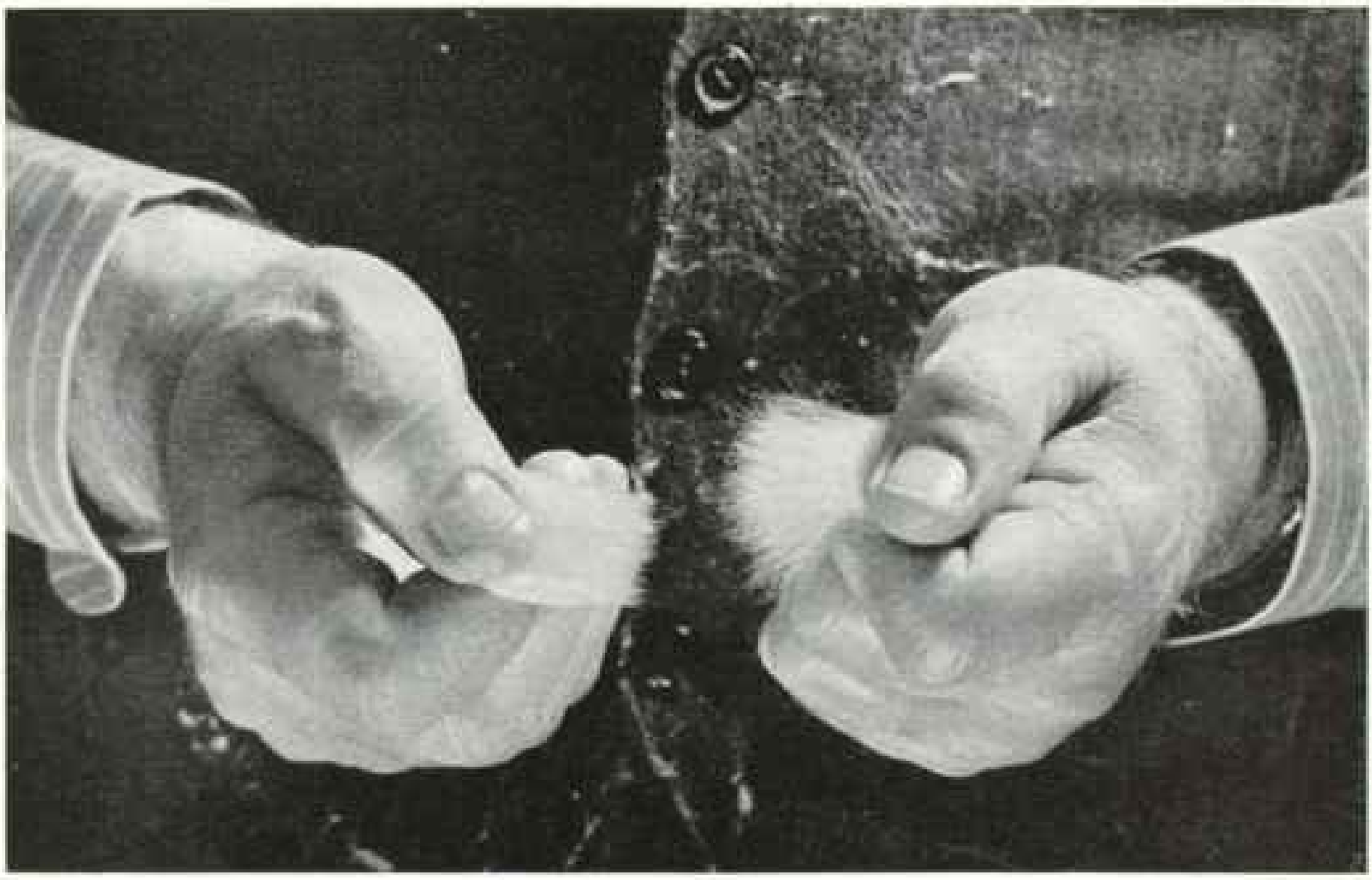
Photograph by Willard R. Culver

Trading Is Lively and Noisy on the New Orleans Cotton Exchange

Crowding the "pit" or "trading ring," brokers buy and sell contracts for future delivery of cotton in some designated month for clients from Boston to England and Egypt. Normally, not only the New York market quotations, but also prices of Liverpool, Bombay, Alexandria, Le Havre, and Bremen are posted here.

Some Day Your "Overhead" May Include "Cotton Sandwiches"

Heavy, loose-woven cotton fabric is pressed into a cement mix to reinforce these shingles on a Jackson, Mississippi, home. The flexible forms are hoisted on a metal palette to be put in place. This innovation in roofing was invented and patented by a Delta planter.



Photograph by Willard R. Culver

Fingers Sensitive as a Pianist's Pull Fibers Parallel to Judge Staple Lengths

"This is what we sell—lighter than most feathers—and we ship it in 500-pound packages," said the sampler. Difference of a sixteenth of an inch in average lint length runs into dollars in bale prices.

Photograph by Willard R. Culver

He Can Yank Any Bale from Half a Million

For the Public Cotton Warehouse in New Orleans, C. A. Bertel invented a crane system of removing any ticketed bale from canyonlike tiers in three minutes. By the old method it often takes hours to get at one.

Photograph from Sea Island Cotton Control

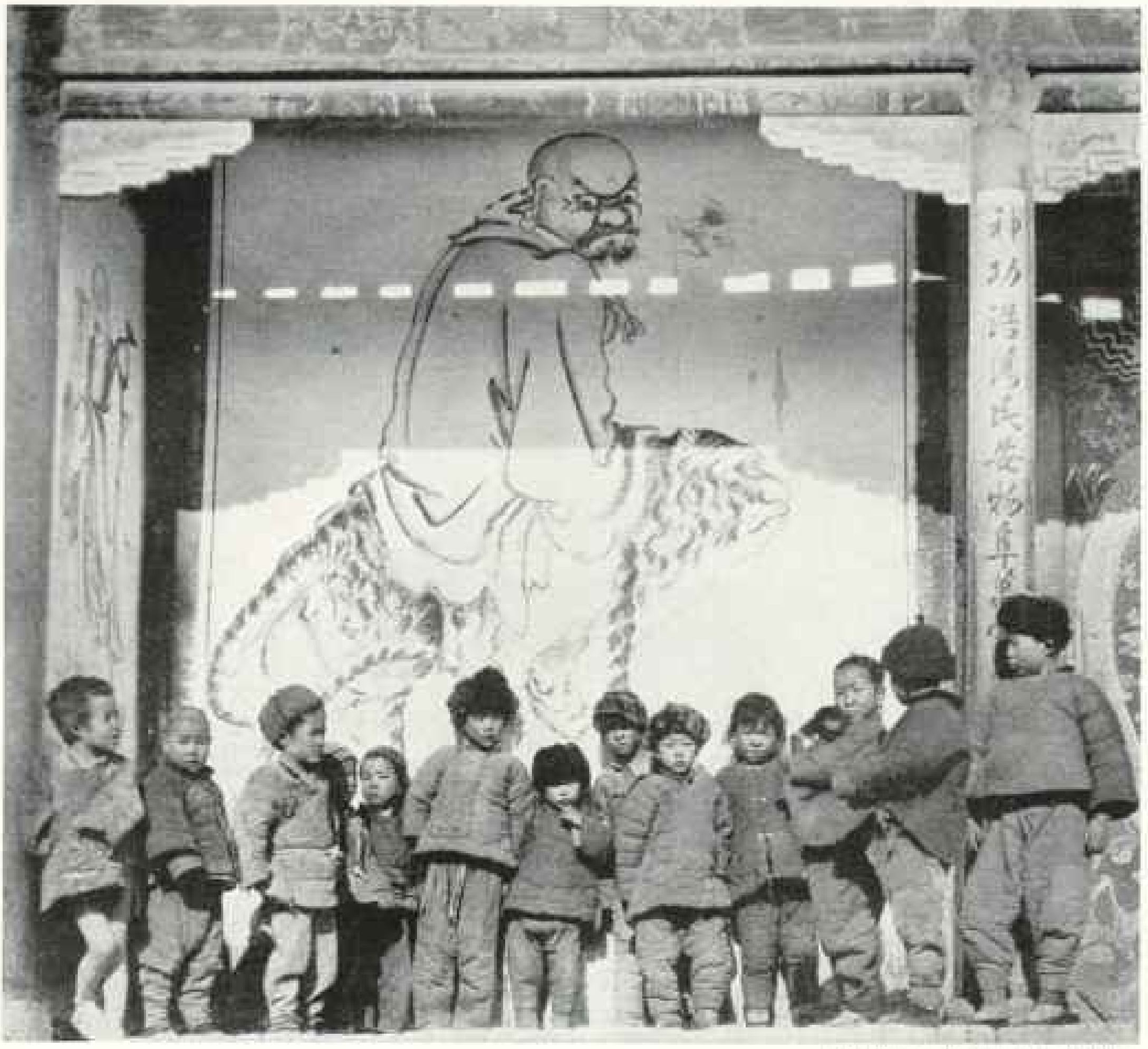
Famed Sea Island Cotton Requires Special Gins and Handling

Enemy Boll Weevil reduced this long and lustrous fiber from a 10-million-dollar crop in 1911 to only seven bales marketed in 1929. Now Florida is growing the premium variety again.

Photograph by Willard R. Culver

Coming to the Commissary for Their "Furnish" at a Mississippi Delta Plantation

Panther Burn, near Hollandale, has more than 2,000 negro employees who get rations every two weeks. These are charged against their year's "picking." After Emancipation, slaves were homeless, cotton rotted on the stalks, and there was even talk of importing Chinese coolie labor. Thus arose the system by which a family was given an allotted acreage to grow cotton, "half-and-half and keep." "In bad years all I gits is them 'de-ducts'," mourned one cropper.



Photograph by Maynard Owen Williams

Along an Old Silk Route Chinese Mothers Had a Cotton Quilting Party

From many stores in bleak Kansu Province women buy bundles of grayish raw cotton to sew between homespun denim cloth. The jackets and trousers of these children huddled near a Suchow temple gate are the fleecy lambskins of the poor. The cotton denim is also laid in layers and sewed into the soles of shoes.

At last report this fibrous antique, badly worn, but proudly wearing a bronze medal and cherishing certificates of its age, was awaiting sale and distribution of the proceeds among about 20 heirs of the original owner's estate. The harassed administrator, trying to find the heirs, calculated that he would have from this bale about $2 to divide among them.

When you consider cotton's durability and its world-wide acceptance, it does not seem freakish that a canny grower should bank his cotton in a barn, or that cotton receipts should be as negotiable as stocks and bonds in cotton-growing States. In these economic respects cotton is comparable to gold, but even gold does not have its daily newspapers and monthly magazines.

If the lasting quality of raw cotton is surprising, consider cotton cloth. When Sir Aurel Stein explored Turfan, ghost city of the Gobi, he found cotton fabric estimated to be at least a thousand years old.

Cotton Weaves a World Web

Normally, in addition to the white fleece ferries from Dixie to Lancashire, sea shuttles from cotton-weaving United States and England ply all the seas with their raiment riches. Railroads of Christendom carry clothing inland. Where rails and highways end, native carriers take up the burden.

Cotton cloth and sewing machines paved the way for Christianity in Africa, missionaries say. "To the savages of the Congo cotton cloth is more precious than ivory or gold," wrote an explorer three decades ago.

Photograph by Willard R. Culver

One Mule, One Plow, on a One-family Farm

One acre near Clarksdale, Mississippi, has 70 rows, each about 210 feet long, and by ginning time the grower must go over his 14 acres at least 22 times. If he were to travel that far in a straight line northeast, he would knock down stalks, plow, drag, chop, pick, and cultivate his way across Tennessee, Kentucky, West Virginia, and Virginia to the friendly front door of the Department of Agriculture at Washington, D. C.

A resourceful teacher in a remote mill town of Georgia had her pupils study transportation by bringing in pictures showing ways the cloth their fathers weave reaches ultimate buyers.

Their neat scrapbooks pictured pack trains of llamas in the Andes, dog teams under the midnight sun, awkward yaks of Tibet and ungainly camel caravans in Egypt, godowns and junks of China's cluttered rivers, lumbering elephants of India, and sleek airplanes landing in an African mining camp.

"Bright girl, that teacher," grumbled a loom tender. "But she certainly has ruined my file of GEOGRAPHICS, what with the kids cutting out pictures and pasting them up."

Raw-cotton prices are quoted on exchanges from New York and New Orleans to Liverpool, Calcutta, Alexandria (Egypt), and Shanghai, because, like wheat, cotton can be classified so the buyer knows exactly what he is getting.

You read in a Government bulletin—which documents are not given to humor—that "the cotton textile industry hangs by a single thread," and that "the fundamental unit of that thread is the single fiber."

You learn that these hollow-cell fibers are 4,000 times as long as they are wide. This means that if the fiber's width is magnified 100 times for microscopic study, the magnified length of the fiber is 100 feet!

You consider that a pound of raw cotton contains some 90 million fibers, and calculate that if the fibers of a 500-pound bale were distributed among the population of the United States each man, woman, and child would receive 342 cellulose souvenirs.

And then you wonder how unwieldy bales of such astronomically numerous and minute raw material can be classified.

The law of averages comes to the rescue.

In a single sample of cotton of $1^{3}\!/_{32}$-inch staple length were found fibers that range from less than $^{1}\!/_{8}$ of an inch up to $1^{3}\!/_{8}$ inches. But the average was determined accurately by the sensitive feel and the micrometer eye of the stapler—the tea taster of cotton whose buying judgment may make or break a mill.

By "grade" cotton men usually mean color, absence of foreign matter, and ginning preparation. By law there are 32 grades and colors of American upland cotton, with such designations as "strict middling," "yellow stained," and "extra white."

Official United States standards recognize 19 staple lengths, from below $^{3}\!/_{4}$ of an inch up to $1^{11}\!/_{32}$ inches.

Obviously there can be more combinations of these lengths and grades than there are possible bridge hands. No two bales of cotton ever are alike. Theoretically they could be, but only an Einstein could calculate when.

Naturally there are disputes between seller and buyer. Practically all cotton entering New England and New York is bought subject to "New England terms," a code drafted about 30 years ago and only slightly modified since. The historic National Association of Cotton Manufacturers, in Boston, helped formulate the "terms," and also initiated the General Arbitration Council for the textile industry.

Making Cotton "Stretch"

Color Plate X shows stages in the transformation of these filament fibers from a matted mass (labeled "lap roll") to gossamer card web (which the girl is holding), and thence through many operations to make yarn for sheerest voile or unwieldy tarpaulin.

In very nontechnical language, the purpose of every stage in spinning and in the preparations therefor is to get these delicate fibers to lie paralled, to adhere, and to twist them to make strong thread.

Each massive and costly machine in a spinning mill—breaker-picker, carder, slubber, jack frame, aptly named drawing machine, and many more—draws out and adds to the original strand of fibers, from thumb-thick drawing sliver to ultimate warp thread which may be of cobweb fineness.

"From first picker to the end of spinning, can you tell me how much the original embryo yarn is drawn out?" I asked the dean of a textile school.

"No one ever asked that one before," he said. "But we can figure it out in the time I was going to take for 18 holes of golf.

"Keep two things in mind, however. The fibers do not stretch appreciably. Drawing out really is a process of sliding the parallel fibers along so that they cling. Always more fibers are being added with each operation."

With that admonition we started the rounds of his miniature demonstration mill as he wrote down "1 inch to 4 on the first picker, 1 up to 100 on the card, 1 to 2 on the sliver lap, 1 to 8 on the comber." About that time he resorted to a slide rule.

And it all multiplied up to the result that, at the end of spinning, one inch of cotton fibers from the first picker may be elongated and imbedded somewhere in 11,612,160,000 inches, which is to say 183,272 miles, of the warp bobbin thread shown in Plate X.

When a Geographic photographer and I started upon a many weeks' survey of cotton, a veteran Georgia editor handed us a crumpled clipping quoting a famed Atlanta journalist, the late Henry W. Grady.

"Read that," he counseled. "It's the best 300 words ever written about cotton."

We did so, and admired the music of Mr. Grady's eloquent words. Now, at the end of our long, long cotton trek, we have learned that there is more fact than oratory in this tribute of a son of a unique civilization and a gracious American way of life that cotton built. He wrote, in part:

"What a royal plant it is! The world waits in attendance upon its growth. The showers that fall whispering on its leaves are heard around the earth. The sun that shines upon it is tempered by the prayers of all the people. The frosts that chill it and the dew that descends from the stars are noted, the trespass of a little worm upon its green leaf means more to England and English homes than the advance of the Russian army on her frontier.

"Its fiber is current in every bank in all the world. Its oil adds luxury to lordly banquets in noble halls and brings comfort to lowly homes in every clime. Its flour gives to man a food richer in health-producing value than any the earth has ever known and a curative agent long sought and found in nothing else. Its meal is feed for every beast that bows to do man's labor from Norway's frozen peaks to Africa's parched plains.

"It is the heritage that God gave this people when He arched the skies, established our mountains, girded us about with oceans, tempered the sunshine and measured the rain. Ours and our children's forever and forever, and no princelier talent ever came from His omnipotent hand to mortal stewardship."

Old Masters Suggest New Colors for Spring Fashions

From the National Geographic Magazine reproductions of National Gallery paintings, Margaret Hayden Rorke selected Gainsborough Pink and Indian Brown, in Benjamin West's painting showing Guy Johnson's Indian secretary, for next spring's textile color cards (July, 1940, Plates XXVI and XXXII).

© National Geographic Society — Kodachromes by Willard R. Culver

From a Pre-Inca Tomb of Peru Came This Thousand-Year-Old Textile Treasure, a Mantle of Cotton and Vicuña Wool

Fast-acting Chemicals Make Fast Colors

White sheeting comes out dyed purplish red, which air then oxidizes to a peach shade.

 Kodachromes by Willard R. Culver

Too Fast, a Fuzzy Shirt. Too Slow, the Cloth May Burn Up

After fiery-furnace singeing at precise speed to remove short fibers, the fabric is plunged into cold water.

 Kodachrome by Willard R. Culver

Uncut Blankets—Photographer's Dream, Mathematician's Nightmare

First, 2,340 warp threads, some 6½ miles in all, are wound parallel on a cylinder to start the run for 250 cotton blankets at Nashua Mills, New Hampshire. Shuttles interlace 5¼ miles of filling, or weft threads (not "woof" unless you are being poetic), to make a pair of blankets. Regiments of needlelike steel points on a drum pluck up the soft filling yarn to make "lofty" nap which provides insulating air chambers (Plate XXIII).

Last Roundup for Foreign Matter and Short Lint

After carding, which removes leaves, dirt, and other particles, the silvery cascade of fibers converges into a sliver (Plate X) that looks like a water jet shot from the nozzle of a fire hose.

Kodachromes by Willard R. Culver

Home Mending Suggested Candlewick Spreads

Early Americans made wicks and fish nets of cotton; some ingenious housewives used the string to repair homespun coverlets. This Dalton, Georgia, girl applies intricate designs with an electric hand needle.

Kodachrome by Willard R. Culver

The "City Crop" of Cotton Makes Rugs at a Memphis "Pickery"

"Snakes" they call the bales of waste from sample-room floors, which here, along with burned and waterlogged cotton, are utilized at the McCallum and Robinson plant. "I photographed piles of wet bales at New Bedford during the New England hurricane," said the Geographic's photographer. "I grabbed the first plane up there and bought them," replied Mr. Robinson. The owner, who entertains buyers in an old Pullman car, is proud of his "homemade" machinery.

 Kodachrome by Willard R. Culver

Perforated Cards in a Jacquard Loom Suggest Piano Player Rolls

This complicated mechanism lifts warp (lengthwise) threads to regulate the design and color of terry-cloth towels at the Cannon Mills, Kannapolis, North Carolina. Cloth with such a loop pile surface has been found in Egyptian tombs near Thebes. In the New Testament St. John records that Christ dried the feet of His disciples "with the towel wherewith He was girded" (John 13: 4, 5).

Like Printing Paper, Window Drapes Roll Through Pequot Mills' Big Color Presses

Kodachromes by Willard R. Culver

How Warm Is a Cotton Blanket?

To answer that one, Nashua Mills clamps the blanket between metal plates of different temperatures and measures the heat that passes through in a given time.

When Dyed in the Raw, Cotton Comes Forth Like Molten Lava

Kodachrome by Willard R. Culver

One Broken End, and This Speeding Quiller Stops Winding Instantly

Some cotton yarn is so fine that it takes 50 miles to weigh a pound. Such fragile strands make typewriter ribbons, airplane fabrics, and fine dress goods.

Arch-Isolationists, the San Blas Indians

Coconuts Serve as Cash on Islands Off the Panama Coast Where Tribesmen Cling to Their Ancient Ways and Discourage Visitors

By Corinne B. Feeney

THE old adage, "Money doesn't grow on trees," may hold true in most localities, but on the islands off Panama's San Blas coast money does grow on trees. The only gold or silver that goes into its making is the gold of the tropical sunshine and the silver of moonlight, for this cash is in the form of coconuts.

Big brown nuts from the coconut palm form the islands' medium of exchange and may be traded for tobacco, fishhooks, fishlines, glass beads, canned biscuits, rice, gaily colored calico, or any number of things required by the Indians dwelling there. Seven coconuts are equivalent to one of our nickels, and a dollar in that strange currency is just too much loose change to carry around.

There are no banks or cash registers in San Blas land. Every month or so a trader makes the round trip, providing the only regular link with the outside world (map, page 197).

The people who live on these islands are the Cunas, better known as Tules or "San Blas Indians." The isles themselves, which Columbus passed on his fourth voyage, are often called the "San Blas Islands," although their official name is the Archipiélago de las Mulatas.

An Isle for Every Day in the Year

"They are more numerous than the days of the year," is a local saying. And correct it is, for there are about four hundred of them—tiny creations of sand and palm rising barely enough from the blue-green Caribbean to escape complete inundation by the breakers of rough weather.

Scattered over a total distance of nearly 100 miles, they stretch from a point beginning some 75 miles from Colón, the Atlantic entrance to the Panama Canal, almost to the borders of Colombia. Many are only about a mile from the mainland of the Isthmus of Panama, but are so well protected by reefs that sizable vessels cannot approach. Some of the islands are uninhabited, only the larger or choicer ones being occupied by this singular tribe.

The chief characteristic of these Indians has been a persistent and sullen unfriendliness to any and all outsiders. In the course of the centuries they have successfully repelled invasions of foreigners.

Once it was sure death for a white person to be found in the San Blas country after nightfall. Strangers were required to leave before sunset, and if a stubborn straggler remained past the zero hour, whatever happened to him was his own fault. By such measures the islanders sought to maintain the purity of their race.

Passage on the "Coconut Boat"

Eager to visit these isles so little touched by what we are pleased to call "civilization," I succeeded in engaging passage on a trading schooner commonly called the "coconut boat." We left Colón at 8:30, and all night we sailed, plowing through waters that glittered and surged beneath a sky canopied with stars.

Eagerly I scanned the horizon next morning for a first sight of the islands. As the dawn picked them out of the sparkling sea, they seemed like tiny peacock-blue clouds; then, as we drew closer, the tone changed to emerald green and finally to a kaleidoscope of tropical hues.

El Porvenir, the first large island of the archipelago and the port of entry to the Gulf of San Blas, stood forth in all its primal colors, but looked so clean and newly washed that one would have concluded its creation had taken place but yesterday (page 198).

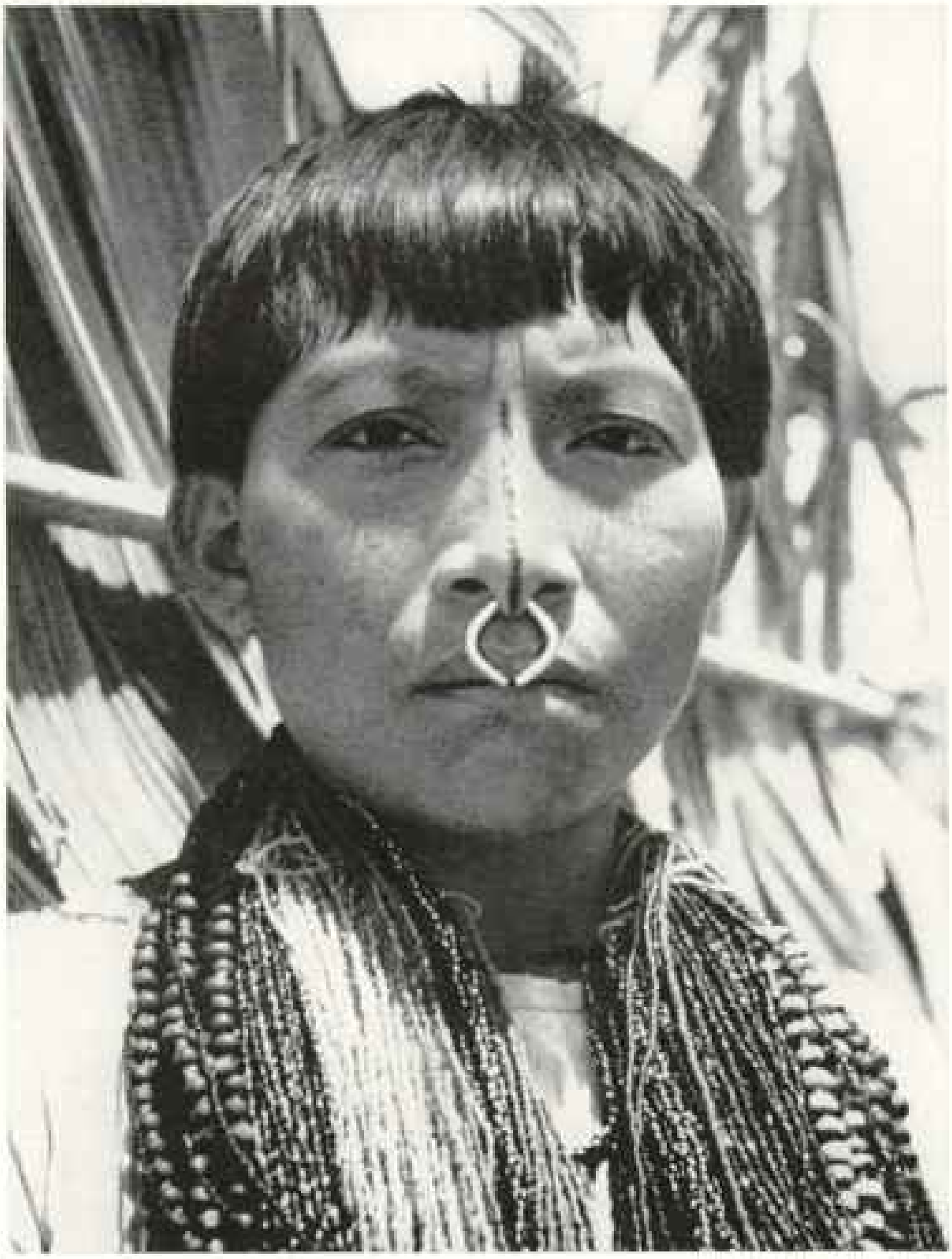
Across the bay from other islands came dozens of *cayucas*, dugout canoes made by burning and hollowing out the trunks of large trees (Color Plate V). In such craft, fitted with sails, natives make the long trip to Colón with ease, for the men and boys of these islands are born sailors. This, though, seemed to be "Ladies' Day," for all the cayucas except one were maneuvered by women.

While our anchor chain rattled down into the water and our engine eased to a quivering halt, the cayucas caught up with us, pushing, shoving, and ramming each other to gain a place alongside. The occupants stood up and with much gesticulation and giggling tried to sell coconuts.

Only the solitary man in his cayuca was quiet. This demure little brown person was clad in dark dungaree trousers; a bright orange shirt, the tails of which were worn outside, flapping in the breeze; and a derby hat!

The derby, of great age, was worn with pride at a jaunty, devil-may-care angle on his squarish little head.

All the ugly rumors I had heard about the



Photograph by Kurt Severin

For a Finishing Touch—Perfumed Beads!

Some of the strings of her necklace are made of dried brown berries, from an aromatic herb which grows in the jungle. When the beads are rubbed between the fingers, they emit a fragrant aroma.

unfriendliness of this race were dispelled by the shining, friendly faces upturned to me.

On sturdy round arms jangled bracelets of glass beads and teeth of animals and fish, while huge, flat golden earrings fully three inches in diameter reached almost to the wearers' shoulders. Each woman had also a gold nose ring which seemed to interfere not at all with her ability to jabber, laugh, and trade in coconuts.

Lone Male "Shushed"

These were the business women of San Blas. Upon them, this morning, rested the task of bartering with the trader, and the burden of bringing enough produce to load the schooner for its return trip.

Once or twice the lone male attempted to advise or caution, but at once he was militantly "shushed" by the females, who outnumbered him forty to one. He placidly resigned himself then to being a mere onlooker.

The San Blas women are much more enterprising in trading than the men because the women own virtually everything (page 204). A man cannot trade or sell any article without first seeking permission from his wife. If she says no, the article is not sold and there is no argument about it. But if she should want to sell the beads she has made for herself, or the garment she has stitched, she does so without having to consult her husband; it is her privilege and right.

The fantastic costumes of the women blazed with all the natural shades of the Tropics—the bright red of Panama's hibiscus flowers; the yellow of the trumpet-vine blooms, the blue of tropical seas, the greens of hills and trees, the orange and browns of fruits, and the gold of the sun. Large scarfs of red and yellow printed stuff were draped over heads and shoulders. The blouses were of intricate designs and many colors. Somewhat plainer were the wrap-around skirts (see Color Plates).

Bands of beads were wound around ankles so tightly that they bit into the sparse flesh of spindly legs; other bands of beads were worn on the arms in this same tight fashion. All the women were barefooted, the skin of their flat feet looking as tough as alligator hide.

In the bow of each canoe were children, taking a lesson from mamma in the art of trading. Sometimes there was only one child,

but often two or more. Not one wore a stitch of clothing, and in the early-morning sunshine their little bodies shone like polished mahogany.

Here, thought I, was a real picture. But as soon as I would be ready to snap a close-up, the women would cover their heads and paddle swiftly out of range.

"You'd better put that thing away," came a gruff, authoritative voice from over my shoulder. "Most of these women won't stand for being photographed: they believe their souls pass from their bodies into the lens. It's the 'evil eye' to them, and you'd better take my advice and put that camera away."

It was the voice of the captain—a voice I obeyed for the time being.

The Intendente, or Governor, came to the boat to greet us. He smiled broadly and was the soul of cordiality. He is not a Cuna, but an official of the Government of Panama.

Photograph by Kurt Severin

Coins of Three Nations Jingle in Her Necklace

The pieces of silver and gold come from the United States, Colombia, and Panama. This beauty of Carti Island, like all San Blas girls, admires long noses. The customary gold ring and the painted line combine to make her nose more prominent (Plate VII and page 208).

Theoretically, the San Blas are Panamanian citizens also, but steadfastly they retain their own form of chief and council rule and make no secret of the fact that they neither admire nor appreciate modern civilization.

Overzealous Drinkers Clean the Beach

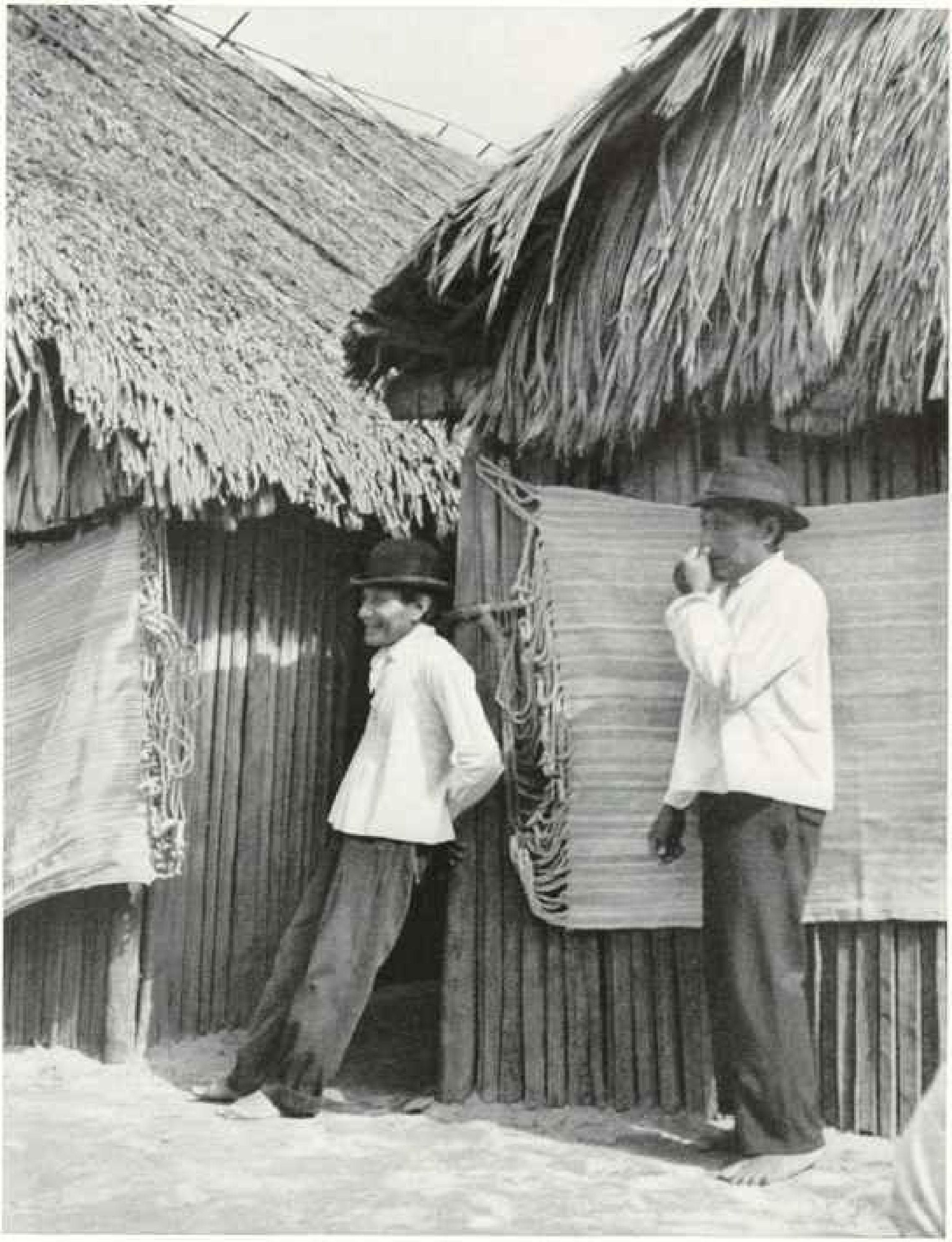
The entire beach of El Porvenir was so remarkably clean and well kept I could not help commenting on it. The Governor smiled.

"You see," he said, "we still have prohibition in San Blas. It is against the law to imbibe too freely. Those who disobey are punished by being detailed to clear the beach of driftwood and trash. The other night there was a celebration; now the beach is very clean."

The Governor invited me to share breakfast with him. I think he was curious to find out just why I had come to San Blas. Afterwards he granted permission to visit the other islands, and also placed at my service a speedy little boat with an outboard motor that would scoot safely in and out over the limpid waters of the lagoons.

A young Indian man was appointed as guide. I was delighted to discover that he was a splendidly educated person, having attended schools in the United States as well as Europe. He spoke a wide assortment of languages, and his English was particularly good.

The San Blas, I have been told, do not



Photograph by Hilda Harrison

San Blas Men Don Well-worn Derbies on Festive Occasions

The skipper of a trading vessel, the *Rolling Stone*, purchased a hundred of the hats at a fire sale in New York many years ago. Wearing one himself, he introduced them to the Indians as the last word in style. He sold out the lot, and the purchasers have carefully preserved them ever since. Hammocks hanging from the walls were woven by the women. All members of the tribe sleep in these "swinging beds."

forbid their young men to go out into the world to glean knowledge, but they expect them to return home afterwards and live as their forefathers have lived instead of by any foolish new standards gained abroad. The women are not encouraged to leave their island homes at all.

Harsh Penalties Keep the Race Pure

These people have retained a purity of race that is remarkable in this big mixing bowl, Central America. Few females ever depart from the islands, visit Colón, or have any chance of intermingling with others.

Should a woman so far forget herself as to become too familiar with a foreigner visiting the shores, she is given the death penalty. If she bears a child not of her own race, the baby is put to death and the erring mother is left on one of the tiny uninhabited islands to die.

Such discipline has to be resorted to very seldom, and my guide was most taciturn when questioned as to the truth of this practice. What happens to the guilty foreigner, provided he is caught, was not disclosed.

In 1922 the Panama Government decided San Blas had remained a law unto itself long enough and sent a number of negro policemen to the islands. Friction arose and the natives went on the warpath, murdering 22 policemen and 20 of their own people who were suspected of being traitors.

Several children, half negro, half San Blas, also were killed and their mothers with them, in keeping with the old San Blas Law and tradition that there must be no half-breeds.

Peace was established when the Panamanians promised to let the Indians do their own policing in the future. Since that time there has been peaceful co-operation, but it is evident that the San Blas are determined to retain their independence at any price. The Governor is tolerated, but that is all.

One-family Isle for the Unsociable

After leaving El Porvenir we passed Carti and Nargaña.

A tiny island was pointed out to me as inhabited by one family only. This is unusual, since the Indians ordinarily live together in a jumbled, crowded state. The story was that the man of the family could not get along with his neighbors, so he moved to an uninhabited isle.

Our destination was a little island south of Nargaña. As we beached our boat on the sandy shore, all the women ran as if for their lives, covering their faces with squares of gay cloth. Naked little children scampered after the women, crying in fright at the sight of me.

On the Mulatas Islands, Coconuts Are Money

Trading vessels sailing eastward from Colón, in the Canal Zone, reach El Porvenir, gateway to the group, after a 75-mile trip. On the largest of these tiny tropical dots dwell San Blas, or Cuna, Indians, who have few contacts with the outside world. The Mulatas Islands belong to Panama.

The island was flat and about the size of an average city block, yet hundreds of persons lived within its confines. Thatched houses were everywhere.

Feathery coconut palms grew right down to the water's edge. In this soil little else could grow. It was not yet ten o'clock, but the sun was blistering hot and the glittering sand in the small lanes around the huts was deep and dazzling white.

One little nine-year-old boy, proud of his English, skipped around to all the huts yelling at the top of his lungs, "Merikin leddy, Merikin leddy," to encourage the timid ones to return.

Someone had taught that youngster not to be afraid of funny white faces, for he soon came up and tried to make friends. On his hip was a tiny baby brother. This practice of carrying smaller children on the hip tends to develop in the carrier a crooked and ugly posture that is never entirely outgrown. An American mother would have a fit to see such tiny tots carrying around mere infants.

A few of the braver women came back after a while and gave me wan little smiles. But when I raised my camera, they were off again, or hid their faces behind their scarfs.

There was a lot of chatter between my guide and the women, and it was explained

Photograph from Mrs. Corinne B. Feeney

El Porvenir—Port of Entry to the San Blas Country

The Panamanian governor of the Mulatas Islands resides here (page 195). All coastal trading vessels, bound for the numerous Indian settlements on the 50 inhabited islands of the group, must call at this islet to sign clearance papers. Graceful coconut palms yield the archipelago's cash (page 193).

to me that I must not again point the "evil eye" at them.

Next, I had to empty my pockets and purse and shake my clothing to prove I had no "needles" with which to stick their arms. Some time before, it seemed, the islanders had suffered an epidemic of smallpox, and white doctors from Colón had vaccinated the populace. They now suspected that I, too, might have some wicked implement of torture.

Making Friends with the Camera-shy

Suspicion and embarrassment were short-lived, however, and after I had presented a few small gifts, the women were soon their lighthearted, bubbling selves.

Seeing that I was interested in their possessions, they eagerly displayed their bracelets, necklaces, rings, and earrings. The necklaces were made of beads, coins, and the teeth of wild animals the men had caught in the jungle of the mainland. The bracelets were of beads; the rings and earrings of gold (Color Plates VII and VIII).

In bartering, the "open sesame" was cigarettes. For these the Indians clamored, and even the tiniest children smoked. Bright buttons, perfumed soap, and candies were popular, too (page 202).

When I gave the children lollipops, one young mother looked at me with suspicion and snatched the candy out of her infant's mouth so she could taste it first. Finding it to her liking, she sucked on it and then gave it back to the baby.

From then on, mother and child shared the "all-day sucker," until I began to feel sorry for the cheated child and gave the mother a handful for herself.

The first thing she did was to remove all the colored wax papers, fold them up, and stick them, for safekeeping, in the waistline of her garment.

For this superfine gift the mother finally broke down and let me photograph her and the baby. But first she ran to get a little boy's sailor suit, bought in Colón; she seemed prouder of it than she was of the baby.

News began to get about that a *waker* (stranger), was giving away sweets, and dozens of other natives appeared from nowhere. I began to wonder if the supply of lollipops would hold out. Excited mothers would run to wake up tots who were sleeping in hammocks and drag them into the circle to get their share.

The young boys were not camera-shy and did much to help me, but they had a rather

Down to the Press a Shy Woman Carries a Bundle of Sugar Cane

Her husband brought the stalks from his mainland plantation. The San Blas live on islands close to shore, but they raise their crops, obtain water and firewood, shoot game, and bury their dead on the mainland.

Photographs by Kurt Severin

They Will Take the Palm Leaf to Church When It Is Braided

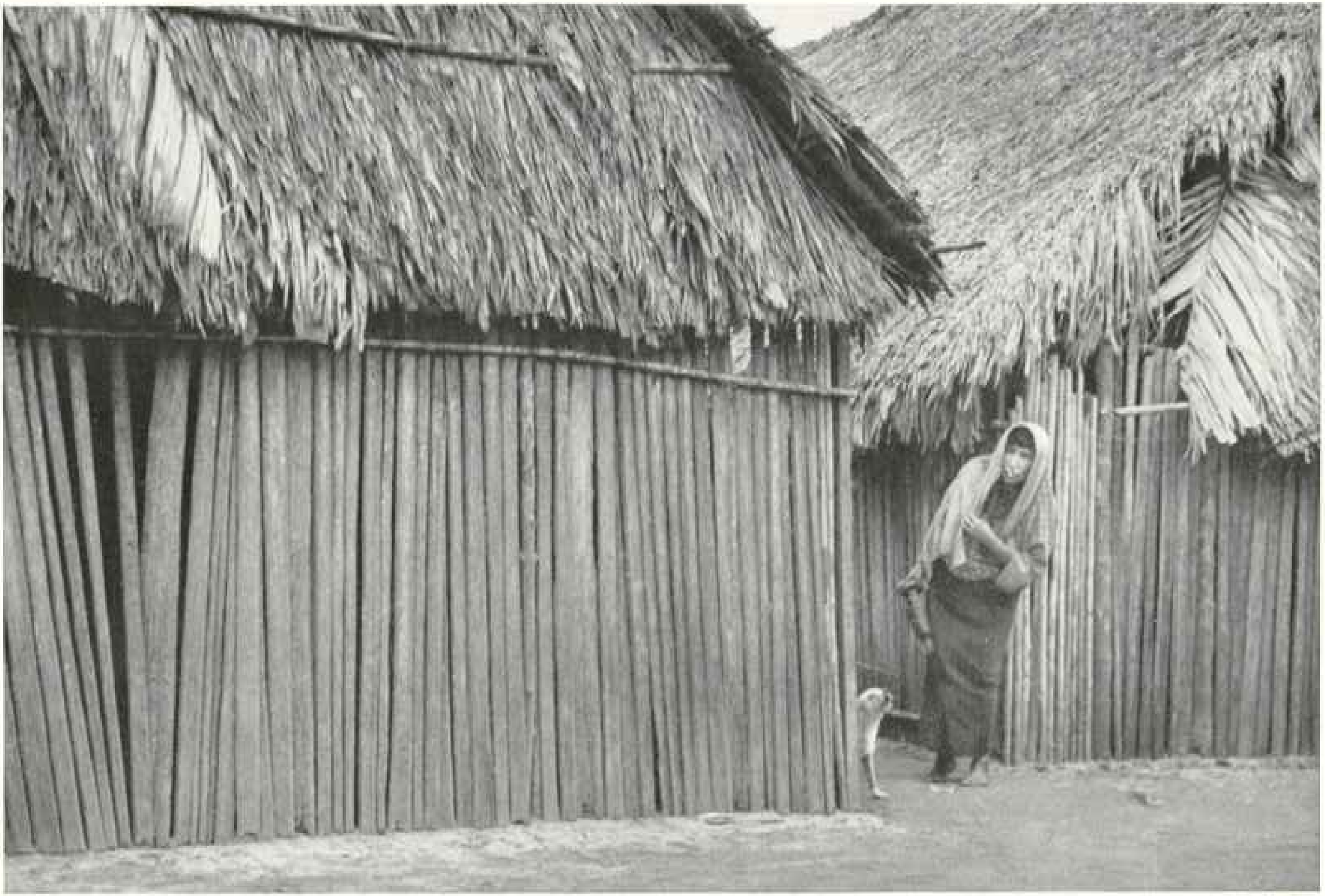
Dressed up for the occasion, the boys will participate in the consecration of a church on Río Azucar Island. A San Blas boy seldom wears clothes until he is ten years old, when he receives a hat and long-tailed shirt. Later he gets a pair of trousers. His father teaches him to make his own clothes (page 217).

Photograph from Mrs. Carlisle B. Feeney

"More Numerous Than the Days of the Year," Say the San Blas: A Recent Count Shows About 400 Mulatas Islands

Photograph by Fisher

San Blas Indians Prefer to Dwell on a Choice Island Such as This, Close to the Mainland



Photograph by Hilda Harrison

Warned by Her Dog's Bark, a San Blas Woman Pops Out to Peer at the Strangers

Photograph by Fiala

For a Universal Sweet Tooth—Lollipops!

A San Blas mother carries baby on her left hip, letting its legs extend, saddle-fashion, on either side of her body. This leaves the mother's right arm free for work. When big sister takes care of baby, she carries it in the same manner. Thus burdened, she will run and play, much to the delight of her small charge.

upsetting habit of thrusting their heads too close, or of pulling at my arm to see better into the magic box that so frightened their mothers.

Often the women, believing only the boys were being photographed, were unsuspectingly caught in the group.

Gold and Its Secret Closely Guarded

For all the sweets and cigarettes in the world, I could not have enticed the islanders to part with a single ornament of gold. If an outsider dares even mention the word, the Indians become alertly suspicious and see to it that the questioner leaves at once. He is not even allowed to wait until sundown.

No one has ever been able to explain just where this Indian gold came from. Some have thought that through the long centuries the San Blas have been hostile to outsiders to protect great wealth in that precious metal or to hide the secret of a rich gold mine. But such supposition is far-fetched. On none of the islands are there signs of great wealth. In fact, just the opposite is true. All the villages show abject poverty, scarcity of food, and sometimes actual physical suffering.

Perhaps the islanders do know the location of a gold mine and get a little gold from some secret place; but certain it is that they do not get it in large quantities any more. Today the San Blas buy many of their gold adornments from Panamanian or Colombian traders.

In this matter of their love of gold, the San Blas are akin to the rest of humanity. But their tactics of possession are different from some. A San Blas Indian would not think of stealing gold belonging to another; neither would he lie, torture, or kill for it.

The San Blas themselves seem as ignorant of their history as any foreigner. Some students believe that these Indians formerly lived on the mainland and fled to the islands to escape gold-greedy whites. Others contradict this theory and contend that the reason the Indians live here is that the islands are free from mosquitoes.

Whatever the origin of the San Blas, it matters not to them. They are satisfied that they are a superior race; they call themselves a "golden people" and feel that their mode of existence is far superior to the modes adopted by vain and foolish foreigners.

Because they have succeeded so well in keeping to themselves and in keeping others out, these people wear much the same style clothes, build the same kind of houses, and adhere to the same customs as did their forefathers hundreds of years ago.

Architecturally, they possess just one design. Their homes are thickly thatched with dried palm leaves, which keep out the heaviest tropical rains (Plates IV and VI).

The walls are made of small bamboo poles set close together and laced with lianas, or vine rope, from the jungle. Mother Earth supplies the floors, which are brushed so much they become very hard and clean.

Around the inside walls of the huts are piled coconut husks and shells for use as fuel. Here and there are nets, lines, and other odds and ends. A few stools, carved from a solid log, are placed at convenient intervals, though most of the people seemed to prefer standing during my visit. Hammocks were stretched around, for none of these Indians ever sleeps on a bed.

Photograph by Kalt, Berwyn

Unwitting Model for Their "Medicine Doll" Was a Missionary

More than two centuries before these children were born, Scottish Presbyterian missionaries from an early settlement on Caledonia Bay visited the islands and healed the sick. When the friendly visitors left, the Indians carved their likenesses in balsa wood, plug hats and all.

Sanitation on most of the islands is unheard of. The huts are built so close together that it is hardly possible to pass between them. Eaves are low and a person of average height must stoop when traversing the narrow lanes between the houses.

The smallness of the homes and lanes does not bother the natives, for they are small creatures themselves and get by very well in cramped quarters. The tallest San Blas man I saw was not more than five feet four, and the tallest woman five feet two. Sometimes a family consisting of four generations will live in one hut not so large as an ordinary box car.

From somewhere down the long line of generations, the San Blas Indians have inherited well-defined traditions, laws, and ways. They are ruled by an autocratic chief whose mandates are accepted as law.

Eye-for-an-eye Code in Force

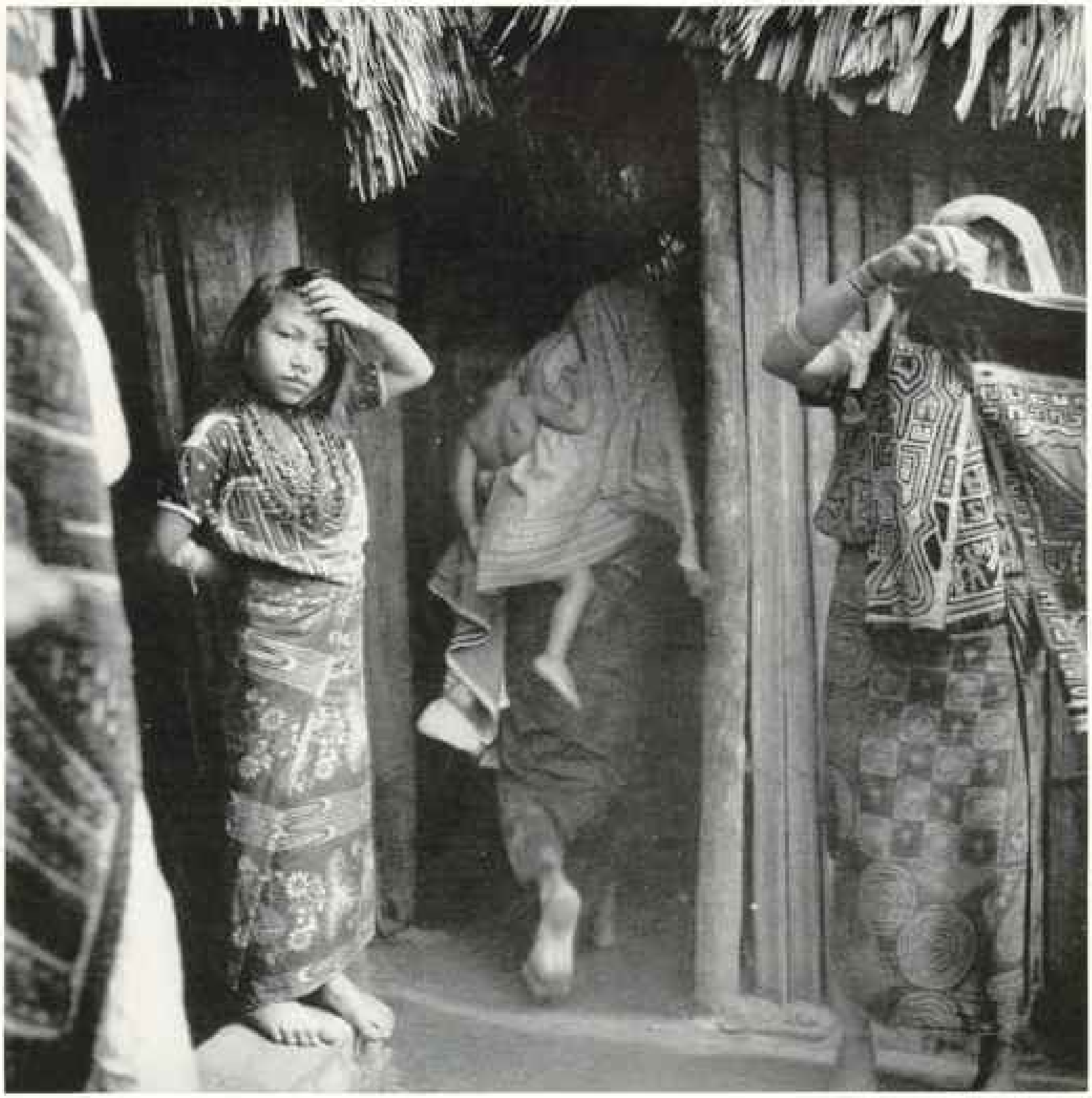
At certain seasons all citizens assemble for ceremonial rites and dances which no foreigners may witness. While such ceremonies are taking place, no one is permitted to land. In one of the dances the participants torture themselves with nettles tied to their backs.

The old code of an eye for an eye and a tooth for a tooth seems to hold good here. Accidents are few, for if a person bumps into,

Photograph by Hilda Harrison

Open-air Displays Catch the Eyes of San Blas Visitors

In the upper islands, closest to Panama, travelers are frequent. Here feminine merchants tempt pocketbooks with brilliantly colored appliquéd cotton, native beads, crudely carved wooden dolls, and miniature canoes. Many of the figures are carved in balsa, the lightest wood of commercial value. A cubic foot of balsa weighs from seven to eight pounds, only one-sixth as much as oak. The idea of a market where native-made articles are sold is a development of only the last decade.



Photograph by Hilda Harrison

San Blas Women Wrap Themselves in Their Skirts

They wind yards of gaily colored cloth round and round, then tuck it in at the waist. Their blouses, or *molas*, are much more complicated (Plate VII). When the parents of the little girl (left) decide she should have a husband, they will cut her hair short and hold a fiesta, or "deb" party, in her honor (p. 217).

knocks down, or injures another, the one who caused the accident is immediately accorded the same treatment. If a man is known to have killed another, the killer likewise is put to death.

Houses are so inflammable and built so close together that danger from fire is great. Once a fire is started, it is constantly watched by someone. If that person fails to guard it properly and the blaze spreads and causes trouble, the one at fault may be thrown into the fire to burn to death.

But they are not vicious people, these San Blas; nor are they sad or unhappy. They are prideful and rather jolly, and if you give them so much as a faint smile, they will return it with a hearty laugh.

At night a tiny coconut-oil lamp burns in each hut. The idea of having a night light is a hand-me-down from forefathers who believed that a faint glimmer of light in the darkness would keep away vampire bats. To the San Blas mind, a bat is a symbol of evil.

Until recent years San Blas children were allowed to grow up to adolescence before names were selected. As J. V. Tinnin records in his book *Roughing It in the San Blas Islands*, the parents would call in the "singing man," an Indian of much importance, who would sing a song composed entirely of names.

When he sang out a name that particularly appealed to the parents, they would stop him and select that name for their child.

Since the coming of missionaries and traders, some of the children of the islands have been given English names. On one island an educated, progressive San Blas man and his wife, a pretty, blue-eyed American missionary lassie, have conducted a school for several years. On Nargaña is a mission and a permanent foreign population.

Toward English-speaking people the islanders seem friendly. Many San Blas youngsters learn English if they drop their own tongue, and nowadays the boys are often enrolled in the schools of Colón and Panama City.

In one little native hut I was rather surprised to see on the wall a faded picture of Queen Victoria! Present-day Indians held it in reverence, just as their parents and grandparents had done. Victoria was still "the good white lady across the sea."

In the houses are large crudely carved "gods," or proxies, but these are not worshiped as holy symbols and at times are willfully smashed or destroyed with no fear or concern (pages 205, 219, and Plate III).

Bird Nominates a Medicine Man

Medicine men hold envied and respectable positions in the community. When a San Blas feels the call to become a medicine man, he goes alone into the jungle on the mainland and fasts for several days.

If a bird alights upon him during his fast and remains for a second, it is a sign he has been selected. As a symbol of this appointment, he carries a staff with a carved figure of a bird upon a man's head and wears a feather crown, although he has no standing as chief, or ruler.

His duties as medicine man are to keep his people well and happy. His methods are secret and magical. Instead of a medicine kit, he carries a basket containing such odd objects as bones, claws, teeth, buttons, shells, string, corkscrews, combs, colored pebbles, and bottle tops. The medicine man has a use for each one, and many are worn smooth by constant rubbing on the afflicted.

If a man has a pain in the head, for instance, a skull bone of some animal will probably be rubbed on the sufferer's cranium. For an injury to a finger, a claw bone might be used, or, in the case of leg injuries, the leg bone of an animal or bird.

In the native materia medica are many kinds of tropical plants. The bark of a certain tree is supposed to stop the flow of blood. The fat of the crocodile is used for colds and lung troubles. The coca shrub, from which comes our cocaine, is employed to alleviate pain, though these Indians do not use it as a drug.

Aromatic gums and astringents are mixed with unguents as salves for wounds in cases where the medicine man's methods are ineffective, and there are concoctions of bitter roots for various internal ailments. The sap of the breadfruit tree is used for sprains and swellings. There are other remedies for rheumatism, sore throat, and toothaches.

With these many efficacious restoratives gathered from the jungle of the mainland, plus the power of the magical articles owned by the medicine man, the patient is bound to get well—or die.

Bark Bath to Strengthen the Aged

The "bath for strength" is supposed to be beneficial to the aged.

At one end of the island a cayuca, half filled with salt water, was raised about six feet off the ground by means of stilts. In the salt water floated numerous pieces of bark, all sharpened at one end so that the strengthening quality of the bark would pass more easily into the water.

When we saw this bath the water was already tinged a pale brownish red. A weak old man was to be put into it and allowed to soak for several hours until the spirit of weakness had entirely departed from his body. Meanwhile, other members of the tribe were to march around the "tub" singing incantations supposed to speed the curative powers of the bath.

When a person dies, his body is placed in his hammock at home and his women relatives chant his virtues. Such a death chant might run as follows:

"My husband is dead. He led a good life on earth. He kept me well supplied with plantain. He struck many tarpon for me. Now God has called him. My husband has gone to Heaven. What shall I do?"

The islands are too small to permit burial grounds, so the dead are carried up the rivers of the mainland and buried in a lonely place in the jungle. Each family, or clan, has its own burial plot, covered by a thatched roof.

These people believe that everything created, even such an inanimate article as a hammock, a stool, a dish, or a chair, has a spirit. When the grave is filled, some of the dead one's earthly possessions must be left at the scene. The family must not fail in this obligation, lest the tormented spirit return to get the articles for itself. Both before and after burial, guns

Photograph by Kurt Severin

One Awkward Move, and the Round-bottomed Mahogany Cayuca Will Capsize

Spearing fish from the hollowed-log canoe requires alertness and skill. Early Spanish voyagers were visited by Indians paddling similar frail craft. San Blas Indians make their spears of black palm, almost as pliable as steel. Because of its strength, elasticity, and fine grain, this wood is used for expensive fishing rods and walking canes. The fisherman in the center is an albino (pages 219 and 220).

are fired to scare off evil spirits who might interrupt the soul's passage to Heaven.

Although a funeral cortege is accompanied by wailing relatives, the Indians cease mourning with the burial ceremony and never speak of the dead again. They have a term for their philosophy: "I forget."

Coconut Palm is Tree of Life

To these islands the coconut palm is indeed the tree of life. Besides currency for trading, it yields meat and drink, the latter especially appreciated on islands where there is no fresh water and all water for drinking and cooking must be brought from the mainland.

The trunk of the palm is made into fighting and fishing implements, or cut into logs for seats. The fronds are used for clothing, shelter, and hammock construction, and the dried leaves, tied into bundles, are lighted for signals and flares. Smaller bundles of shorter leaves make brooms for sweeping the dirt floors of the huts.

The threads of the fronds are used in sewing and weaving and in forming lamp wicks and certain kinds of rope, while the coarse covering at the base of the growing leaf can be formed into hats or made into sieves and strainers. Husks and shells are burned to provide warmth and protection; the oil and bark serve as medicines. Dishes are made from the shells, and the shuttle used in hammock construction is carved from palm wood. These are a few of the uses we know about.

The very old women fascinated me, for their faces were as wrinkled as dried apple peel, and yet not a gray hair did they have! Like other Indians, the San Blas retain the thick, lustrous hair of their youth at an age when whites are getting bald or gray.

Except for luxuriant locks, Mother Nature has not been lavish in bestowing beauty upon

the race. For the most part the islanders are not beautiful, since short necks, broad shoulders, and undeveloped lower limbs give them a gnomelike appearance.

Probably the disproportion between the upper and lower limbs of these people is attributable to their extensive use of canoes.

Shortly after a baby girl is born, her nose and ears are pierced, and a little string is placed in each wound. The wearing of the heavy nose ring later is a mark of family prosperity, but a most disfiguring habit, for it pulls the nose down to the lip, giving a strange expression to the face.

Making the expression worse, some of the women paint a thin straight line down the face, beginning on the forehead and continuing to the tip of the nose (Plate VII and pages 194-5). This is intended to make the nose appear less broad and flat. The females wear many rings on their fingers after marriage, but never before.

Children Suffer "Beauty Pains"

The women go through genuine punishment to attain their ideal of beauty. When a female child is about six years old, string after string of beads is wound tightly around the calves of her legs. As she grows, the flesh comes up in ridges and the beads become deeply imbedded in the muscles. These children suffer real "growing pains" which they must endure for beauty's sake.

Young children of San Blas never get cow's milk, since this is not an Indian custom—except where acquired from the white man—and since there is no place for grazing on the islands. Infants are weaned from the mother's breast to coconut milk.

If the mother of a newborn child dies, the baby may be put to the breast of any woman within that clan who is in lactation. But it must never be nursed by one not of the family fold. If there are no women in the family able at that time to feed the baby, the Indians know of a jungle herb that will bring milk back again—so they declare—no matter how long a time has elapsed since the female suckled an infant.

Before going to San Blas, I had been advised by an old traveler to take magazines along—"magazines with plenty of pictures in 'em, if you want some fun." I had carried out this suggestion and, after the entertainment with the lollipops, I distributed a few colorful publications.

These magazines, with their bright pages and unimagined scenes, brought forth shrieks of laughter. The eyes of the women traveled with round-eyed wonder over the columns depicting our current fashions, and those feminine hearts must have skipped beats at the sight of New York's latest hats.

At some illustrations there was audible horror, and at the sight of others the rapid chattering increased in crescendo until the women were almost screaming at each other. No San Blas person, either man or woman, wears a head covering for the protection it affords, but rather for the beauty of the thing.

Kissing Scene Calls for Explanation

Some of our pictures and ads were difficult to explain. For instance, what was I to say—through my interpreter, of course—about the picture of a young man kissing the lovely lady because she had "the skin you love to touch"? What should I tell these people who had never heard of kissing?

And an ad for false teeth—where did Americans get teeth like those, that could come out and be held in the hand? Did they bite?

What were the automobiles like? Could they travel as fast as a cayuca and could I make one for them? Airplanes were more familiar than motor cars, since planes from the Canal Zone occasionally visit the islands.

A full-page pastoral landscape showed groups of "contented cows." How many of those queer and horrible animals did my country have—as many as ten? The San Blas ability to count does not go very high.

Was it true that children drank milk from monsters like those and did men eat the flesh of the animals? Better the San Blas way of coconut milk; better the San Blas way of using magical herbs to restore milk to old and shrunken breasts. Americans did not believe?

Worldliness is discouraged by San Blas religion. The less owned in this world, the islanders believe, the more there will be for them in the next. Their gold ornaments and beads are their sole luxuries, and food is taken only in quantities sufficient to sustain life.

The iguana, a lizard with a spiny back and thorny throat, is captured on the mainland and makes a favorite dish. Despite the creature's repulsive appearance, its meat is white, tender, and delicious, being somewhat on the order of chicken. Yams, maize, rice, and sugar cane are cultivated on the mainland under the most difficult of conditions. Breadfruit, plantains, bananas, oranges, star apples, limes, alligator pears, and mangoes are grown in the jungles, but they must be gathered before the wild parrots destroy them.

To eke out an existence from the land in San Blas is not an easy task. The machete, or large knife, is the only farming implement known. At daybreak the islander takes his

Indian Haven—Off the San Blas Coast

San Blas Business Women Wait at the Dock for the Trader

Husbands of these Cuna Indians, who dwell on the islands fringing Panama's north coast near Colón, take a "back seat" on a near-by pier. Women own everything in the Mulatas Archipelago. Men cannot sell a single article without first getting permission from their wives.

 Kodachromes by Lieutenant Dayton Seiler, U. S. N.

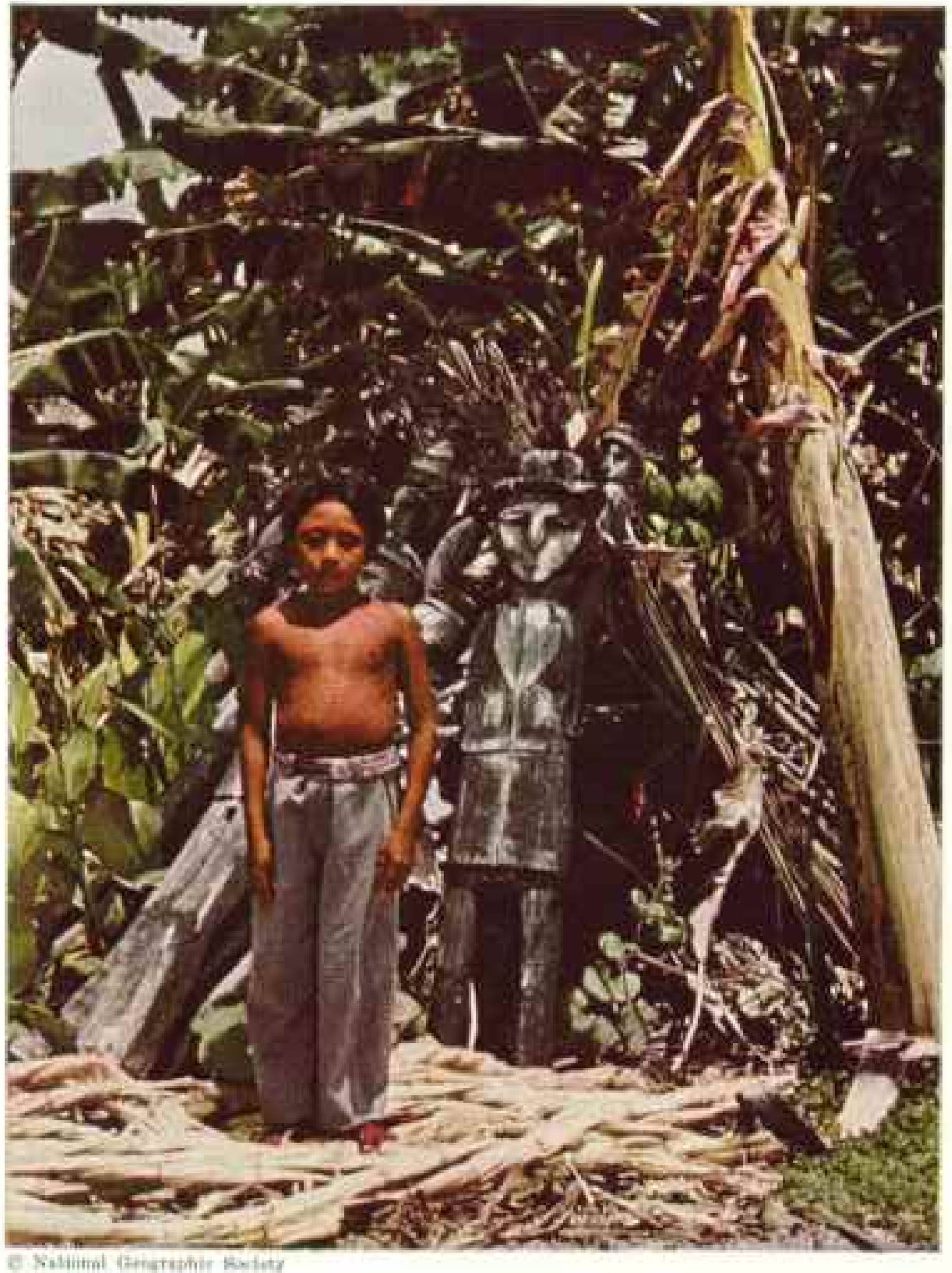
Sweet Juice Flows When Sugar Cane Crunches Between Wooden Logs

San Blas Indian women feed the stalk of yellow cane into the primitive masher. Outside their stockade-like dwelling, a string of fish and a jaguar skin hang in the hot sun to dry.

Kodachrome by Lieutenant Dupuy Bellet, U. S. N.

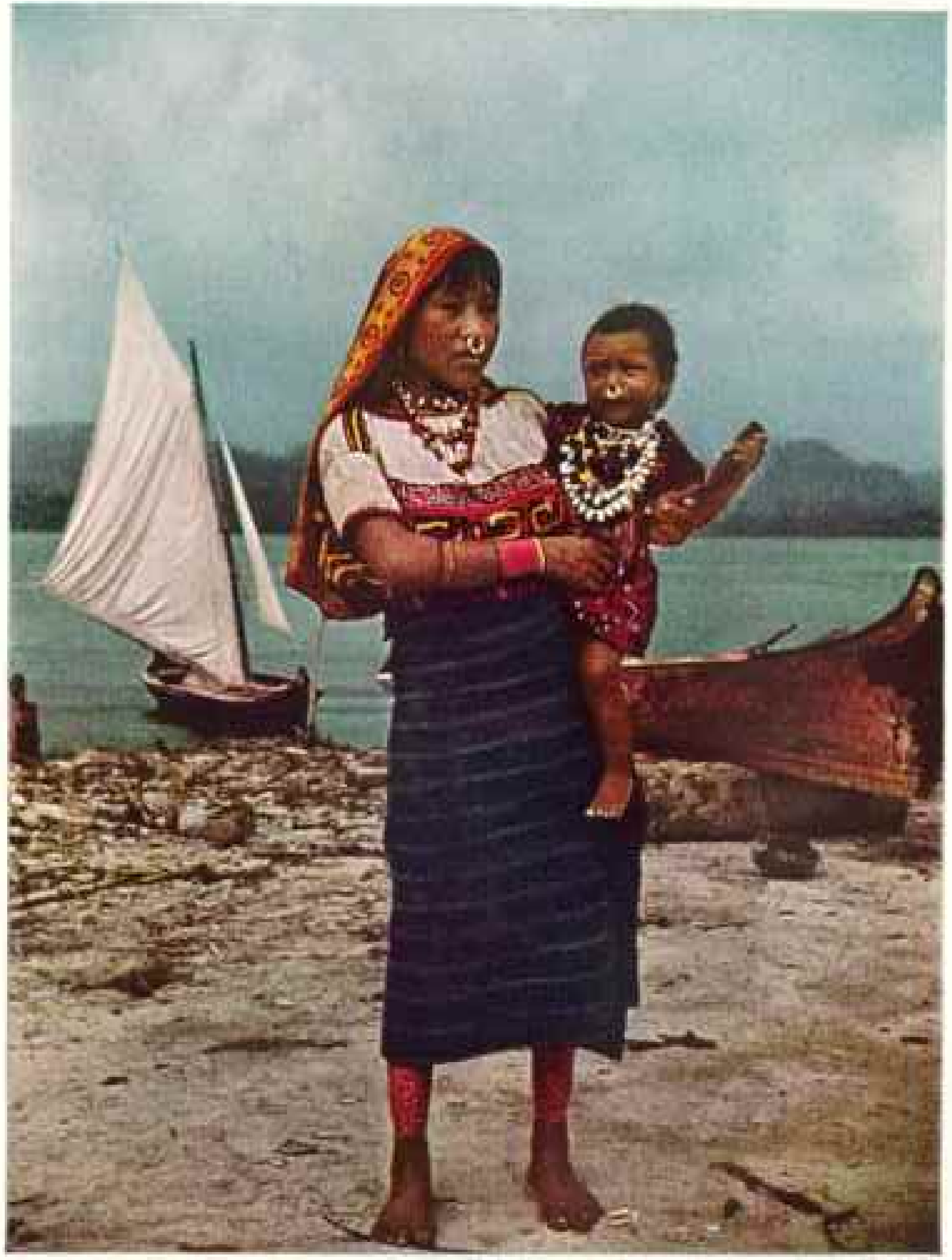
Beneath Sheltering Palms, San Blas Islanders Greet a Visiting Trader from Colón

By sunset the craft must depart, for white men are not welcome more than a day at a time. Jealously the Cuna Indians maintain their isolation.



Discarded Idols Watch Over Him at Work

The carved balsa wood gods have been abandoned in the banana and sugar cane patch which the little Indian boy cultivates. Because of their hostility to strangers, the 20,000 islanders have retained unusual purity of race.



Kodachrome by Lieutenant Dutton Bellet, U. S. N.

Gold Nose Rings Are Feminine Beauty "Musts"

The nose of each baby girl is pierced and a silk thread drawn through the opening. Thicker threads are substituted every few days until the hole is large enough to admit the ring. Cuna women seldom leave the islands.

Kodachrome by Lieutenant Dayton Stiller, U. S. N.

Shy San Blas Women Dodge the Photographer

Eloquent persuasion and gifts were necessary to prevail upon grownups to pose. Youngsters did not share their fears. Homes are much alike. Roofs are thickly thatched with dried palm leaves. Small bamboo poles, laced together with vines, form the walls. Floors are of hard-packed earth.

Kodachrome by Lieutenant Dayton Reller, U. S. N.

With Beads of Polished and Matched Seashells, San Blas Indians Paddle Out to Meet the Trading Boat

Skillfully the islanders handle their *cayucas*, or dugout canoes, made by hollowing and burning out the trunks of trees. Often the Indians fit a boat with sails and make the 75-mile open-water trip to Colón. The chief form of exchange is coconuts. Seven coconuts are equivalent to a nickel, fourteen to a dime.

Kodachrome by Lieutenant Dayton Keller, U. S. N.

Compact Homes, Built Close Together, Suit the Islanders Well, for They are a Small People

Seldom do the men exceed five feet four inches, and their wives are shorter. Often a family of four generations lives in one hut. All belong to the Cuna tribe.

Streamlining Camouflages a Broad Nose

Gold nose ring of the San Blas maiden also helps create the illusion of length. To make the pleasing designs in her gay blouse, she stitched together several layers of cloth in contrasting colors, then cut away parts of the layers.

Kodachromes by Lieutenant Dorton Heller, U. S. N.

Bizarre Designs in Her Skirt Have Tribal Meanings

Often they tell a family legend. Some stand for the intricate patterns traced by crabs on the sand. A few, more modern, are copies of pictures in newspapers or magazines. Tight bands of beads bite into the flesh of her legs.

Many San Blas Indians Are "White"

Fellow tribesmen call the albino woman (right) a "moon child." Glare of the sun is hard on her weak, light eyes, so she can see better at twilight or in the moonlight. Scientists think prolonged tribal intermarriage accounts for the high percentage of albinos.

 Kodachromes by Lieutenant Darius Beebe, U. S. N.

San Blas Costume Jewelry Blends Silver and Gold, Seeds and Seashells

Silver necklaces are family heirlooms, handed down from generation to generation.

machete and paddles his cayuca across the bay to the mainland, then goes a mile or so up some river. Here, with the aid of his machete, he hacks the ground and plants the few seeds he has been able to get.

His meager crop may be devoured by wild hogs or other animals, or it may be entirely wiped out by a storm.

Coconuts, the chief means of exchange with traders, form another trust-to-luck crop. It takes about ten years here for the coconut tree to reach maturity. For nine and a half years perhaps all will go well; then, when the fruit may at last be expected, the trees are likely to become the victims of an awful blight. The Indians know nothing of scientific methods of fighting tree diseases. All they can do is plant more trees and wait another ten years.

The old Indian way of fishing with palmwood spears is resorted to more often than the use of hook and line (page 207). But spearing fish is not easy, and the catch is often disappointingly small.

Land of Emancipated Women

The daily life of the Indian women seemed to me to be easier than the men's. The women have many tasks, often including the carrying of heavy loads, supported by a strap across the forehead, but they seldom worry or seem over-worked and are held in high respect.

The women are jealously guarded, though certainly not because of their beauty according to white standards. Being a San Blas wife is not a hard task if the sacred law is not broken—the law against half-breeds. While the men are off working in the fields or fishing, the women wash their few clothes, tend the children, and do the cooking.

Here on these islands is a matrilineal society. Kinship and descent are reckoned through the mother, the children taking the mother's totem and belonging to her community. The women play a considerable part in tribal life.

The San Blas women told me they pick their duties. Loading coconuts is one. After all, dealing with coconuts is like handling the family income. But they do not make a chore of it; instead, it is a sort of holiday and relaxation for them.

The women all make their own clothes and the men theirs. As a rule, woman's dress is modest and simple, consisting of a long strip folded around the body from the waist to the ankles like a Javanese sarong. This skirt is of cheap printed calico and is purchased by the men on trading trips to Colón or from the trader on his visits.

Cotton for weaving is often procured from a cotton tree that grows in the jungles, but it is easier and cheaper to purchase cloth.

With the skirt is worn a short-sleeved waist called a *mola*. The mola is of true Indian manufacture and is made by laying several squares of brightly colored cloth, one upon the other, and stitching them with bright threads. Then the various layers of material are cut away in curious and shapely patterns, the edges are turned under and hemmed, and the result is a gay design of many colors (Plate VII).

The design worked into a mola is often representative of the emblem or totem of the woman's family and means as much to her as a coat of arms means to Europeans. To us these designs are often incomprehensible and bizarre. Some are supposed to have been inspired by the fine, lacy tracks made in sandy beaches by the millions of little land crabs that overrun the islands.

The women are all good copyists, and if a bright label, travel pamphlet, or pretty picture or sign falls into their hands, they are likely to convert it into a design for a mola.

There are some sewing machines on the islands, but the fine stitching that goes into the making of a mola is done by hand. When sewing machines were first introduced, the possessors looked upon them as gifts from the gods and guarded them with ritualistic care.

Each father teaches his sons to make their own clothes, a cotton blouse and a pair of ill-fitting trousers. Often nowadays, however, these are bought in Colón or from traders instead of being handmade.

Married at About 14

Children mature early in tropical climates, and in San Blas the marriage age is about 14 or less. In each island village there is a little palm enclosure or hut known as the "maiden's house." When a girl reaches puberty, she is taken to this place, and for four days the women of the village take turns pouring water on her.

This treatment is supposed to cleanse her and to harden her for the vicissitudes of marriage. Her hair is then cut for the first time as a sign that she has reached womanhood.

After the puberty ceremony the parents of the young lady entertain with a big feast to announce that she is now on the marriage market—a "coming out party," in our language (page 205). At this affair is served the drink *chicha*, a fermented concoction of cane juice, plantain, corn, and water, which carries an awful wallop.

Such an occasion is noisy and gay. Large stocks of food and drink, provided by the

father, are assembled in preparation. The guests wear their most colorful clothes and most lavish ornaments and freely partake of the chicha in big crocks set on the floor.

Some of the men bring flutes, and as the celebrants dance, the stomping of their feet and the rattling of the bead and money ornaments of the women keep time to the music. The party lasts three days.

The debutante now receives gifts from the women of the tribe—clothes, rings, and gadgets. They take the place of wedding presents and must last the recipient a long time. In fact, she saves some of them to pass along to other brides.

The girl tells her parents which boy she wishes to marry, whereupon the father goes to the young man's home and announces that he has been selected. This saves the girls the trouble of having to be attractive, coy, or of vying with other females for the attentions of the males.

Bridegroom Must Run Away

When everything is in readiness for the marriage ceremony, the debutante is placed in a strong hammock and the attendants swing her back and forth. Then the young married men go to the home of the bridegroom and bodily carry him to the bride's house, place him in the hammock with her, and swing them both.

Now the bridegroom must jump out and run away, whereupon his friends must catch him and bring him back. He does this three times, after which he is supposed to remain in the hammock with his bride.

If the bridegroom, in the process of being swung and chased, scampers off more than the allotted three times and does not allow himself to be caught, it is a sign he does not wish marriage with this particular maiden. She is jilted, and the father must now look elsewhere for a son-in-law. But this does not release the bachelor from marriage to some other maiden in the future.

Of course, with such a system in vogue, matrimony is universal and there are no old maids or old bachelors among the San Blas.

Polygamy is permitted but is rare, for the son-in-law is compelled to serve his father-in-law, and what young man in his right senses would deliberately choose to work for more than one father-in-law?

The mother-in-law is an unimportant person, and this is one country where mother-in-law jokes are unheard of. Perhaps there are some good father-in-law jokes, though it is doubted that these folks are ever so flippant as to joke about anything so sacred as the family. Duty and loyalty to the wife's father is a tradition that is not laughed away or joked about. A man's devotion to his father-in-law is as serious as the Chinese woman's devotion to her mother-in-law.

Divorce is allowed but seldom practiced, and a woman enjoys a relatively enviable position in wedded life, as she does in her tribal life generally.

A San Blas mother knows nothing about prenatal care or infant psychology. When her time has come, counted by the moons, she betakes herself to a special little hut built for the women. Such a hut is sacred to females, and men are never allowed to enter.

In this little place, often alone and unaided, the mother brings another soul into the world. If it is a girl there is great rejoicing, for now the father can set up his own establishment and become independent of his father-in-law. Sad is the lot of a man who produces nothing but sons!

A girl never leaves her parental roof. Sons have to leave home to mate with daughters of other clans, since clans are held together by the female line.

Just because a man espouses matrimony does not mean that he becomes the directing head, arbiter, and final word within the family circle. Far from it. Even in the upbringing of his own children he has no voice until his father-in-law, convinced by the man's years of labor, obedience, and good sense, decides that he may have that prerogative.

Once there was the absurd belief among outsiders that San Blas women squatted in the shallow water surrounding the island and gave birth to their babes in the ocean.

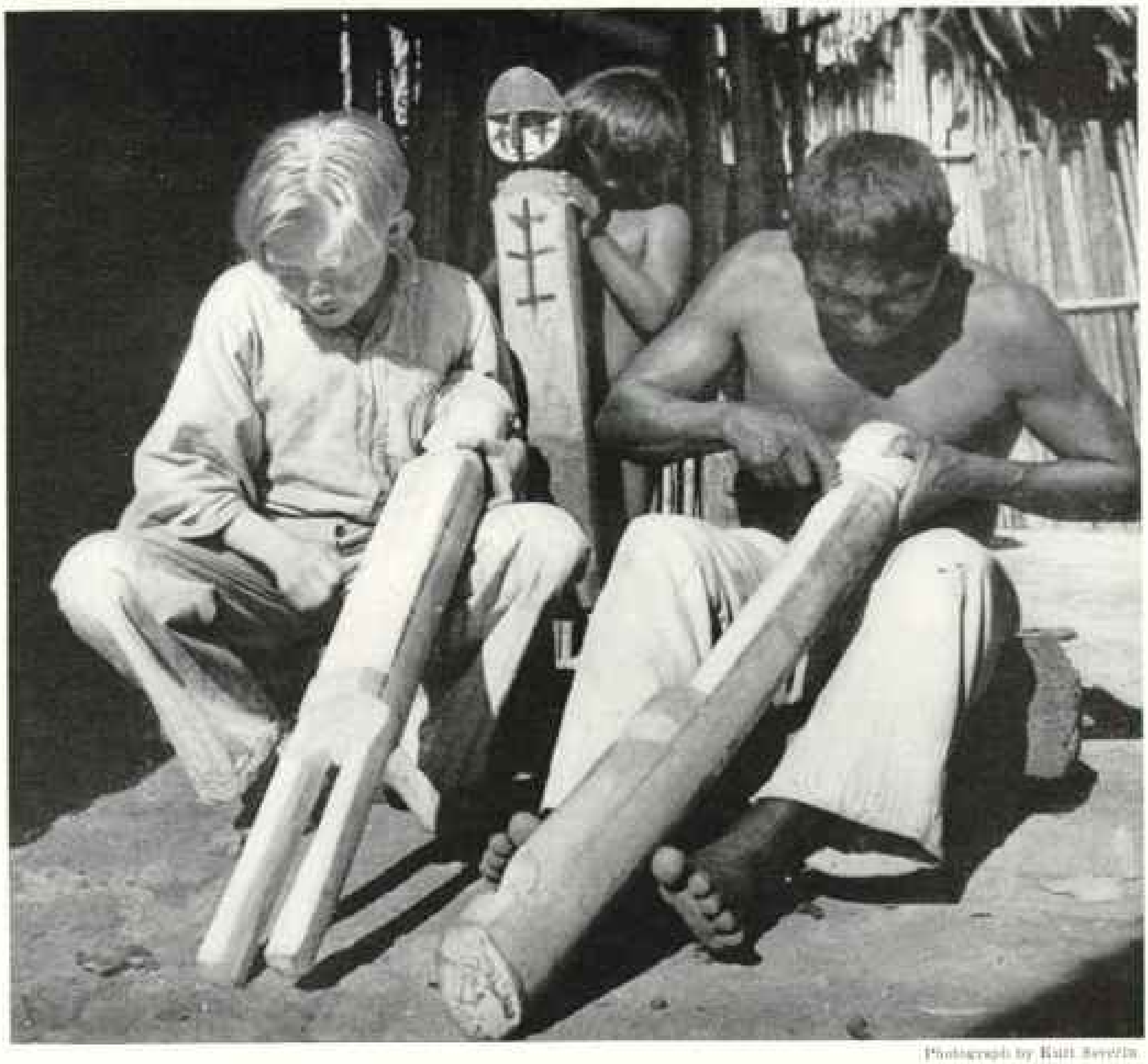
Another unbelievable story was that these women never suffered childbirth pains. This is untrue, of course, though doubtless these women, being strong characters, can endure a great deal without making a fuss.

If agony must be expressed, a "singing man," knowing what is going on inside the hut, may loiter near by and make chanting or groaning noises. This is done with the hope of keeping away evil spirits, lest they take advantage of the woman's weakened condition and enter her frail body.

The male makes as much noise as he can to fool the evil spirits and make them think it is he who is ailing.

Inside a Maternity House

One old granny who had been rather kind to me tugged, pulled, and beckoned me to come with her to a dark, palm-thatched, earthen-floored hut. It was not until I was well inside and my eyes had become accustomed to the dimness that I realized I was



Photograph by Kurt Severin

Deft Carvers Turn Balsa-wood Posts into "Medicine Dolls"

The youth at left is an albino (Plate VIII). In 1924 a group of persons from the United States believed they had discovered a separate race of "white Indians" in the San Blas tribe. Several were brought to New York and Washington. Since as early as the 17th century, however, it has been recognized that these light-skinned Indians were albinos. The other natives call them "moon children" (page 220).

in one of the maternity houses, rarely if ever entered by a white woman.

The old woman picked up a squirmy little bundle of humanity and put it into my arms. The young mother in a hammock (I doubt that she was more than 14 years old) watched me like a hawk. She was so tired, listless, and ill-looking that I was afraid for her.

The new baby was adorable—well-formed and healthy and a picture to behold. Already her little nose had been pierced for the gold ring it was to wear some day. I was afraid to smile down at the little creature for fear the women would misunderstand and think I was making fun. I didn't know what to do next, or how long to hold the youngster, so I just stood there, cuddling her up to me and trying to appear as intelligent as possible.

Suddenly it dawned on me that perhaps they wanted me to have the baby for my own! But I already had a little girl, my own little daughter in the Canal Zone, who was quite sufficient for the time being. It would be much better to make myself a sort of godmother by giving the new child everything I could in the way of presents.

Tenderly I replaced the wee one in the granny's arms and gesticulated to indicate my intentions.

Opening my handbag I found a few coins I knew would some day be made into an ornament, but more precious than the coins was a tiny mirrored vanity case. I handed this to the little mother; we exchanged smiles and she studied her reflection rather proudly, I thought, in the glass.

Fortunately, I had on my wrist a luminous-dialed watch which I offered to the mother of my godchild. I held it to her ear so she could hear the ticking and darkened the face so she could see the numerals shine.

Upon the older woman I bestowed the only remaining treasure I had brought, a cigarette lighter that both frightened and pleased, a "magic flame" that flared at a touch. I've wondered since what happened when the fluid gave out and the magic flame was dead.

"Moon Children," the Albinos

Among the hordes of little brown children were seen now and then a few albinos (Plate VIII and pages 207, 219). These are not uncommon here and are referred to as "moon children," a name which reflects an Indian superstition.

Albinos can see better after dark or in the moonlight, since the daylight glare is hard on their eyes. Accordingly, the belief arose that these fair children are of partly celestial origin—offspring of the moon god and an Indian mother.

Poor little things! Their bodies are misshapen, spotted, and crooked. They have big heads and thin, spindly legs; their skin is pasty white and they have stiff, tow-colored hair, yellow eyelashes, and weak, light eyes, habitually squinty.

Upon the occasion of an eclipse of the sun or moon, however, they have an important part to play. The Indians believe that at such a time a horrible dragon or huge black dog is jealous of the heavenly body's beauty and is biting pieces out of it.

All the time this battle is going on, the Indians must stay in their houses lest the dragon fight them, too. Only the moon children may go out and watch, for albinos cannot be harmed by the monster. They are armed with a small bow and arrows, and with these they shoot in the direction of the conflict to scare off the attacker.

Of course the Indians know the arrows cannot reach the dragon, but they serve to warn him and he is frightened away.

When I left the island, the little fellow who had christened me "Merikin leddy" brought me a farewell gift—two enormous turtle eggs; these, I was told, were the symbol of San Blas friendship. Then he grasped my hand and pumped it, Yankee fashion, as some previous visitor had taught him to do, and puckered up his lips for a good-bye kiss.

Coconuts Make a Hard Bed

The coconut boat was filled to the gunwales with thousands of brown, husky coconuts. They crowded the hold to overflowing, while more of them, four and five layers thick, cluttered up decks and gangways.

Coconuts everywhere! The only place to sleep was atop the stacks of coconuts—not exactly a soft bed, I assure you.

Fleets of cayucas, heavy with supplies and trinkets, were homeward bound. The women sat erect as they paddled away and did not once look back. Their every motion was one of grace as they brought the handles of the paddles against the side of the canoe near the end of each stroke and then pressed downward, Indian fashion, to gain speed.

In the distance, as we sailed away, the richly laden palms of San Blas rode ghostlike in a sea of onyx, stretching their fronds heavenward to be silvered by the moon.

The American Scene

ON THE following 26 pages the National Geographic Magazine prints some of the winning photographs in the Sixth Annual Newspaper National Snapshot Awards.

This annual contest for amateur photographers is conducted by 97 newspapers in the United States and Canada. The photographs are judged in four classes: Babies and Children; Young People and Adults; Scenes and Still Life; Animal Life.

From the many hundreds of thousands of pictures submitted in 1940 by amateur photographers, four were selected by each participating newspaper. Then these 388 regional winners were sent to Washington, D. C., to be exhibited in Explorers Hall of the National Geographic Society.

The collection was intensely interesting. Thousands of visitors came to the National Geographic Society headquarters to admire and study the exhibit. The pictures gave a fine panorama of the many adventurous activities and diverse life and scenery of the two countries.

Richmond News Leader — Photograph by Robert Holland

Ride, Cowboy, Ride! This Virginia Lad Catches the Spirit of the West

Oakland Tribune Photograph by H. F. Bullstock

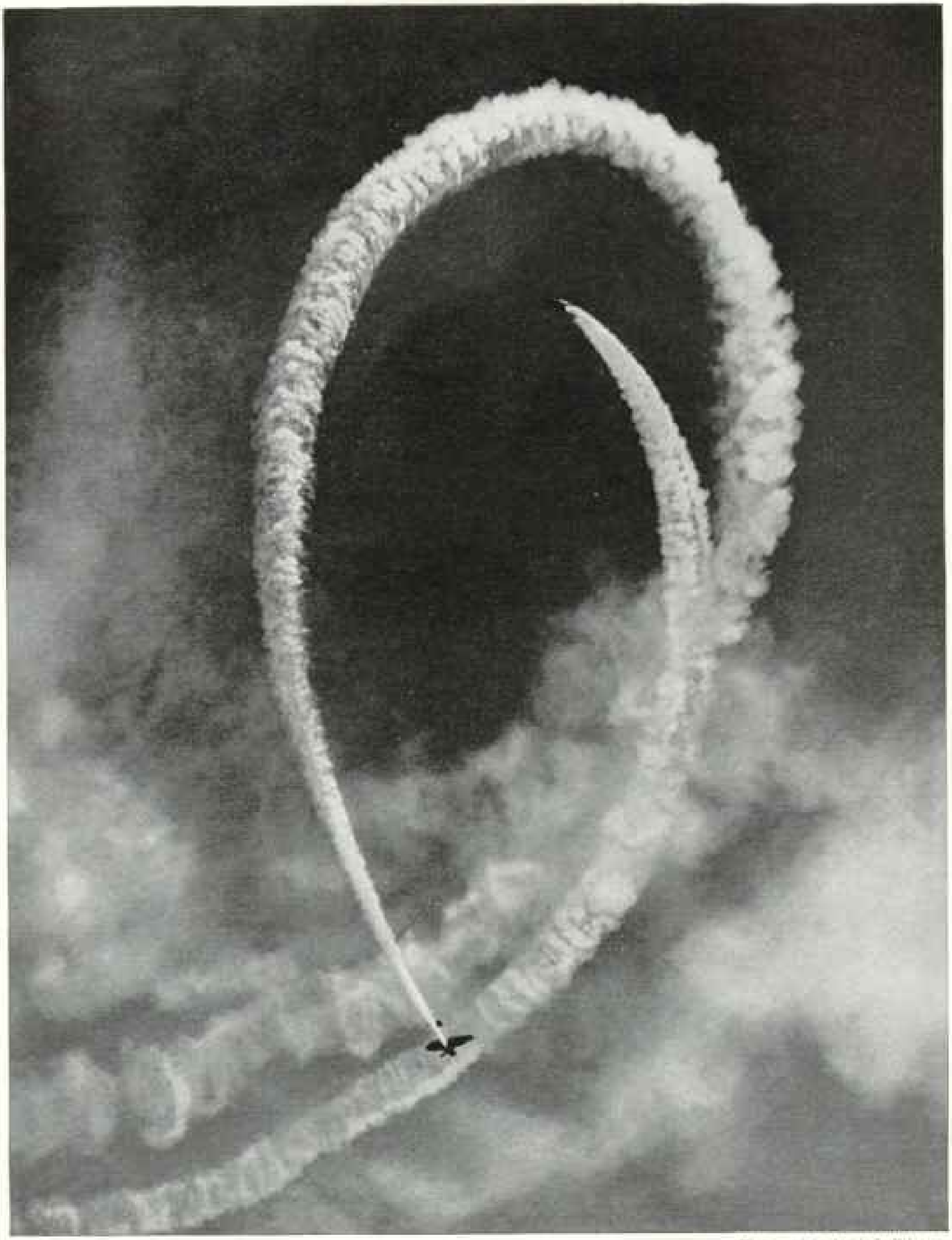
Take-off! Journey's End for This Gasoline-propelled Model Was a Haystack

Topeka State Journal — Photograph by Arthur Wolf

Jane Blaney, Student Pilot, "Makes Up" for Her Solo Flight

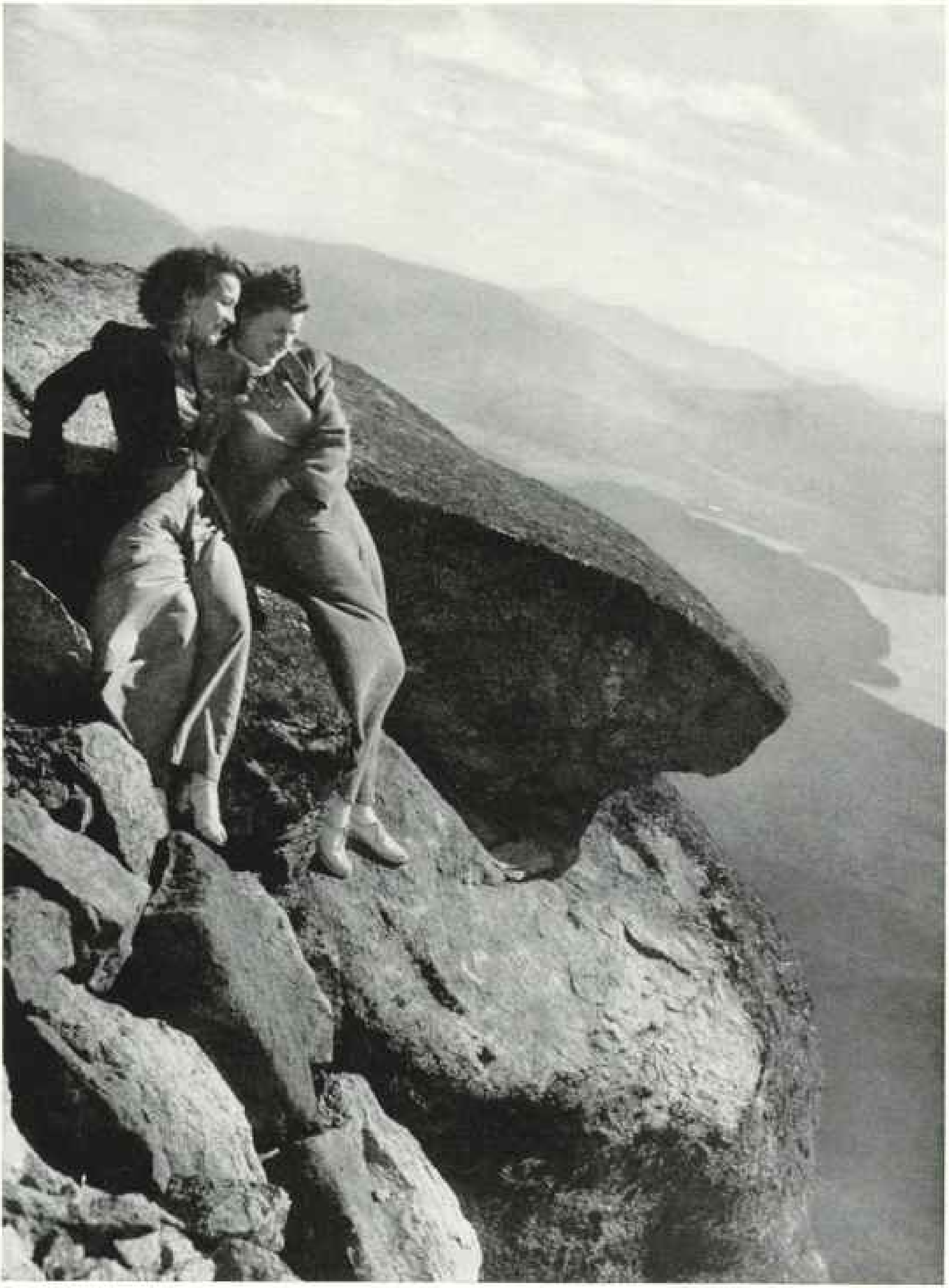
Columbus Citizen Photograph by Paul N. Gustafson

Safety First! An Ohio Pilot Scans His Billowing Chute for Tears and Tangled Shrouds



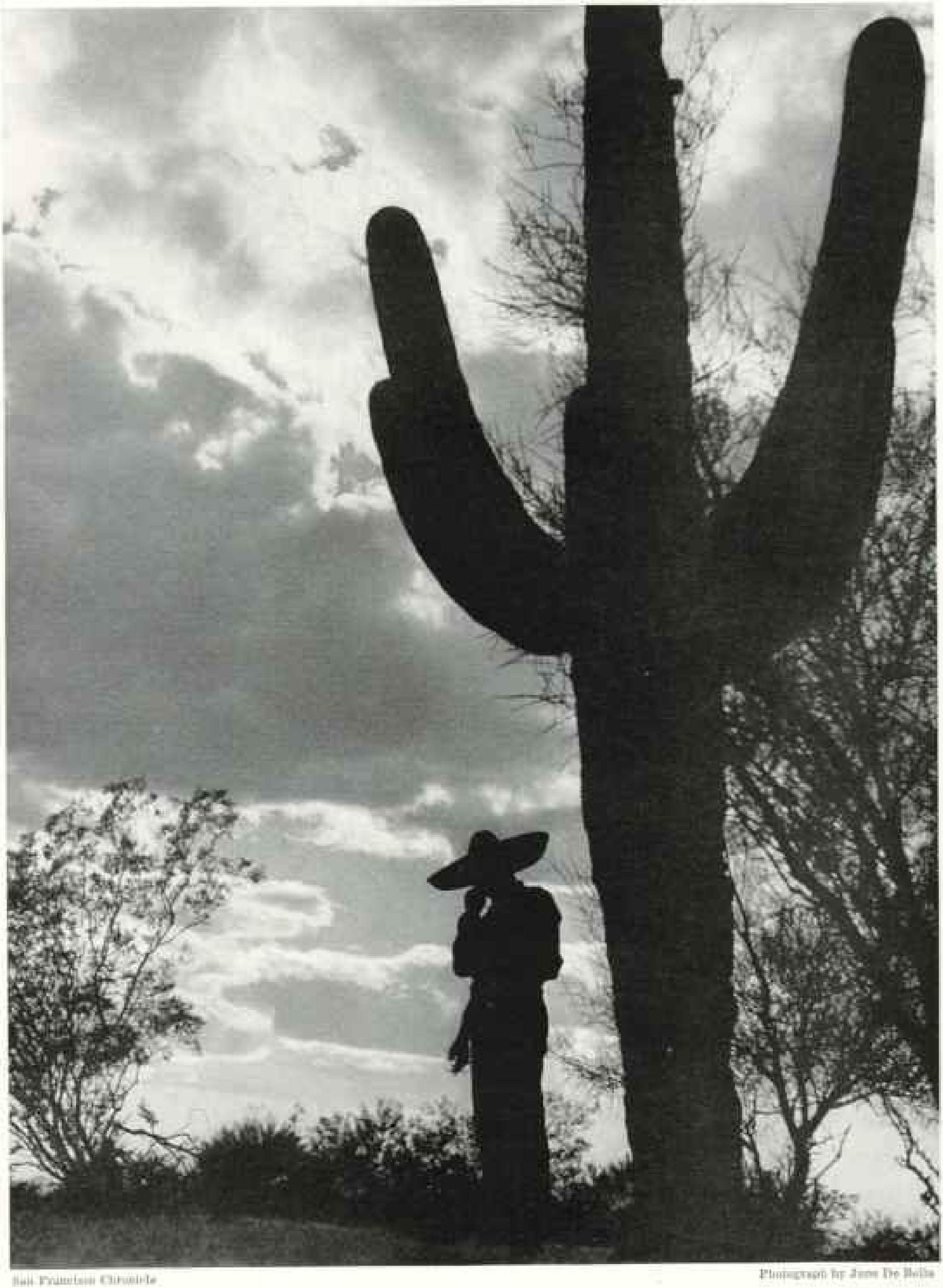
Des Moines Register Tribune — Photograph by Annie L. Peterson

Not a Dogfight—Just Sky-romping Aerobats Blazing Trails Over Austin, Minnesota



Syracuse Herald-Journal Photograph by Willard R. Smith

From a Dizzy Perch Atop Whiteface, Vivian and Doris Smith Look Down on Lake Placid



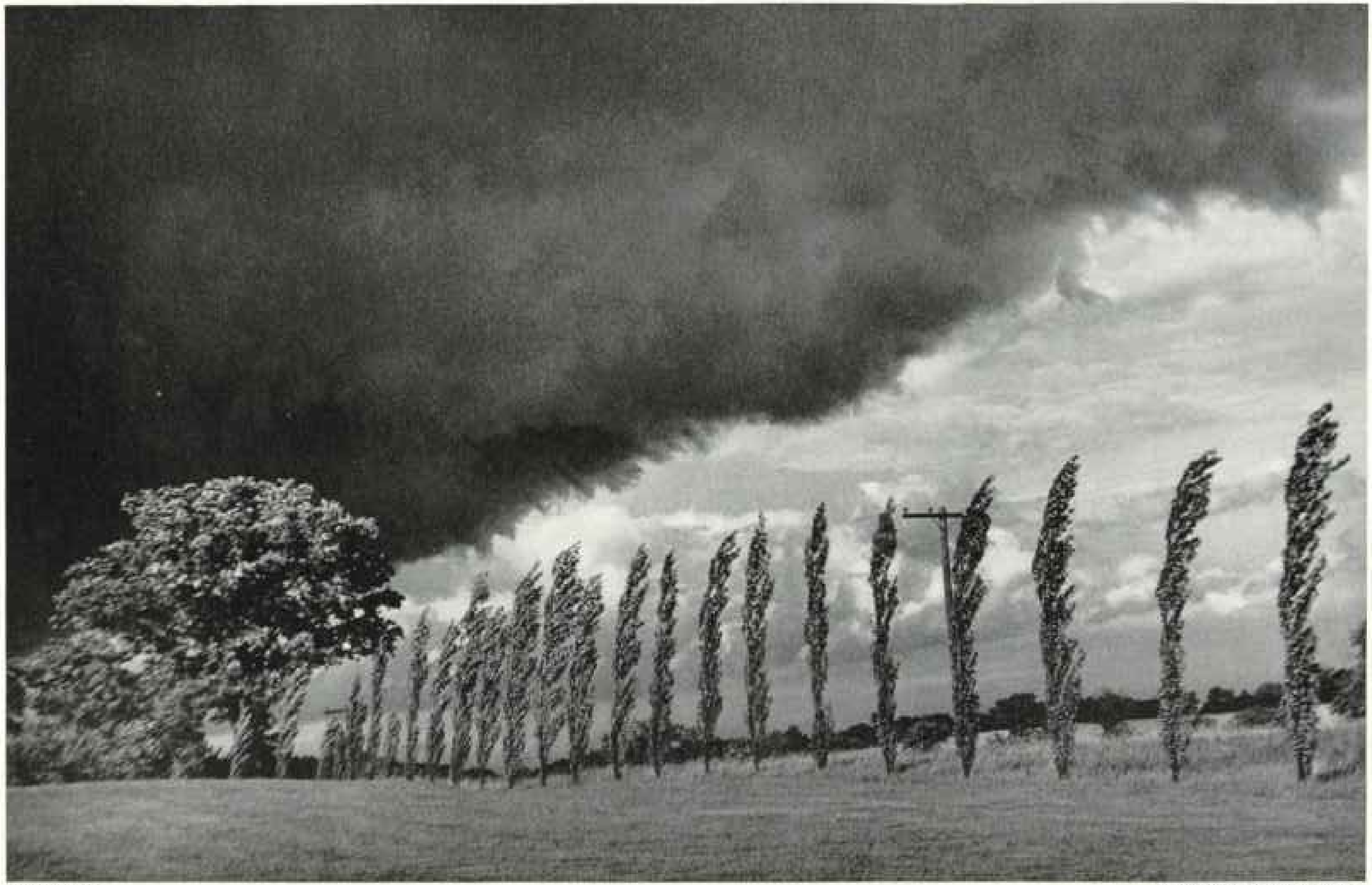
San Francisco Chronicle Photograph by Jane De Bella

Caballero, Saguaro Cactus, and Clouds—Sunset Along the Mexican Border in Arizona

Spokane Daily Chronicle

Photograph by William Gaede

Powerful Horses Turn Drained Bottomland into Fertile Fields at Bonners Ferry, Idaho



Cleveland Press

Photograph by Sherman L. Boney

Midsummer Blackout—Aviators Give Such Line Squalls a Wide Berth

Atlanta Journal

Photograph by Allyn Hare

Heavy Traffic on a Georgia Lane—Club Members of Atlanta Go Hiking

Memphis Commercial Appeal — Photograph by Charles N. Tigrett

A Modern David of Eastern Arkansas

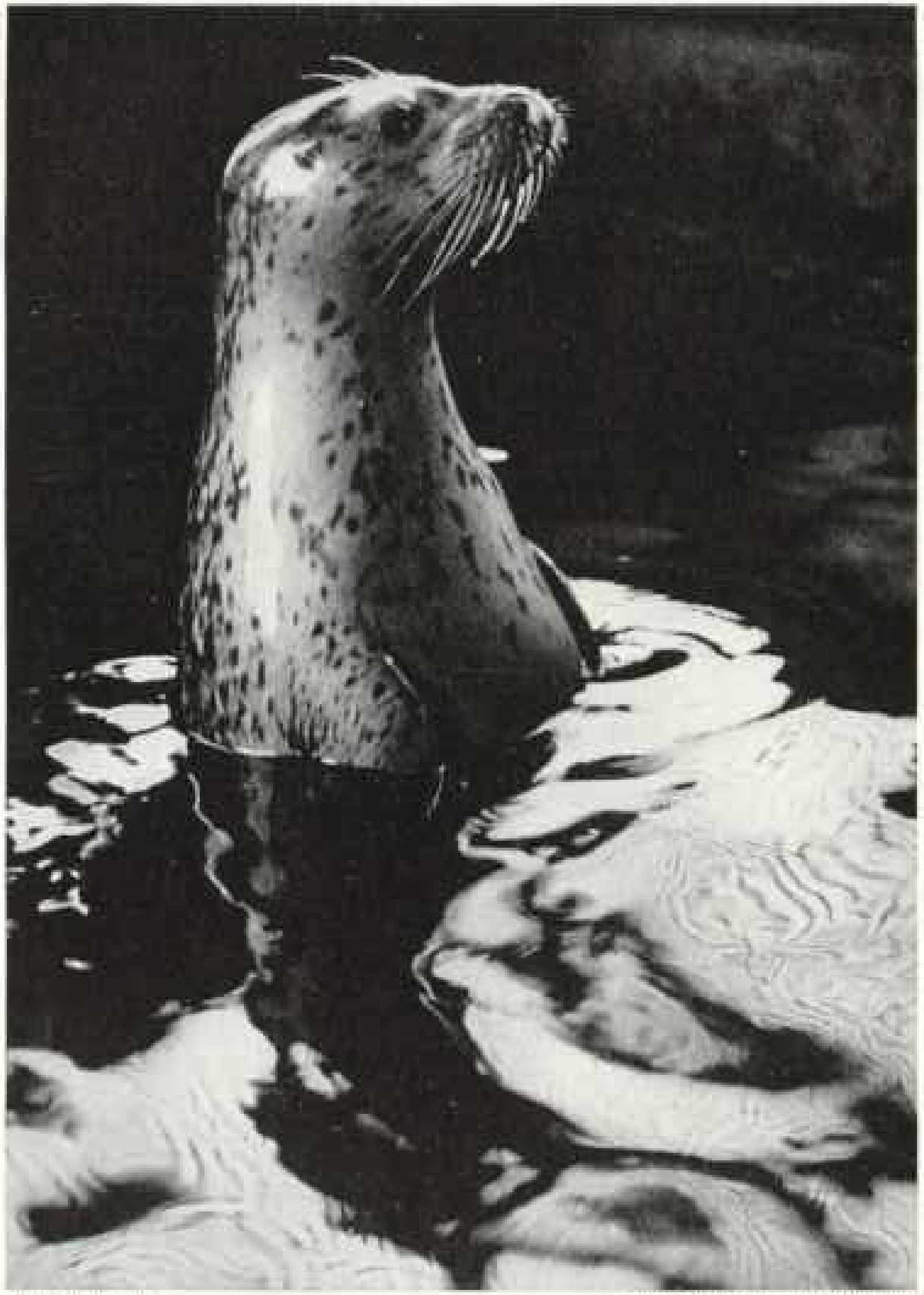
Tacoma News Tribune — Photograph by O. R. Johns

"Go Ahead—We're all Ears"—Whitetail Fawns

Baltimore Sunday Sun

Photograph by Dr. T. E. Russell

Clinging to Her Rubber Mattress, Mrs. Russell Rides Ashore on a Breaker at Ocean City, Maryland



Boris Stalkenian — Photograph by Kenneth M. Lamm

"Any Fish Today?" Asks Baby Seal

Omaha World-Herald — Photograph by G. D. Keller

"Do You Want to Come, Tinker?"

Indianapolis Times — Photograph by John G. Bills

A Big Hug for "Lucky"—Four-year-old Nancy Armstrong, of Indianapolis, with Her St. Bernard

Minneapolis Tribune — Photograph by R. E. Michaelson

"Tell Me Not in Mournful Numbers. . . ."

San Francisco Chronicle — Photograph by Lloyd Van Dover

"Bottoms Up"—A Thirsty Sparrow Takes a Drink

Omaha World-Herald

Photograph by Kenneth E. Aikins

Steady! Mrs. Aikins Keeps Her Line Taut as a Game Bass Fights for its Life at Bellwood Lakes, Nebraska

Albany Knickerbocker News — Photograph by Nathaniel Field

"Happy Birthday to You. . . ." Climax of a Surprise Party in Brooklyn

Wilkes-Barre Times Leader

Photograph by Basil Hewlett

"Gee! When I Grow up I'm Goin' to Be a Marine!"

Baltimore Sunday Sun — Photograph by Robert Holland

"Some folks dey would 'a' beat him: Now, dat would only heat him;
"I know jes' how to treat him; you mus' *reason* wid a mule."—Irwin Russell, *Nebuchadnezzar*

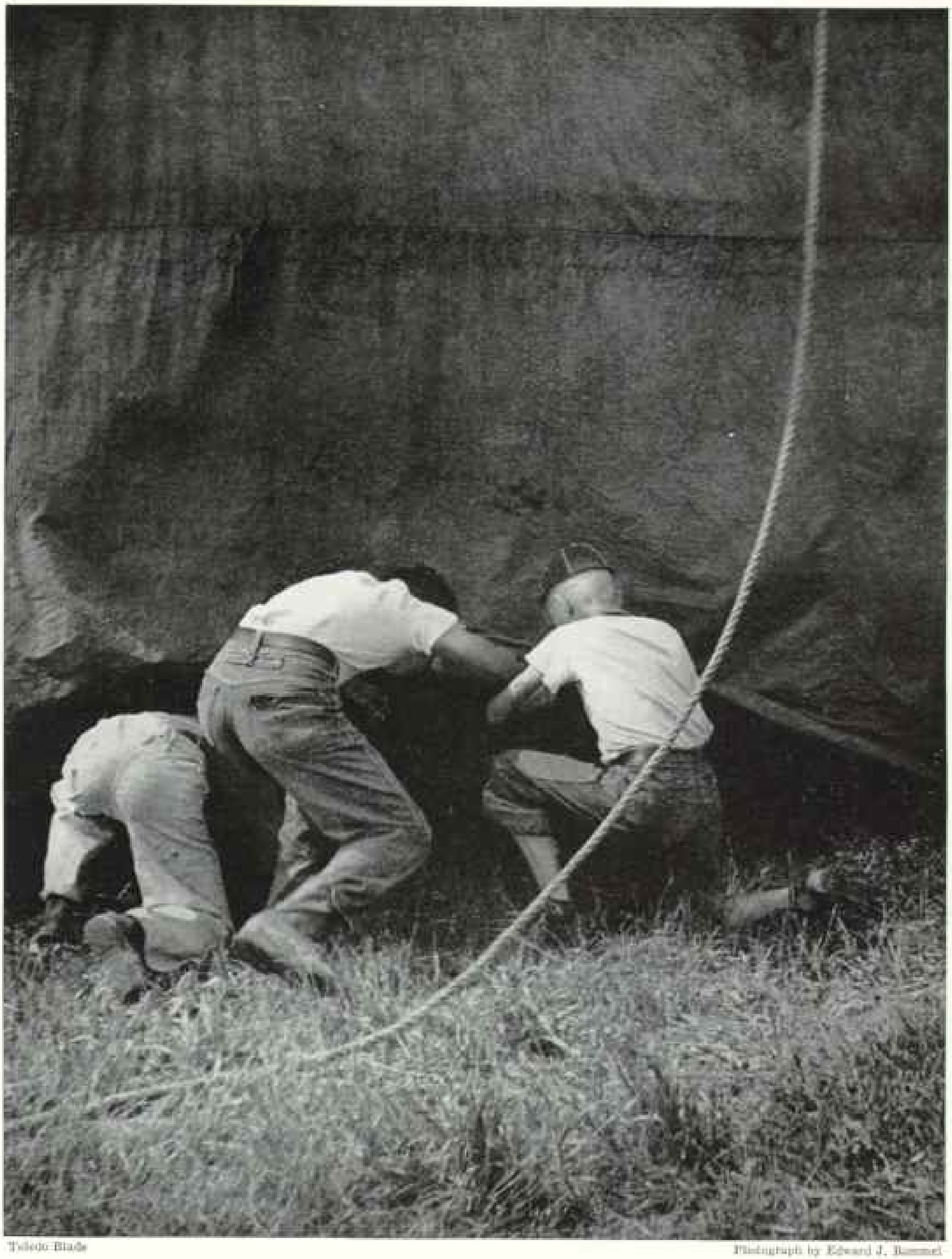
Portland Journal

Photograph by Ben A. Eddy

Into His Steaming Pot on the Oregon Coast Goes a Tasty Dungeness Crab

Fort Wayne News-Sentinel Photograph by N. G. Hann

Fort Wayne Airport's Emergency Crew Lends a Hand to Save a Near-by Home



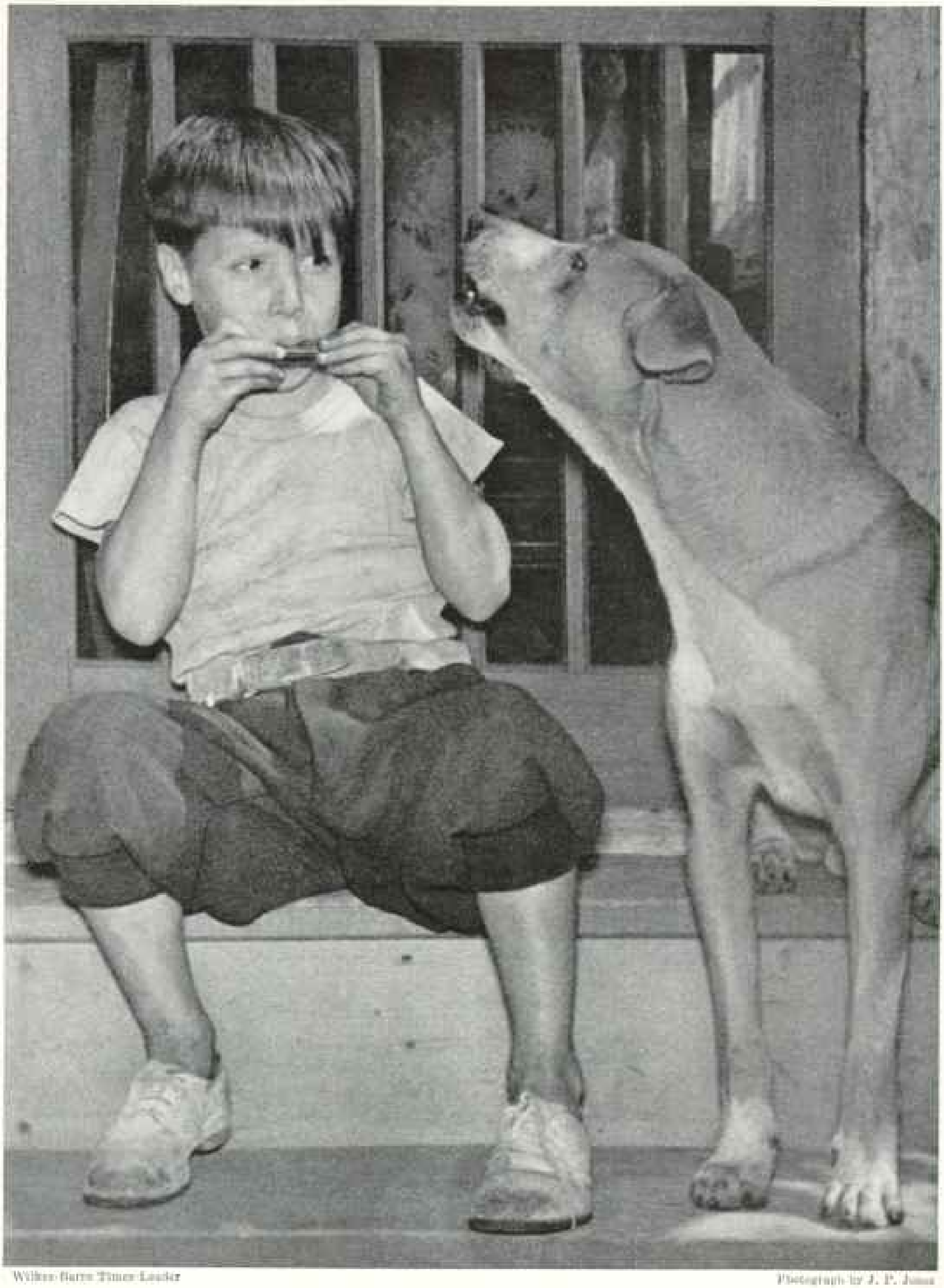
Toledo Blade

Photograph by Edward J. Rummel

Box-office Dodgers—A Toledo Trio Succumbs to the Lure of the "Big Top"

Duluth Herald and News Tribune Photograph by J. C. Bradway

High Jinks! Fun on a Giant Ferris Wheel at Duluth, Minnesota



Wilbur Barry Time Leader

Photograph by J. P. Jones

"Sweet Ad-e-line"—Solo by Rover, Accompaniment by Louis Kratz

Salt Lake City Tribune-Telegram Photograph by R. J. Glade

"Little Tommy Tucker Sings for His Supper"

Detroit Free Press

Photograph by Leo Gardner

"Rhythm on the Line"—An Intimate Detroit Study in Curves and Contours

Ancestor of the British Navy

England's Oldest Known War Vessel Is Unearthed, Laden with Remarkable Treasures of an Anglo-Saxon Ruler

By C. W. Phillips

Selwyn College, Cambridge; Fellow of the Society of Antiquaries

TALES of buried treasure have a powerful fascination but are seldom true. Rarely is the world granted the thrill that comes from the finding of the riches of the past in great profusion, untouched by the hand of the spoiler, and still more uncommon is it when such a find can be related to known facts or used to throw light on one of history's dark places.

Gold has a fearful power and finders of treasure in the past have often kept their secret, so that the archeologist is left sadly to imagine the many marvelous objects which must, by devious ways, have reached the base level of the melting pot.

New Light on England's History

The two months which preceded the outbreak of the present war saw a find unparalleled in the British Isles and not easy to surpass in the whole of Europe. This was the Sutton Hoo ship burial, the almost certain monument of one of the earliest English overlords of southern Britain. Its discovery will compel a reconsideration of the whole background against which the founders of the English people lived and died.

The scene of the find was the pleasant heathland of East Suffolk, where miles of sandy, bracken-covered wastes run down to the sea, and small rivers merge gently into quiet tidal estuaries past sleepy country towns and villages.

This land, little touched by modern change, is a favorite haunt of yachtsmen and artists. Near by are landscapes immortalized by John Constable, and in Woodbridge, just across the water from the site of the find, Edward Fitzgerald ended his days.

It was here that East Anglia, one of the earliest of the Anglo-Saxon kingdoms, had its center, and it is with the greatest early king of this land that we have to do.

Woodbridge stands at the head of the estuary of the little River Deben, which flows into the sea nine miles away at Bawdsey. The river fills and empties with the tides, and the harbor, always full of small boats, was a most convenient place for the shipping of ancient folk (page 250).

East of the town, on the opposite side of the river, the ground rises steeply to an escarpment one hundred feet above the water, a marked feature in this land of gentle contours and moderate heights.

On the edge of this ridge, which bounds the wide heath stretching eastward to the sea, stand a number of mounds called "Sutton Mounts," and the place has the general name of Sutton Hoo, meaning the "high place of Sutton Parish." The property is owned by Mrs. E. M. Pretty, whose interest had long been aroused by the mounds.

It is normal in England for round mounds of this type, standing on hilltops and in desolate places, to be the burial places of folk of the Bronze Age, who lived between 1800 and 800 B.C., and there was no obvious reason why Sutton Mounts should be an exception to this steady rule except that one of the mounds was of unusual size and form.

One end had been dug into by farmers, but it was clear that this had been an oval mound of lofty profile, not less than 100 feet long, 70 feet wide, and 12 feet high. This type is abnormal and might by itself have suggested that the group did not belong to the Bronze Age.

Learning the Secrets of the Mounds

No tradition seems to have attached to the place, and until 1881 plowing was carried on so close to its western side on the edge of the escarpment that several more mounds, none of them very high, may have been removed. A fine gold disk brooch, identical in style with the Sutton Hoo treasure, was found by a plowman hereabouts in 1810.

Mrs. Pretty decided to probe the secrets of the mounds in 1938 and, in consultation with the neighboring Ipswich Museum, placed the work in the charge of Mr. Basil Brown. In that year three mounds were opened. Two proved to be graves of early Anglo-Saxon date. The third was empty. The largest of the three covered the burial of a small clinker-built boat, 18 feet long, which had contained a cremated burial disturbed by tomb robbers.

It became apparent that the group of mounds must be attributed to the pagan Anglo-

Saxons, and that, in accordance with the custom known elsewhere, the group was probably the burying place of a noble family.

Encouraged by the success of her enterprise, Mrs. Pretty decided to open the large mound in 1939, and it was there that the ship burial was found.

Boat Bore the Dead to Eternity

Before describing the actual events, it may be useful to give a short account of this mode of burial.

Among peoples in many lands it has been a firm belief that after death the soul makes a journey to another world and so must be provided with the means to travel there. In ancient Egypt a symbolic boat was placed in the tomb, but in the northern lands of Europe an actual boat was buried. In it the dead person was placed with all the equipment for maintaining full dignity and well-being in the other world, beyond the western ocean.

Such a burial is described in the Anglo-Saxon epic poem, *Beowulf:*

> There stood at the haven with rings on its prow
> All sheeny and eager the Atheling's bark.
> Then laid they adown the ruler belov'd,
> The giver of rings, in the lap of the ship,
> The chief by the mast. They brought there, moreabove,
> Great store of things costly, of treasures from far.
> I never heard tell of a keel fitted out
> More fairly with weapons and trappings of war,
> With bills and with byrnies. There lay on his breast
> Of treasures a many, and these were to go
> Far way, as a prize for the ocean, with him.
> They furnished him forth with less gifts not a whit,
> With less tribal treasures, than those who did once
> Send him out on his way, at the spring-tide of life,
> Alone o'er the waves, being yet but a child.

In varying forms the custom lasted from the late Bronze Age, about 800 B.C., till the conversion of the North to Christianity by A.D. 1000. In prehistoric times the existence of a boat was sometimes symbolized by placing a boat-shaped arrangement of stones around the grave. But with the opening of the Christian Era real boats were used, and sometimes, for great men and their wives, vessels of the finest type the times could afford were sacrificed in this way.

Our principal knowledge of ship and boat burials comes from Norway, but they also have been found in Sweden, Denmark, and northern Germany. More than a thousand examples are known.

Ship burials suffer more or less from having been plundered, and although common robbers may be responsible for most of these outrages, it is known that after conversion to Christianity the descendants of the mighty dead often concluded that it was pointless to leave treasures in the ground for those who would no longer need them. They therefore opened the burials and removed the imperishable objects, which would certainly include all gold and silver.

The most famous ship burials are those found at Gokstad and Oseberg on the shores of Oslo Fiord. The ships from both of these are housed in a special museum near Oslo, and the wonderful series of finds taken from them may also be seen there. In each case these two ships owed their fine state of preservation to the fact that they were sealed in clay and peat, which did much to stop the decay of the wood.

At Gokstad the burial was that of a great warrior and the ship was a war vessel. At Oseberg, on the other hand, the body of a queen was found, and the vessel was an ornate barge unsuitable for rough voyaging; the grave contained an amazing collection of woman's gear and wooden objects of many kinds in almost perfect preservation. Both burials had been robbed of all precious metals.

Of more recent discovery are the Vendel and Valsgärde boat burials from the Uppsala district of Sweden. These also are famous for a wonderful series of objects, including magnificent helmets and weapons.

The idea of a mysterious voyage to another land, where a full life was to be resumed, is powerfully shown in all these burials. They belong to aristocrats, but it is worth recalling that there were many humbler forms in which the vessels used were only small rowing boats and the modest craft of fishermen.

Invaders from Jutland and Germany

At the close of the 4th century A.D., the Roman province of Britain was collapsing before the assaults of barbarian enemies. The most dangerous were the Anglo-Saxon sea rovers coming from south Jutland and the North Sea coasts of Germany.

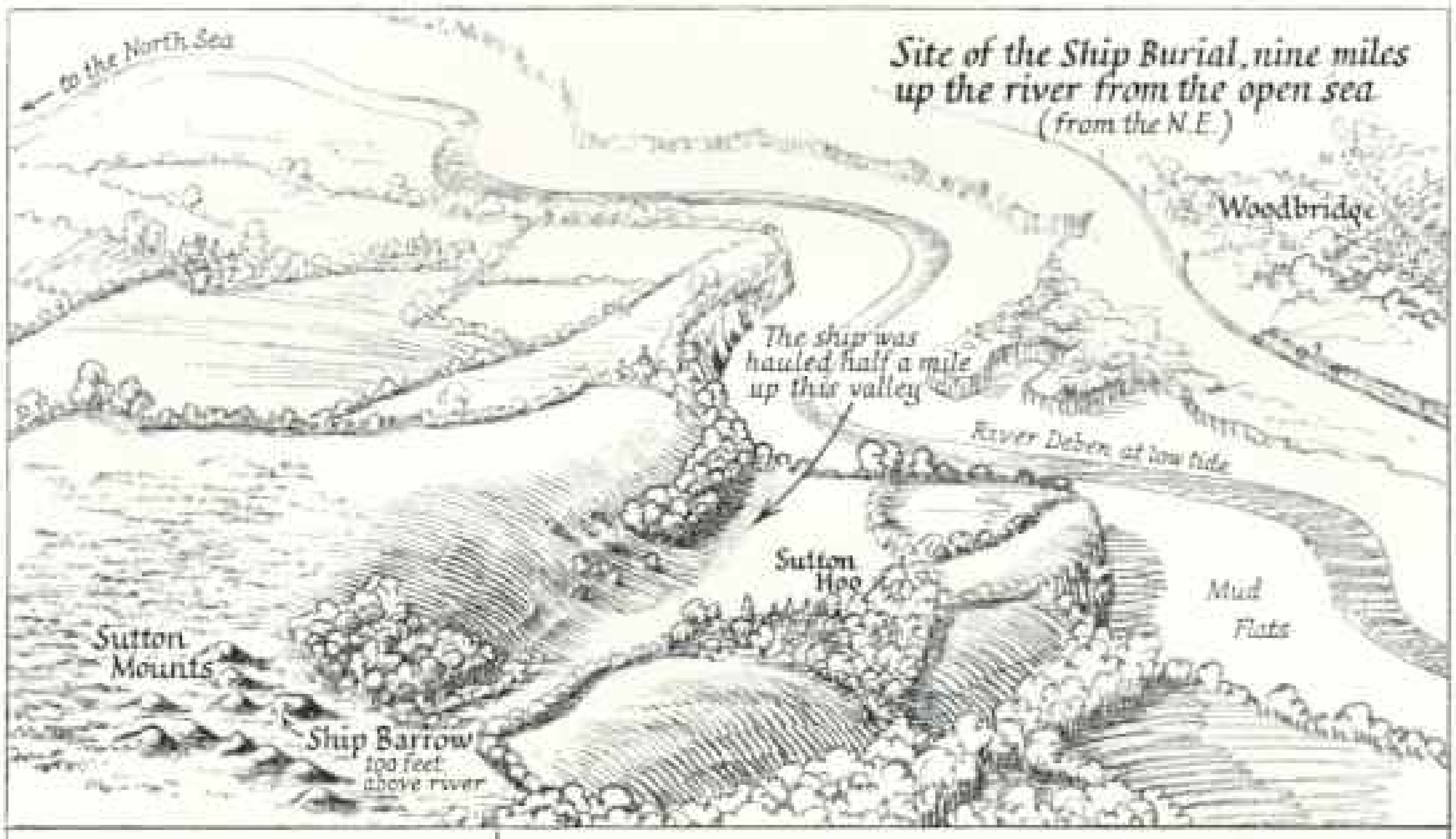
No certain Anglo-Saxon ship burial has been found there, but the *Beowulf* poem, which tells of one, is a contemporary description of life in those times, and it would be surprising if these folk, with their seafaring prowess, differed in this respect from their neighbors at home. When the Anglo-Saxons settled in England, it might be expected that they would bring this custom with them.

Before 1938 the only hint of this was a discovery made in the 1860's at Snape, a place nine miles northeast of Sutton Hoo and close to

© Dr. C. W. Phillips

Under the Great Dish Excavators Unearthed Bits of the Anglo-Saxon Past

British archeology offers few parallels of this scene, which greeted the searchers when they had removed the large silver dish (pages 257, 258-9, and 261). Its foot was imbedded deep in a mass of rotted cloth and probably pillow stuffing. Beside and beneath this were many rich objects—silver dishes, sandal-like shoes, combs, bronze bowls, a leather bag with silver handles, a throwing ax, a shirt of mail. The most fragile relics were immediately packed in wet moss, so that they reached the British Museum without further deterioration.



Drawn by Charles R. Riddiford

An Artist Reconstructs the Sutton Hoo Ship as Revealed by the Excavations

Capping a high ridge near the sea in East Suffolk is Sutton Hoo, burial place of an early Anglo-Saxon warship. It is within the sound of guns by which the Royal Navy is now keeping the Strait of Dover open for shipping. Over it roar the planes of the R. A. F. in the defense of London, only 70 miles inland.

the estuary of the Alde. Here the remains of a clinker-built boat some 45 feet long were found buried in sand. The wood had rotted, but the iron clinch nails remained to show the form of the vessel. It had contained a burial, but had long been robbed of its contents. The only thing of value found was a Roman gold ring which had been overlooked.

Ship burials of the Viking type are also rare, but two have been found in the Isle of Man, and there is an obscure story of another near the mouth of the River Lea in Essex.

Thus, the record of the British Isles before 1938-9 was poorer than might have been expected, in view of the frequent arrival and settlement of folk using this form of burial for their leaders.

Remains of an Ancient Ship Appear

At Sutton Hoo in 1939 Mrs. Pretty recommenced the work, this time on the large oval mound, which was opened lengthwise.

The soil at Sutton Hoo consists of sand with a slight admixture of gravel down to a depth far below the range of excavation. There is a thin surface growth of grass, lichens, and other small heath plants, but directly underneath is sand.

Since the whole of the mound was of this material, all work had to be terraced back and timbered to prevent collapse, and several times the success of the excavation was threatened when rain weakened the sides of the trench. Fortunately, through the skill of Mr. Brown and the workmen, disaster was avoided.

The opening of the mound had gone only a short way when Mr. Brown saw iron clinch nails of a clinker-built vessel in orderly arrangement in the side of his trench. These proved later to belong to the starboard side of the bow of the ship where it protruded from its grave under the mound, and it was fortunate that the true nature of the find was suspected early.

Work was continued with extreme care and a trench was opened down to the old ground surface along the middle of the mound. This was widened sufficiently to clear the gunwales of the ship on each side and provide a wide walk along which the excavators could move.

After much of the bow end of the ship had

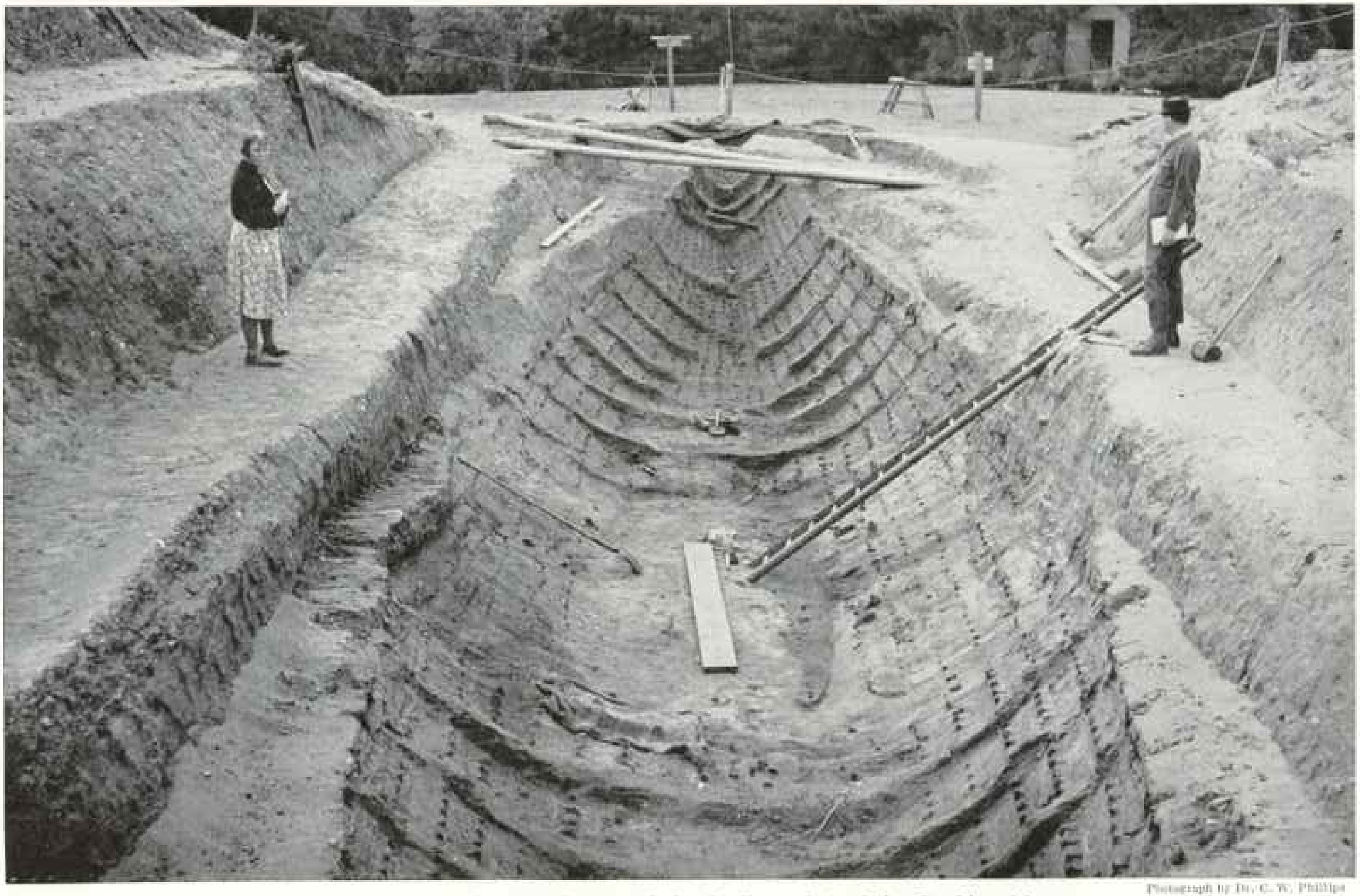
© British Museum

Burdened by the Great Buckle, a Modern Wearer Would Groan

This massive gold ornament, five and a half inches in length, has a broken interlaced decoration picked out in niello, a metallic alloy of sulphur with silver, deep black in color. It is the most ostentatious piece in the collection of jewelry found with the purse (pages 255 and 256).

The Oldest and the Youngest British Navies Confront Each Other—View Forward

Some thirteen centuries have elapsed since Anglo-Saxons placed at Sutton Hoo the ship burial which preserves a record of the earliest days of English supremacy on the seas. The sailors who visited the excavation in 1939, just before the present war began, are now proving that Britannia still rules the waves.



Photograph by Dr. C. W. Phillips

Careful Excavation Has Preserved the Outlines of the Ship—Looking Aft

Amidships, distorted lines of nails show where the hull rotted and was pressed out of shape by the weight of the burial chamber roof resting on the gunwales (page 250). The vessel was clinker-built; that is, formed of planks put together overlapping like the clapboards of a house.

been cleared of sand and it had been seen that there was some sort of deposit amidships on the bottom, the great importance of the find was realized and consultation took place with the British Museum and the Office of Works. As a result, the excavation was placed in charge of the present writer, who carried it on from this point to the end. Lieutenant Commander J. K. D. Hutchison supervised the investigation of the boat at a later stage.

When the writer took charge, it was at once plain to him that there had been a large hollow space amidships which had collapsed and filled with the sand piled over it in making the mound. This argued the former presence of a wooden burial chamber of the kind familiar in the Viking ship burials.

Vessel 84 Feet Long

At this stage it was supposed that the find was another Viking ship burial, but it was not long before the absence of any arrangements for setting up a mast, the type of the internal framework, and the small number of strakes making up the hull of the boat from keel to gunwales disposed of this idea. Its construction, though extremely competent, was too primitive in form, and the excavators realized with growing excitement that they had to deal with an Anglo-Saxon ship burial as much as 300 years older than most of the Viking ones.

Slowly and with infinite patience the form of a vessel 84 feet long, 14 feet wide amidships, and some 5 feet deep was revealed in a big trench dug in the sand underlying the mound (pages 252 and 253).

How did the ship reach this position? The site of the burial is just 100 feet above the water level, and there is no reason to suppose that this has changed since Saxon times. The boat was brought up from the River Deben, and the route must have been a little valley close by with a gradient of about 1 in 25. The effort was great, but with the aid of rollers, teams of horses, and gangs of men working in skilled collaboration the work was not too difficult.

The site of the burial had been prepared by digging a trench some 90 feet long, 16 feet wide, and 10 feet deep. The problem was how to lower the ship neatly into this trench.

We do not know the exact method used, but it may be supposed that the feat was achieved by running the ship on to a number of cables, which were secured around bollards driven into the ground well away from the trench sides. By tightening the cables the ship could probably be raised and the rollers withdrawn; then by carefully paying off the cables from the bollards it could be lowered into the grave.

The ship had no cabin, but a burial chamber had been made of rough oak planks. Enough indications remained to show that the chamber had been 18 feet long and the rooftree probably had been pitched about 12 feet above the keel line.

The whole structure had collapsed, and its place was occupied by sand which pressed down on the objects placed on its floor. This sand was removed with great care, and gradually vague shapes began to appear, covered by the last traces of the wood of the fallen roof.

16th-century Treasure Seekers Baffled

We were now at a most exciting stage of the work. It was almost beyond doubt that the burial had never been robbed, and the thought that here were probably treasures of a kind never before seen raised expectation to highest pitch. Through all these thrills, however, the strictest regard had to be paid to the careful recording of every stage of the work by survey and photography, and it was possible to approach the main finds only with utmost deliberation.

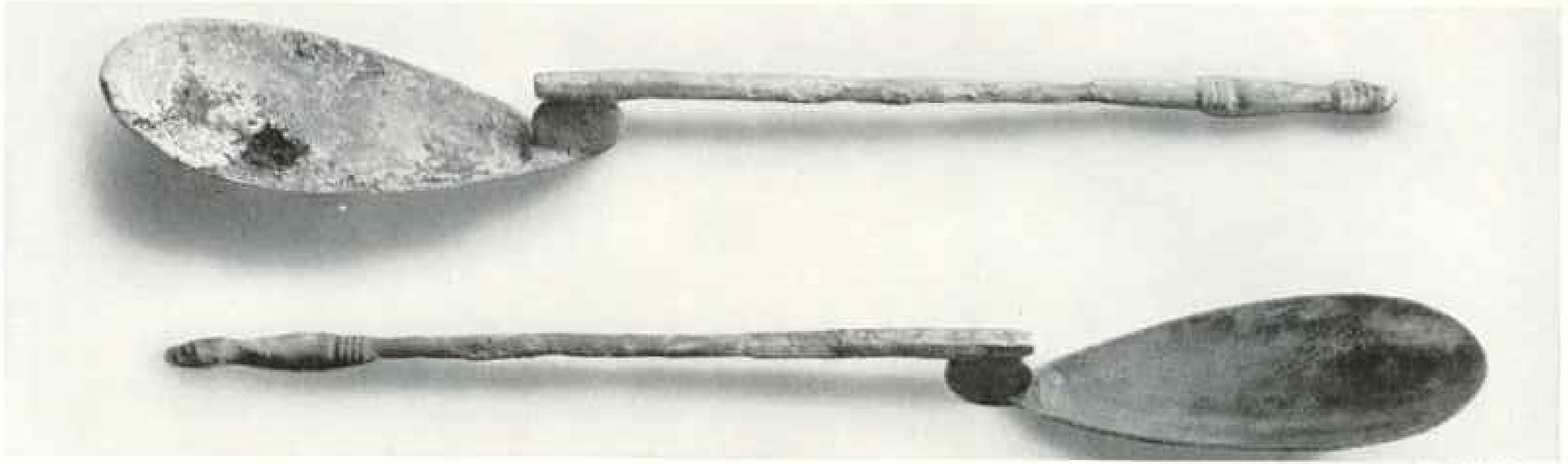
There were clear signs that an attempt had been made to sink a shaft from the top of the mound in the later 16th century, but it had been given up on reaching the old ground surface some ten feet above the burial deposit. A broken jug of distinctive type, along with beef bones and the ashes of a fire, showed where these baffled treasure seekers had lunched.

At last the vaguely seen mass of objects was cleared to the stage at which it could be understood. It proved to be full equipment for a warrior of high rank, probably a king, along with many rich things to enable him to maintain his state in another world. The objects were ranged on the floor in the form of a letter H, the two uprights running across the boat and the crosspiece along the keel line.

The richer end of the grave was aft where the weapons, jewelry, and objects of display were concentrated. The chief sensation was the discovery of a large number of solid gold objects enriched with beautiful cloisonné work in garnet and millefiori glass, which appear to have belonged to two belts. One of these had a massive gold buckle of the richest kind and a sumptuous purse (pages 255 and 256).

Coins and Gold Ingots in Purse

The buckle is richly decorated with niello work and is one of the most impressively rich objects in English archeology (page 251). The back opens on a hinge to reveal a hollow for inserting the end of the belt.



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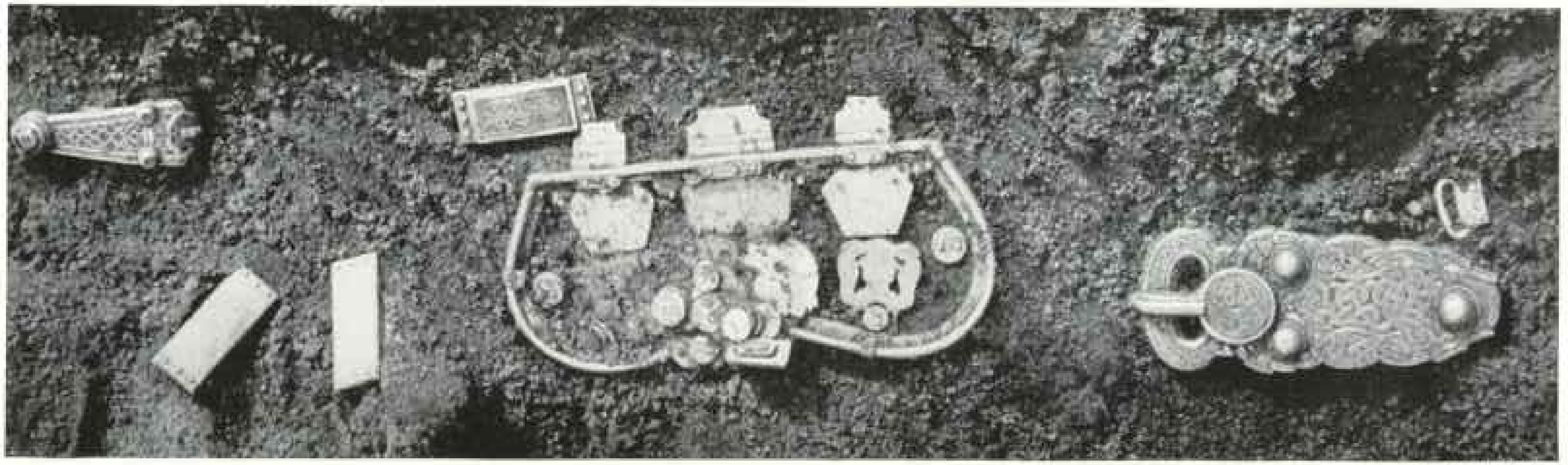
Two Inscribed Byzantine Silver Spoons Were Found with a Nest of Nine Silver Bowls (Page 256)



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The Hero Could Pay His Way Among the Shades with Cash or Collateral

Besides the purse, here uncovered face down, containing 40 gold Merovingian coins and two small ingots of pure gold, he would have the great buckle (right and page 251), a lesser one decorated with cloisonné work, and three belt mounts. The purse was richly ornamented (page 256).

© British Museum

Formerly Sewn to the Outer Face of the Purse Were Seven Gold Cloisonné Plaques
The delicacy of the craftsmanship is everywhere notable. For attaching to a belt or baldric, the wallet has three hinged gold tabs (page 255).

In the purse were forty gold Merovingian coins and two ingots of gold. The purse itself is a gold frame with a sliding clasp of modern type enriched with filigree work and carrying a series of round inlaid gold studs.

The bag of the purse was made of some rich material, but it has entirely decayed, leaving free seven remarkable gold plaques which were formerly sewn to it. These are also of high interest and value, and are done in the same rich style of cloisonné work.

Two matched pairs of plaques show a man struggling with two animals, and a bird of prey carrying off a duck. Two more have a most intricate geometrical pattern, and the seventh is a masterpiece of champlevé work showing two intertwined animals.

A pair of great gold clasps of uncertain purpose were also in the same astonishingly rich style (page 263). Elaborate, too, were the fittings of a large sword (page 264), the most striking features here being two hemispherical bosses on the scabbard and two exquisitely fashioned gold pyramids which had formed the ends of the sword knot.

This jewelry has caused a sensation among those devoted to Anglo-Saxon studies, for not only is it of almost unparalleled richness, but it is in an entirely new style.

Other objects found at the head of the grave were a great iron cresset decorated with bulls' heads of iron, presumably for lighting the owner's home; four spears and three barbed throwing spears; the richly decorated bronze mounts and boss from a big wooden shield; and a large ceremonial whetstone, beautifully carved, with four human heads full-face in low relief at each end (pages 264 and 265).

A wonderful helmet had a crest in the form of a bronze stag, and a face piece with bronze nose, mouth, and mustache cast in one piece.

A large footed bronze bowl with drop handles had been copied from a type imported from Coptic Egypt (page 262); a fine bronze hanging bowl, with beautifully enameled escutcheons around the sides, had a unique feature in the form of a bronze fish so placed on the end of a stem springing from the inside of the bottom as to seem to be swimming in the bowl's contents (page 257). In this last were also the remains of what may have been a small five-stringed instrument of the lute kind.

By the sword was a nest of nine silver bowls imported from southeastern Europe, and under these were two large silver spoons with the names of Saul and Paul on them in Greek

© British Museum

Novel Decoration of the "Coptic" Bowl Was a Bronze Fish

This was set inside on the bottom of a smaller bowl, so that it seemed to be swimming about (page 262). All the ornaments were rich with enamel, millefiori glasswork, and scroll patterns.

letters (page 255). The condition of these bowls was excellent in all but two cases, for they had been nested, turned upside down; thus the inner ones had been protected from corroding influences (page 262).

Horns for Quaffing Ale or Mead

Among the numerous objects were the collapsed remains of a wooden tub with iron hoops. Three of these were found in different parts of the grave, and no doubt they contained liquids, possibly ale or mead.

Passing forward along the boat, we next found a curious mass of what looked like purple starfishes splayed about on the remains of rotted cloth. This was a puzzle until the decayed relics of two horns were seen in relation to two of the "fish." Then it appeared that these were the corroded and spread silver mounts around the mouths of drinking horns, the perishable parts of which had decayed.

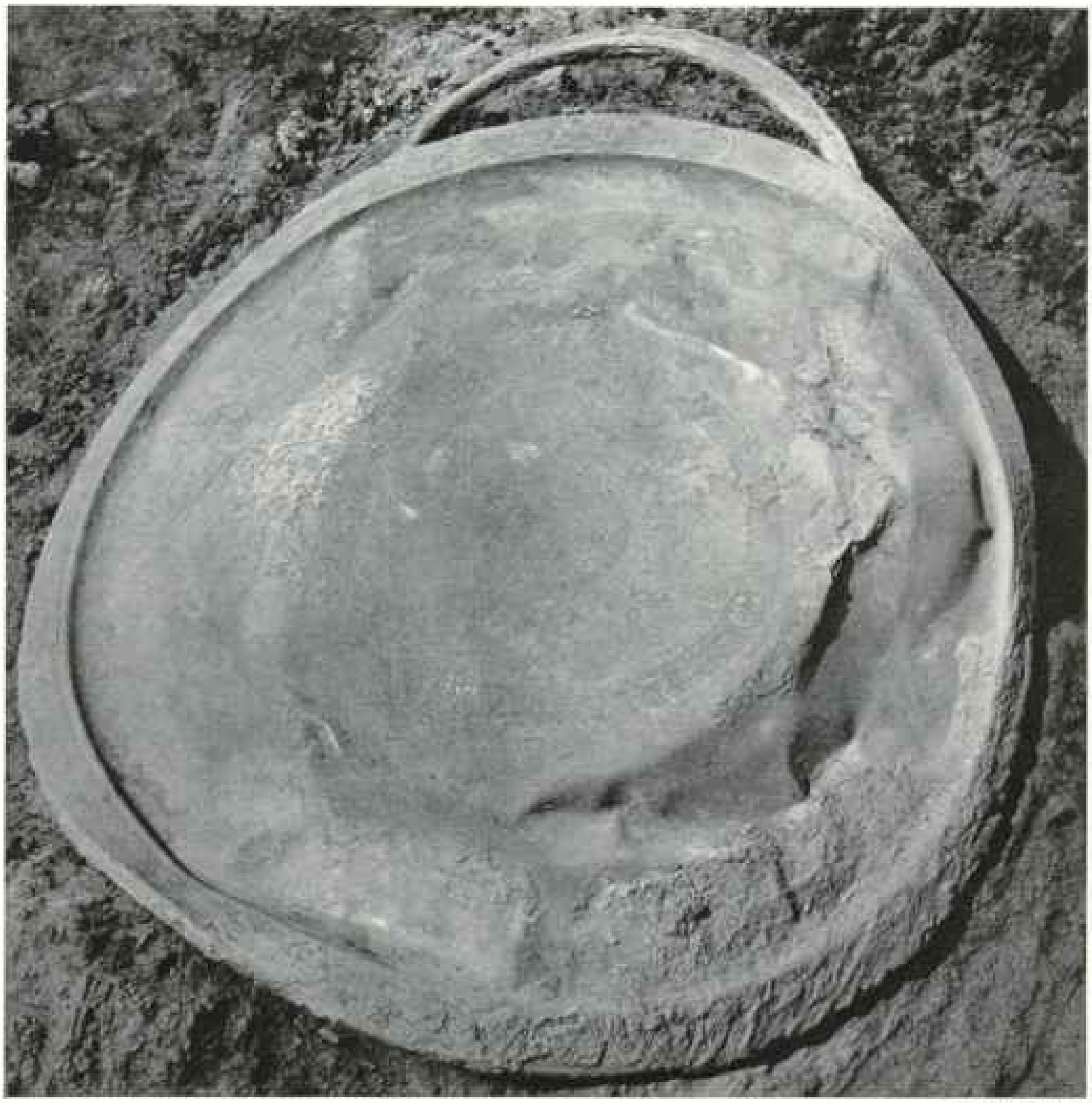
Nine horns could be identified, and they doubtless went with the bowls to form a sort of dinner service. In spite of decay, it was possible to study the designs on the silver, and it was found that the horns were Anglo-Saxon work, not imported.

Next in line forward was a big circular object which was at first thought to be a shield, but which proved later to be a large silver dish. The top was chased with debased classical designs, and on the underside were four impressed stamps which showed that it had passed through the treasury of the Byzantine Emperor Anastasius I, who reigned from A.D. 491 to 518.

The dish is 28 inches in diameter and in good condition; although not remarkable as a work of art, it is the most considerable piece of Byzantine silver yet found in Britain (pages 258-261).

When lifted, the dish was found to be resting on a pile of miscellaneous material. First came a smaller silver dish with a fluted body and a woman's head in profile in the center (page 266). In this were the remains of six small gourd bottles with gilt bronze rims, and a small plain silver bowl containing a pad of cloth. Various other objects were found, including a silver ladle and two combs.

Under the main part of the dish was a large mass of decayed cloth mixed with much flock-like material, which was plainly the stuffing of a pillow. This was taken up with great care for future study, since it is a rare event to find any quantity of textile, and it was evident that here there were several kinds of weave.



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A Smaller Silver Vessel Protruded from Under the Great Dish

Purple stains around the edge of a nearly circular shape covered with rotten roof wood led the excavators to expect a shield with silver binding, but when the débris was removed this sheet of silver 28 inches in diameter was revealed (page 257). It had incised decoration of a rather small and fussy type. The faint outline of the foot-ring shows clearly (page 260).

Under the cloth were the remains of one, if not two, pairs of sandal-like shoes, a wooden scoop, two small bronze hanging bowls, and a horn cup. Under the smaller silver dish were the remains of a leather bag with silver drop handles which appear to have been adapted from a piece of furniture.

Beneath all were found an iron throwing ax and a shirt of mail, while as a final layer there was a large wooden platter.

The rest of the deposit needs little description. There was a pottery bottle looking humble beside so many rich objects, and across the forward end of the chamber stretched a line of large vessels, all collapsed. They were one large wooden tub reinforced with ornate strips of iron, three bronze caldrons, and an elaborate arrangement of decorative iron chain-work which was almost certainly a device for hanging them over a fire.

Relics Now in Bombproof Cellars

The excavation was completed within a week of the outbreak of the war, and before any finds could receive more than preliminary examination and treatment they had to be carefully packed and put in bombproof cellars, where they must remain till better times.

© British Museum

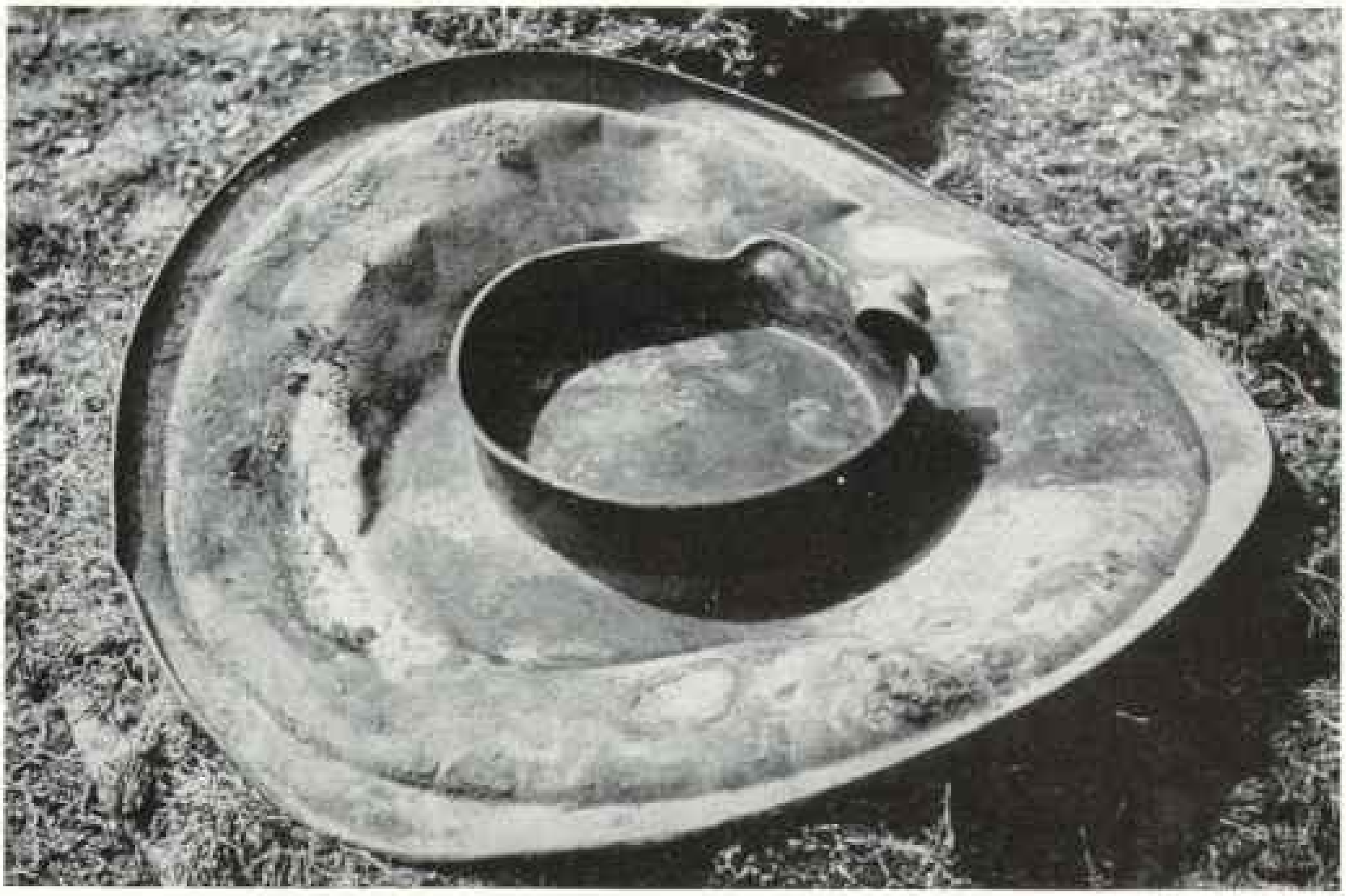
One Byzantine Control Stamp on the Silver Bears the Bust of an Emperor

Careful examination of the marks has proved beyond doubt that the treasure once belonged to Anastasius I, who ruled the Roman Empire from Byzantium (ancient Constantinople).

© Dr. C. W. Phillips

The Underside of the Great Silver Dish Shows Four Stamps of Anastasius I

The marks establish its date as in the reign of this Roman Emperor, A.D. 491-518. Two different dies have been used to make them. The design of one shows the bust of an emperor with a nimbus and inscription; that of the other, hexagonal in form, contains an inscription with a small cross and star.



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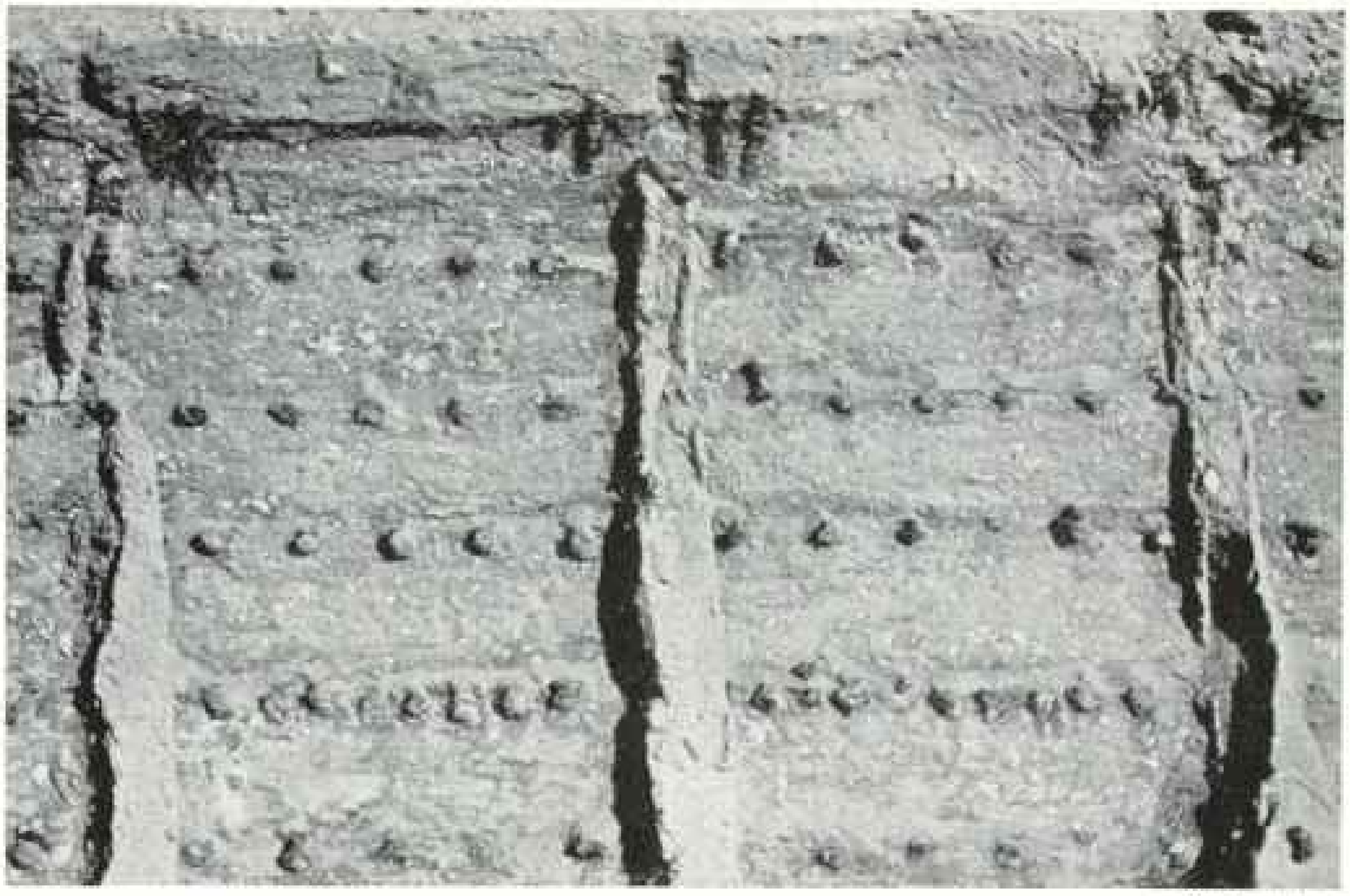
Turned Over, the Great Silver Dish Proved to be Footed

This foot-ring had caused the hump observed in the middle of the dish (page 258). The cup of a ladle two inches high (right center) has been pinched on to the base by soil pressure.



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Mighty Men Once Toiled at Oars Set in the Tholes on the Gunwale

Clearly seen are the vertical nails (upper center) which held the thole-pieces in place. Double nailing of the fourth strake, or plank, indicates a hull repair. The broken sand "rib" (right) reveals a rotted oaken rib.

Lifting of the Big Dish Was a Delicate Undertaking

Twenty-eight inches in diameter and pressed down around the edges, this large piece was handled with speed and care lest fragile relics under it be destroyed (pp. 240 and 258-260). The excavators were rewarded by finding textiles, leathers, and numerous small articles, including six globular bottles with gilt bronze rims. These last were at first supposed to have been turned from wood, but were later identified as gourds.

As yet, no one can say with certainty what is the true nature of all the finds. Many pleasant surprises await those who later clean and treat objects which the excavators saw only as soiled and corroded lumps. We may hope that some day the Sutton Hoo room, fully arranged and set out, will be one of the chief glories of the British Museum. Mrs. Pretty's generosity in presenting everything to the Nation has made this possible.

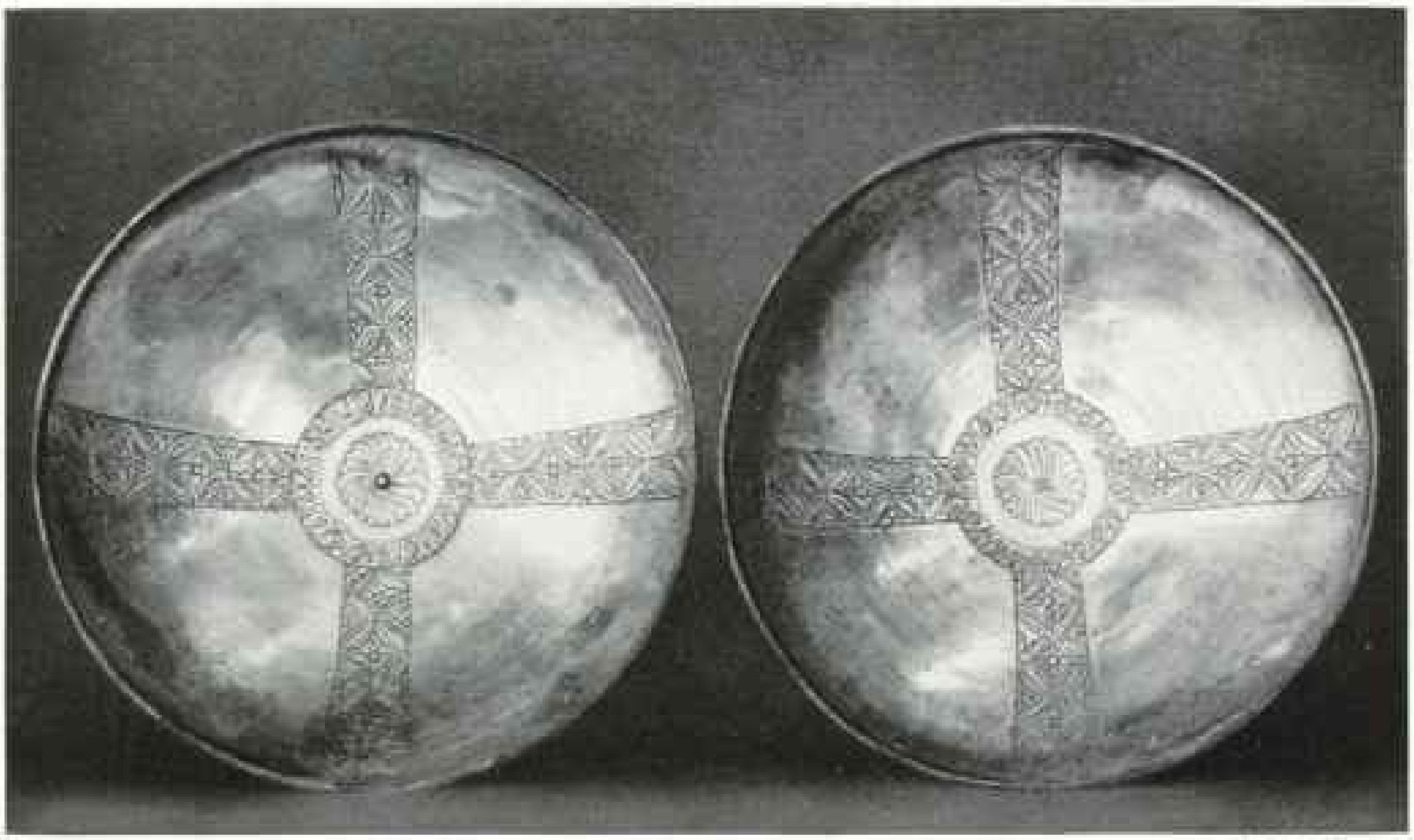
It is certain that so far many of the objects found are without parallel and that the war panoply is of the most distinguished kind, achieving in its weight and glory almost the status of a regalia. The jeweler who made the precious objects—and they were all plainly from one hand—was a master craftsman of the Dark Ages. The find reveals a school of goldsmith's work in Anglo-Saxon England which rivals and in many ways exceeds the achievement of the Jutish work in Kent.

At all points the contents of the grave show the connections of the early Anglo-Saxon princes with the world outside England.

No doubt the Byzantine objects reached England through the interchange of rich gifts between princes, and the coins of Merovingian Gaul found in the purse are further evidence of close contact with the country across the Channel. Such contact is shown not only in the indebtedness of much of the early Anglo-Saxon jewelry of southeast England to Frankish models, but also in the marriage between Ethelbert of Kent and the Frankish princess Bertha, which had such momentous consequences in bringing Latin Christianity to the Anglo-Saxons.

Mystery of the Missing Body

Before we consider the ship, there are several important points which rise out of the study of this grave. In the first place, the excavators were convinced from their observations that no body had been placed in it, either



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Under a Dome-shaped Mass Was a Nest of Inverted Silver Bowls

There had been nine, but one, evidently thrown off the pile by the fall of the roof, was beyond recognition. The topmost of the remaining eight was in bad condition, but the other seven were intact and as bright as on the day of their deposit, save for slight discoloration around the edges. They were found when puzzled excavators were attracted to what they described as "a tantalizing patch of purple dust."

© Dr. C. W. Phillips

A Copy of the "Coptic" Bowls of the Pagan Saxons Was a Rich Find

It held a bronze hanging bowl, slightly smaller, containing a curious fish mounted on a pedestal (page 257) and fragments of a five-stringed musical instrument. Through one of the handles of the outer vessel the shafts of three iron javelins had been thrust, and with them lay four iron-socketed spearheads,

cremated or unburned.

Space will not permit a rehearsal of all the reasons for this view, but it is clear that if the body had been cremated the burned bones would have been placed in one of the rich receptacles which were common in the grave. No trace of burned bones was found anywhere, nor any sign of uncharred bones or teeth.

It might be argued with truth that the sand everywhere present in the grave would easily account for the total disappearance of any remains, but the body would have been richly clothed and decked with many articles of personal jewelry such as rings and pendants, none of which was found.

Granted, then, that the grave is a cenotaph, it is necessary to consider under what conditions such a rich deposit would be made without a body.

It may be suggested that the body was lost at sea or in battle and could not be recovered for burial. There is another possibility, however, and this raises the question of the identity of the man in whose honor the burial was made.

There are many indications that the deposit belongs to the first half of the 7th century A.D. We have to consider what the scanty recorded history of that time tells us about the chief personalities of the East Anglian kingdom, and this brings us to King Redwald.

In the early history of the Anglo-Saxons, before a more or less permanent domination was established by kingdoms such as Mercia and Wessex, the overlordship which carried with it the title of "Bretwalda" passed quickly from kingdom to kingdom as dictated by the changing fortunes of intertribal wars.

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Jewels and Filigree Adorn the Large Clasps

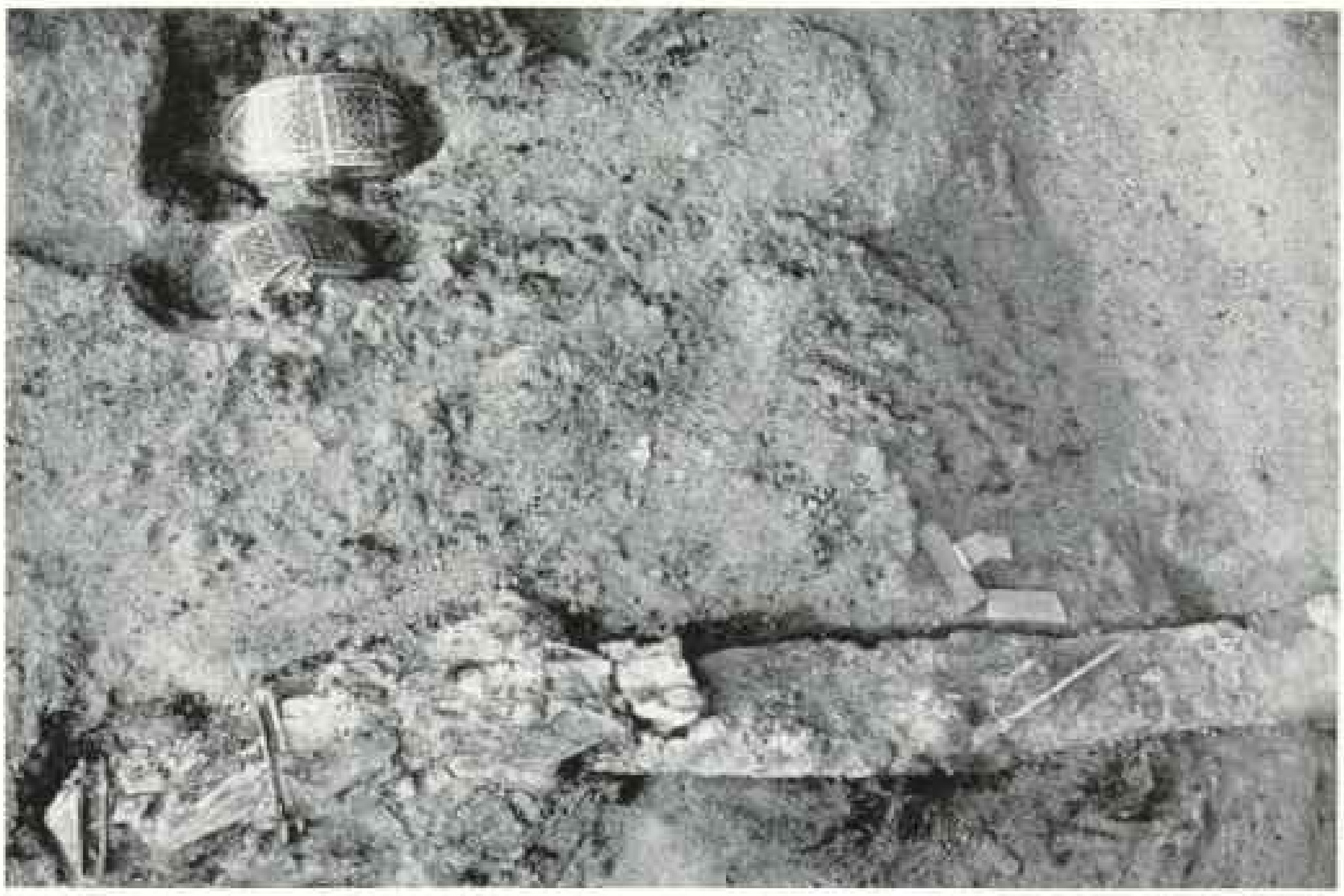
Possibly this ornament once graced the shoulder of a leather cuirass hung up in the burial chamber near the helmet and sword (page 264). The pieces of jewelry found with the purse (page 255) lay face downward, and their arrangement bore no recognizable relation to the positions they would have assumed on a body.

Redwald was the fourth king and the only ruler of the East Angles to hold this title. He secured it from Ethelbert, King of Kent and patron of St. Augustine, some time before Ethelbert's death, A.D. 617.

The Venerable Bede tells us several interesting facts about Redwald, which may throw some light on Sutton Hoo. The king was converted to Christianity during a visit to Ethelbert, who gave him many rich presents at his baptism. Returning to his own land, he found his queen and other leading members of his folk strongly hostile to his change of

With a Two-foot Whetstone the Dead Hero Was Expected to Sharpen His Sword

It was placed near a portable flambeau which would furnish light for the work. Next to the red-painted bosses at the ends, the square stone is decorated on each face with a bearded mask carved in high relief in a pear-shaped frame. Bronze terminals were once clasped around both knobs, but only one survives (opposite page).



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The Sword Has a Golden Pommel and Gold Fittings Lying Beside It

Originally three feet long, the iron blade was broken into four pieces when the roof fell. A crushed helmet lay near the sword and between them were most of the pieces of jewelry (page 256). Above are two gold clasps decorated with cloisonné (page 263).

religion. As a compromise, Redwald set up altars both to Christ and to the old gods in his temple, much to the disgust of Bede.

Redwald must clearly have been a successful warrior to have attained the Bretwalda title, but his only campaign of which we have definite knowledge occurred A.D. 616. Marching north in support of Edwin, an exiled prince from Yorkshire, he defeated and slew Ethelfrith of Bernicia on the River Idle, near Bawtry in Nottinghamshire, and placed Edwin on the throne of Northumbria. This cost Redwald his son Raegenhere, who was slain in the battle.

It is just possible that the burial was made for the fallen Raegenhere, whose body might not have been recovered, but since his father won the day this is improbable, and it is unlikely that the burial can in any case be as early as A.D. 616.

Redwald himself seems to have died about A.D. 624-5, and history tells us nothing of the circumstances of his death nor of the place of his burial. He was succeeded by his son Eorpwald, who also became a Christian, though after his early murder by a heathen called Ricberht there was a period of three years in which East Anglia reverted to paganism. From the accession of the next king, Sigeberht, Christianity took final root and was never again shaken.

Burial a Pagan Insurance Policy?

All this suggests that there was much internal tension about religion in East Anglia at the time of Redwald's death, and the cenotaph character of the Sutton Hoo burial has been explained ingeniously in the light of this fact.

It is thought that perhaps Christian influences were sufficiently strong at Redwald's death to secure him Christian burial, but that his wife and other reactionaries may have felt that, as an insurance, a noble pagan burial should be prepared in the traditional burying place of his family in case he should find that his conversion to Christianity had been a mistake.

Finally we come to the ship. Although overshadowed in popular estimation by the gold and silver, this is really as remarkable a discovery as any, for the building of a large and beautiful vessel of seaworthy type implies a tradition involving the garnered experience of many generations of sailors and craftsmen.

Before the Sutton Hoo discovery, our knowledge of Anglo-Saxon shipping on this side of the North Sea was almost nonexistent. We had some idea of the kind of ship used by the Saxon sea rovers in the last days of the

© British Museum

Stern Faces Decorate the Whetstone

Apparently functionless were the dishlike round bronze terminals clasped by claws around the lobed bosses at the ends. One of these ornaments had disintegrated, and the one remaining is in bad condition. The carvings on the stone are remarkably well-preserved (opposite page).

Remains of Two Combs Were Found in the Smaller Silver Dish

Possibly a wash basin was this 15-inch bowl with a plain, horizontal rim and fluted sides. The bottom is decorated with a woman's profile in low relief surrounded by a stylized leaf pattern.

Roman Empire and so for the invasion of Roman Britain, but we did not know what developments took place after the Anglo-Saxon conquest was complete.

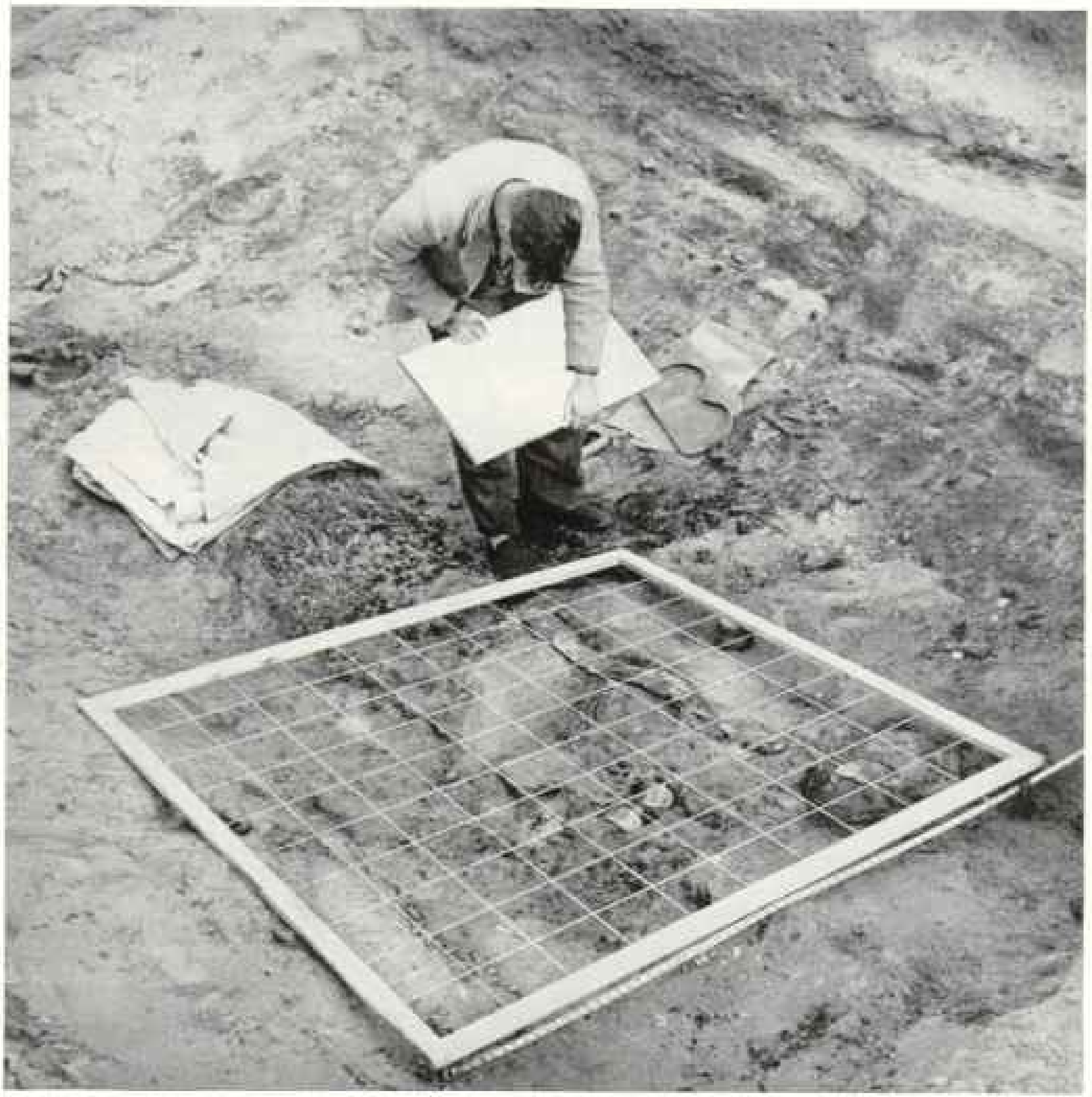
The ship which covers the invasion period is that found with two others in a bog at Nydam in Schleswig in 1863. This vessel, securely dated to the 4th century A.D., had been buried as a votive offering to the God of War along with large quantities of weapons, and had been well preserved by the action of the peat in which it lay. It was successfully got out and is now magnificently restored and displayed in the Kiel Museum.

The Nydam craft is a large keelless rowing boat 74 feet long with a narrow beam of 10 feet, and was driven by 30 oars. Instead of a true keel it had a large plank set flatwise, to which the stem and sternposts and the side strakes were attached, the former by scarves secured with wooden nails and the latter by iron clinch nails, clinkerwise.

Long, Narrow, Wave-tossed Warship

A remarkable feature of the boat was the small number of pieces of wood used in building the hull, for each strake, of which there are six on a side, is a single oak plank. When the length of the boat is recalled, the skill required to adze out these huge planks from hard oak will be realized.

The internal framework of the boat was



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Careful Methods Were Used in Surveying the Finds

Before any objects were removed from the earth, their positions relative to one another and to the ship as a whole were charted with mathematical precision by means of this grid. Data thus gathered will enable scientists to make an accurate reconstruction of this ancient craft.

simple, consisting of ribs bent to the inside of the hull, lashed to each of the strakes in turn through cleats, and resting on each gunwale. The rowers' seats were placed on thwarts across these and were supported by vertical stanchions.

There was no cabin of any kind, and the boat was steered by a large oar over the starboard side at the stern.

Although in many ways a triumph of technical skill, these boats must have carried about a ton of ballast apiece to be at all stable, and they cannot have been easy in a sea, nor had they any value as cargo carriers. They must be regarded as war vessels, and it was in craft of this kind that the Anglo-Saxon invaders of Britain came to this land.

A detailed account of the Nydam boat is necessary because the Sutton Hoo ship is only a modified form of it, increased in size and showing a number of technical developments which must have been the result of the two centuries that elapsed between their times of building.

It is probable that the main migration, after the military successes which placed the eastern coasts of Britain in Saxon hands, was carried out in a smaller and more beamy type of sailing craft represented by the boat found at Galtahäck in Sweden, but the warriors at-

tacked from the long, narrow, unstable boats of the Nydam type.

The Sutton Hoo ship was 84 feet long, 14 feet wide, and 5 feet deep, the prow rising in a great sweep to a height of 12½ feet above the level of the keel plank amidships. There were at least 38 rowers. It was clinker-built of oak planks 1½ inches thick and 18 inches wide.

There were nine strakes on a side, including the gunwales, and each strake was made up of five pieces joined end to end. There was no true keel, and its place was taken by a keel plank which was probably a single piece of wood nearly 60 feet in length.

The use of composite strakes at Sutton Hoo, instead of single planks as at Nydam, marks a considerable technical advance. Early boat-builders preferred to use as few pieces of wood as possible in order to minimize the potential number of leaks and increase the strength of their work, but as their skill and experience grew, and they gained a greater mastery over their materials, ships became more composite and many more pieces of wood were used.

The strakes were held together by iron clinch nails some two inches long with rounded heads on the outside and riveted over diamond-shaped iron roves on the inside. This work was carried out very neatly in the Sutton Hoo ship, and it is likely that the vessel was a particularly careful piece of work, done for a great man such as a king. It was a misfortune that the point of the prow projecting from the grave had decayed, for its detail might have been interesting.

Internally the hull was braced by a system of 26 ribs, spaced, with a few exceptions, about three feet apart. Each rib was a strong curved piece of oak, probably grown to shape, stretching from gunwale to gunwale and lashed to each of the strakes through holes bored in strong cleats left standing up on the insides of the planks when they were adzed to form. Across each rib from head to head were thwarts which carried seats for the rowers; vertical stanchions provided extra support for the seats.

At Sutton Hoo all these parts except the ribs had been taken out of the ship at the time of its burial, and we can only arrive at an idea of the original arrangement by the analogy of the Nydam ship where they were found in position. The exact construction of the gunwales is not certain, but they seem to have been made of heavier wood than the rest of the hull.

The tholes against which the rowers braced their oars could still be seen preserved in the form of characteristically claw-shaped dark stains in the sand, all that remained of the wood. These tholes sprang from long slats of wood which were spiked to the gunwale fore and aft with pairs of long iron nails (p. 260).

Signs of Damage from Shipwreck

Three extra-strong ribs, placed close together in the stern, were designed to brace that part against the heavy strain of the steering oar. This, in common with all the other movable fitments of the boat, was missing, but it must have been very like that in the Nydam boat.

In several places there were signs that the ship had suffered damage from collision and been repaired, and it is possible that it was already a disused hulk when it was decided to use it for the burial. This would be fully in accord with the evidence from the later Viking ship burials, where outworn vessels were also used.

Altogether, the Sutton Hoo ship must be regarded as a developed and more seaworthy version of its Nydam ancestor, and since in the north the keeled sailing boat was then being rapidly developed, it must be considered as a type already outmoded and soon to vanish.

However this may be, the ancient vessel stands as one of the supreme achievements of the northern shipbuilders in the earlier Dark Ages. It may truly be regarded as the first English war vessel known, and therefore as the ancestor of the British Navy, which still maintains an unshakable defense of this island against the enemy.

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To carry out the purposes for which it was founded fifty-three 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, 1935, 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.

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* * *

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Margaret Armstrong in TRELAWNY has written a biography of "one of the most genuine originals of currace"; it was our October choice, and is rising swiftly on all best-seller lists.

William Saroyan's new book, MY NAME IS ARAM, is a delightful puckish picture of a small boy which, we have a hunch, may go the way of Clarence Day's *Life With Father*.

Franz Werfel's new novel, EMBEZZLED HEAVEN, is the Club's December book—quiet, deeply thoughtful, "a magnificent character study" of a lowly woman that leaves one comforted and inspired.

Willa Cather's new novel, SAPPHIRA AND THE SLAVE GIRL, is her first book in five years. The scene is pre-Civil War Virginia; "undoubtably as good a decade hence as today."

Hans Zinsser's book, AS I REMEMBER HIM, was a Club choice just prior to his death; if any book deserves its present place, among the top best-sellers in the nation, it is this.

Jan Struther, with MRS. MINIVER, is a new author to Americans—instantly and widely introduced, as so many authors have been in the past, when her book was chosen.

Gontran de Poncins, a Frenchman, has written KABLOONA, an extraordinary book about Eskimos—beautifully translated and strikingly illustrated. It will appear very soon.

Van Wyck Brooks' NEW ENGLAND: INDIAN SUMMER, is, in the opinion of many, even more absorbing than *The Flowering of New England*. It was the September choice.

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FEW people realize that writers who now have become as famous as Pearl Buck, Clarence Day, Stephen Vincent Benét, Sigrid Undset, Hervey Allen, John Steinbeck, J. B. Priestley—and a score of others little less known—were *first* introduced to a nation-wide book-reading public by having one of their books distributed to every tiny corner of the country, by the Book-of-the-Month Club.

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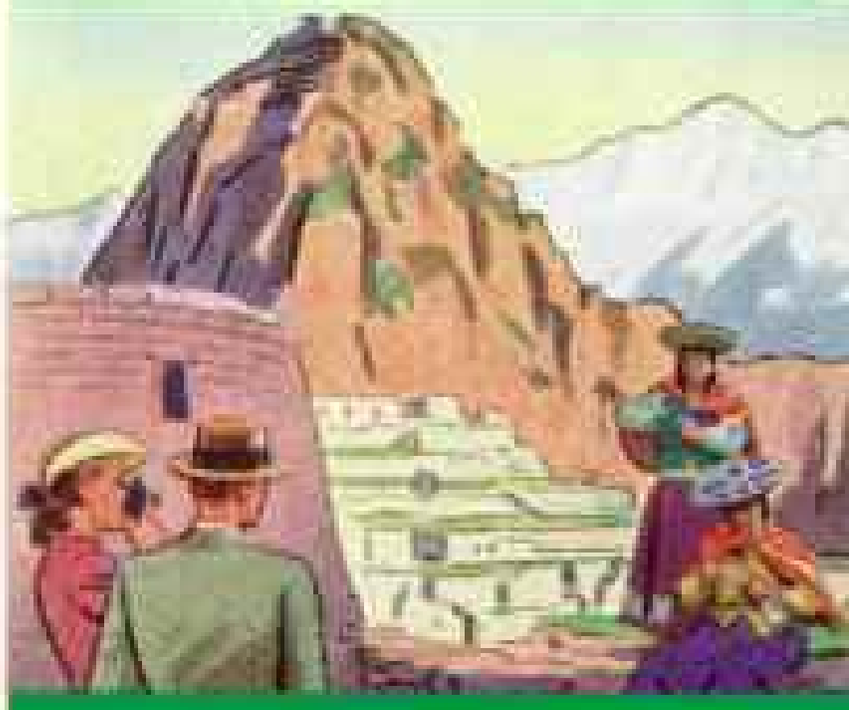

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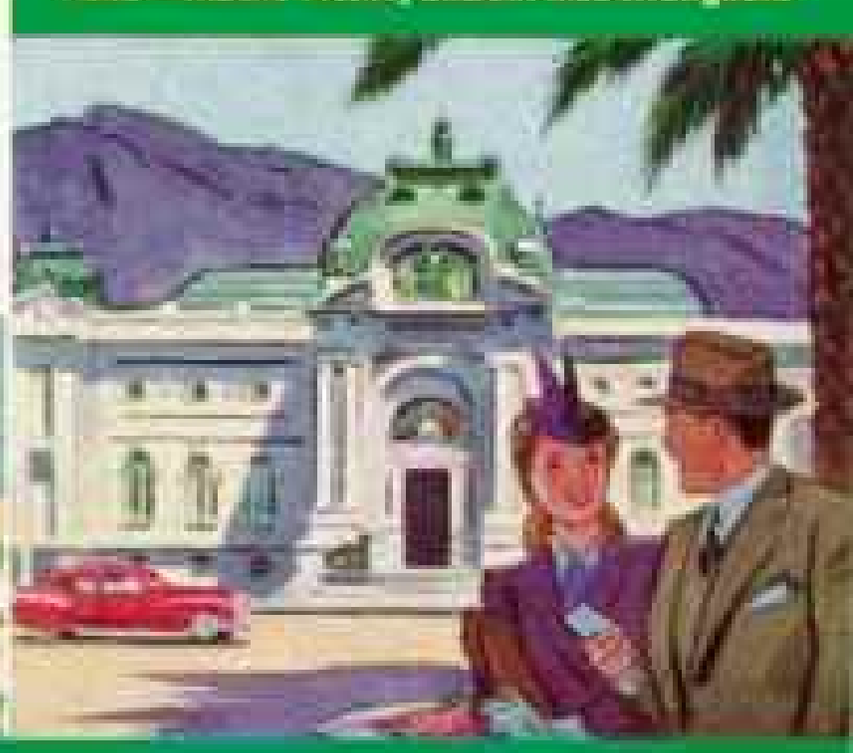

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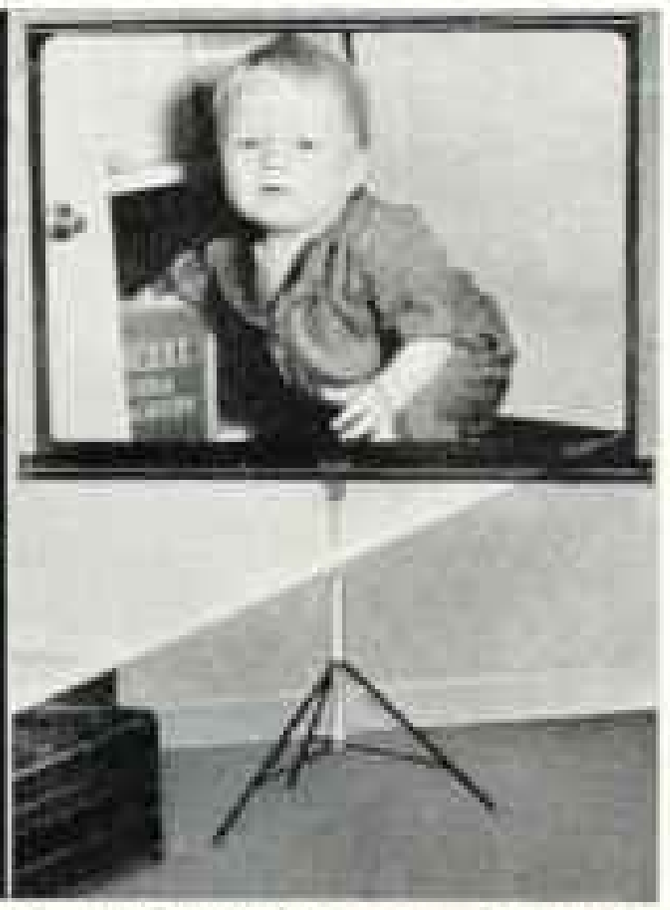

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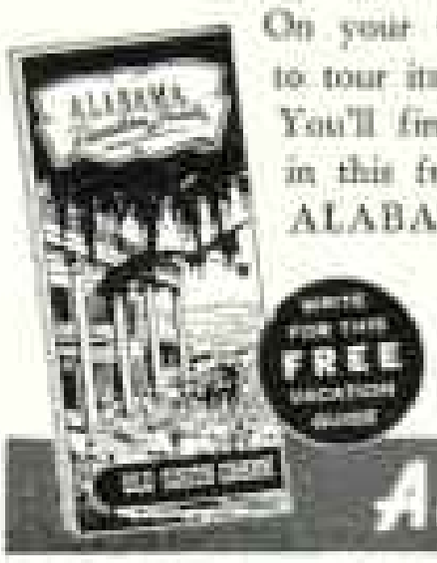

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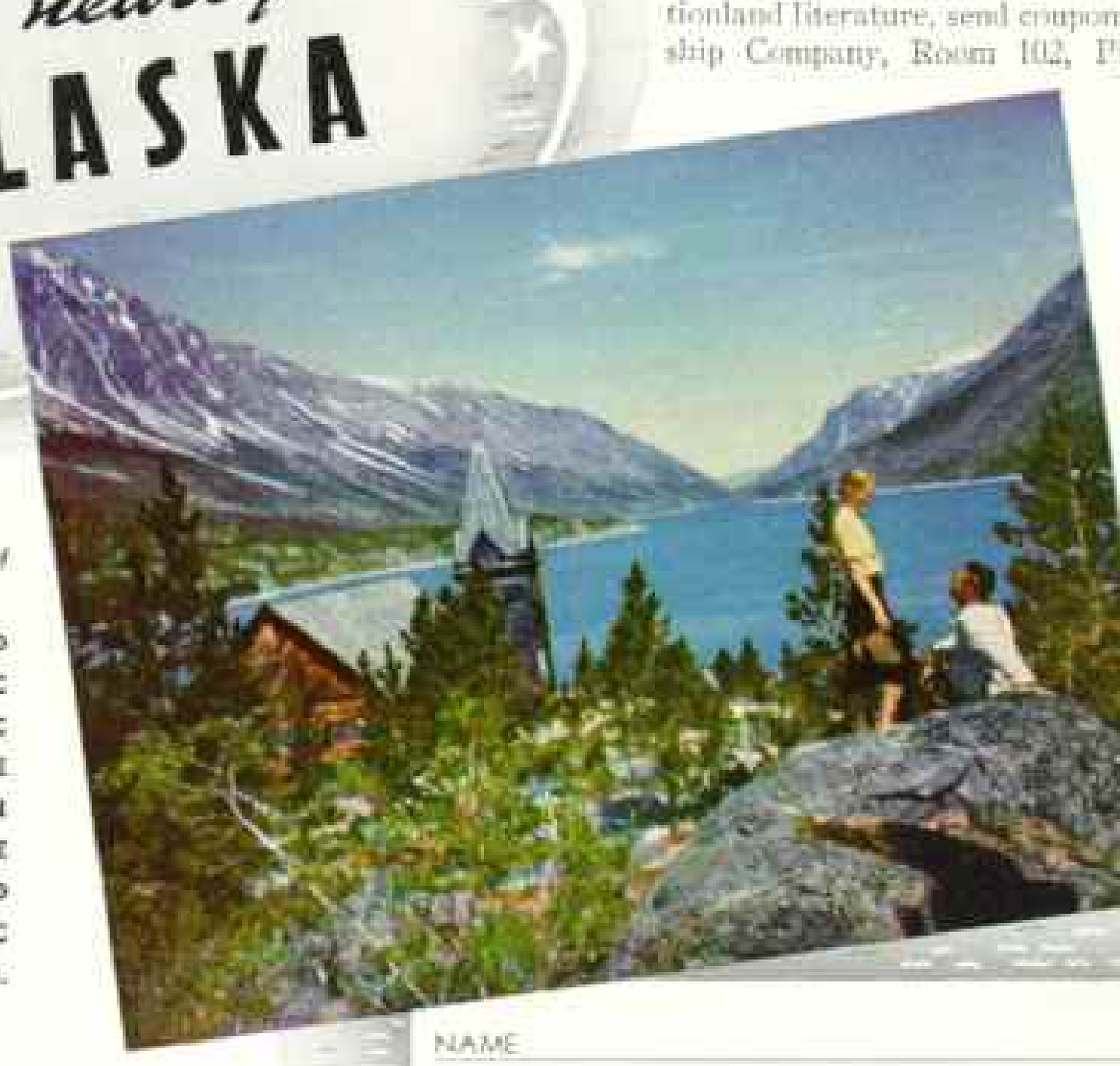

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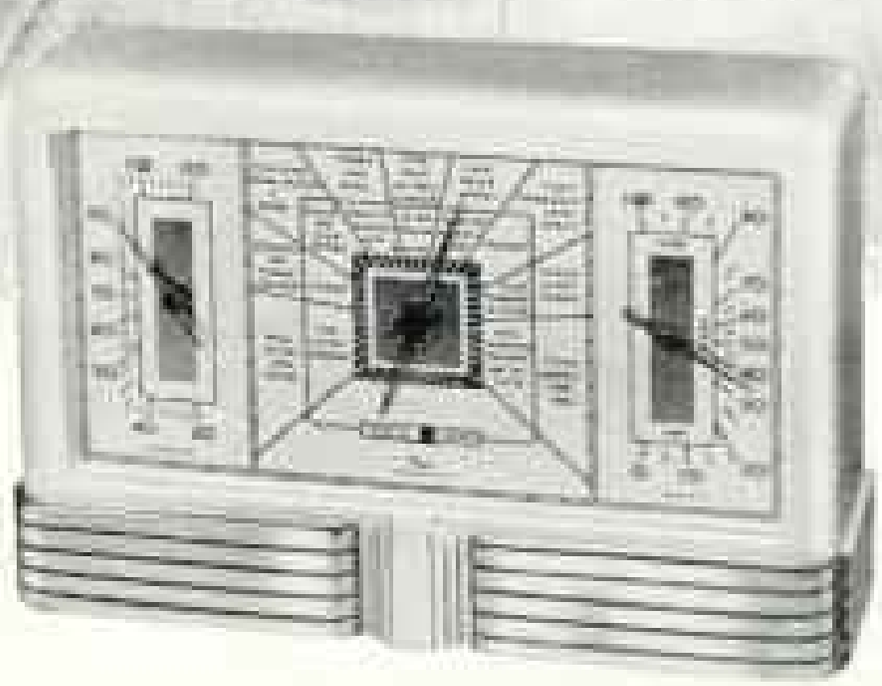

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*From Address at Trenton, New Jersey, February 21, 1861.

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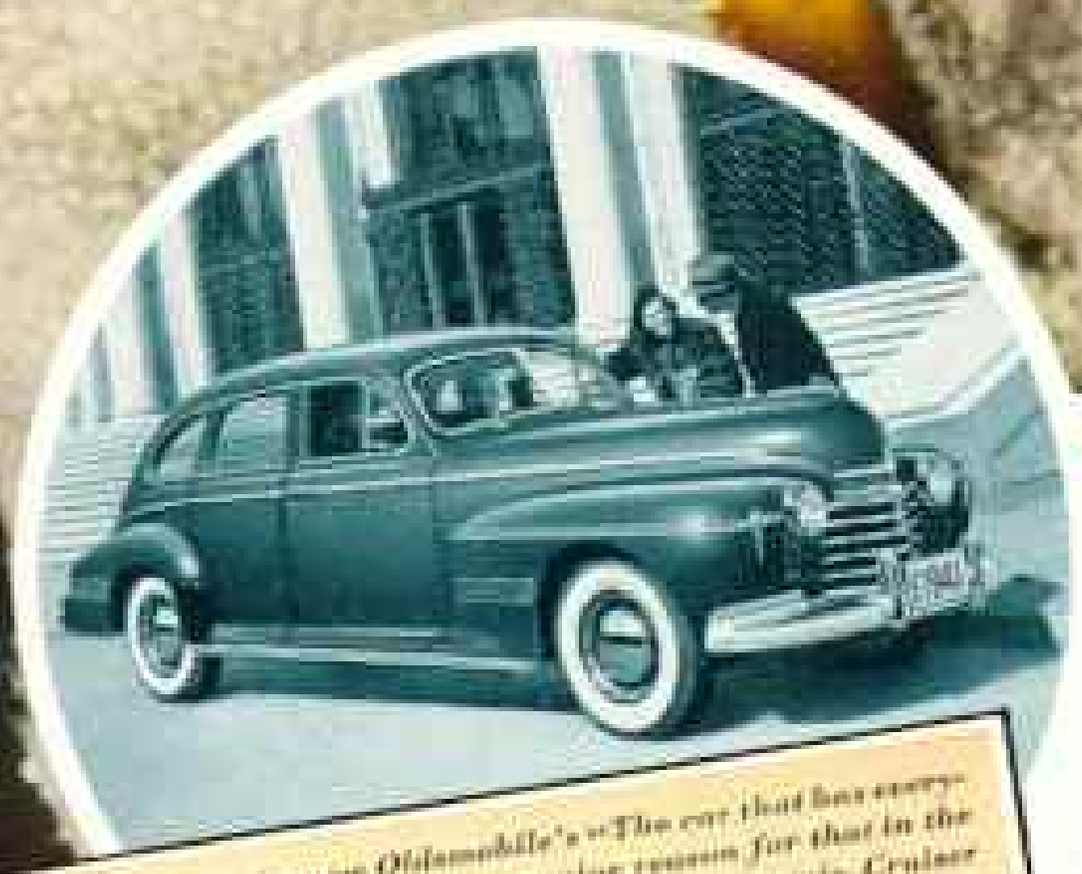

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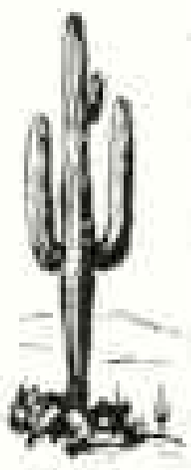

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