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Midshipmen's Cruise

BY MIDSHIPMEN WILLIAM J. ASTON AND ALEXANDER G. B. GROSVENOR, USN

"SHOVE OFF, coxswain. Return to the sea wall," sang out the Junior Officer of the Deck of the U.S.S. *New Jersey*. About him was the clamor and confusion of the launch's load of midshipmen trying to locate sea bags, suitcases, and blue service uniforms heaped in pyramids on the forecastle.

The motor launch, empty now of its cargo of human freight, with a roar headed back to the United States Naval Academy dock in Annapolis, Maryland.

Wistful glances followed her wake as she gradually grew dim in the rainy mist of that early Saturday morning, June 7, 1947. Some fellows, perhaps a little homesick, tried to bring to life the last beautiful image of the June Week O.A.O. (one and only). But the eager ones were already heaving sea bags down the forehatch, glad to be away from the confining walls and books of the Academy and bound for foreign shores.

Ever since Rear Admiral James L. Holloway, Jr., Superintendent of the Academy, had announced our cruise plans, all hands had been enthusiastically awaiting this day.

Edinburgh, Oslo, Copenhagen, London—glittering names lay ahead. Now with our task force of two battleships, *New Jersey* and *Wisconsin*, the carriers *Randolph* (flagship) and *Kearsarge*, the LSD *Fort Mandan*, and four destroyers, 2,100 midshipmen shoved off for their first taste of a sailor's life and travels (Plate I).

The new second class (juniors) enjoyed the sunbathing on the flattops (Plate XV).

Our division of 60 youngsters (third classmen, or sophomores) and first classmen (seniors), plus 10 Reserve midshipmen from various colleges, was quartered forward of *New Jersey's* No. 1 16-inch gun turret. Our pipe bunks—and they were comfortable too—were stacked in tiers of four, lining the bulkheads (walls or ship's side) and grouped compactly in columns, fore and aft, two tiers wide, but with enough room to scoot out quickly.

We were each assigned a locker, so tiny it left us skeptical. How could we cram all the gear in our two bulging bags into that small space? Nevertheless, after much refolding and rolling, our "white works," "skivvies," etc., were squeezed in.

One of Uncle Sam's battlewagons is a self-contained, multi-decked machine. Think of it as being divided into thirds. The superstructure, with its bridge and command stations, is the brain. The middle third (first two decks below main deck) feeds and repairs the two other sections. Lastly, the lower division, with its turbines, boilers, and generators, energizes the ship.

We Learn Our Way Fore and Aft

It was three or four days before we could step through watertight doors from one compartment to another without bruising our shins. But it took longer to master climbing and descending ladders (no stairs!) from one deck to another without use of seat, elbows, and gravity.

Shipboard navigation, taught by personal experience, was not learned by many for weeks. We were in England before some of us found the cobbler or tailor shops. During a pre-cruise lecture a humorous instructor said that to survive the cruise we must learn the location of only three places: our bunks, the chow line, and the "head." We all survived.

A frequent question of the late war was, "How can Halsey and Mitscher stay at sea so long without refueling at a base?" Now it is an everyday trick to transfer millions of gallons of fuel from a fleet oiler to thirsty battlewagons while under way. Our first dem-

U. S. Navy, Official

Midshipmen Leave H.M.S. *Victory's* Entry Port and Walk down the Brow (Never Gangplank!)

A latticelike series of gangway steps, or battens, enabled men to climb aboard. Muzzle-loaders peep from three gun decks. Each of the three masts has a fighting top (upper right) where some ships stationed marines to fire muskets during battle. A ball from such a French top killed Lord Nelson at Trafalgar (page 719 and Plate XXIX).

onstration occurred a day out of Annapolis.

Sunday morning, on coming topside for our first look at the Atlantic, we were greeted by a startling sight. Dead ahead steamed a Navy oiler, the huge *Wisconsin* surging close to her portside. At first glance they seemed about to collide, but then we saw they were laced together with snaky black lines (Plate X).

Slowly our skipper conned the *New Jersey* into position on the opposite side. Inch by inch we crept up, until we were only 100 feet from the oiler's bridge. Because of the armored conning tower, steersmen on duty could see only dead ahead, so they never knew how close the steel monsters were. Eyes glued to compasses and ears tuned to captains' voices, they kept the ships on steady course hour after hour. A veteran officer told us that even in wartime simultaneous refueling of two battleships was as rare as "sun off Cape Horn."

Our big ship supplied its destroyer escorts with fuel throughout the cruise. What a sight it was to see a "can" bucking the waves as she received her oil transfer!

These sleek ships swung up from astern, turned parallel to us, and slid over to within 20 feet of our life lines. Then, as they stuck their sharp noses into every wave, we fired lines from our heaving guns over their forecastles.

Quickly the crews pulled over hoses, and the cans were suckling alongside the mother ship. Waves breaking over the destroyers made it a risky and slippery job for the line-handling crews (Plate VIII).

Less Romance, More Work

Some landlubbers imagine that midshipmen's cruises are luxury voyages. Admittedly, foreign ports are romantic; but long days of work at sea are far from luxurious.

On last summer's cruise the youngsters received instruction from three academic departments—Seamanship and Navigation, Ordnance and Gunnery, and Marine Engineering—for a month each (Plate IX).

Our "seamo" course qualified us for the rating of seaman, first class. We lived the lives of deckhands, did their jobs, stood their watches. Thus we began learning the Navy from the bottom up.

Our watches, stood four hours on and twelve off (instruction periods were attended when off duty), ranged through 32 different stations, from a lookout in the clover leaf (the tiptop level of the mast) to a life buoy watch at the rail or assistant helmsman on the bridge. Many of us found our spell at the wheel the most thrilling job. It was quite a trick trying to hold that monster within a degree of her course.

We all favored Ordnance and Gunnery. Besides being out in the air most of the time, we stood no watches.

During the day's three hourly drills we became familiar with the ship's guns, perhaps by a tour through a monstrous 16-inch gun turret or by actually tearing down and cleaning a 40-mm. antiaircraft gun. Often we viewed training films and studied for and passed the tests seamen must take to become third-class gunner's mates.

In Marine Engineering we experienced our most uncomfortable conditions. This was particularly true for those lads down below when tropical climate prevailed.

To familiarize midshipmen with the "works" that make a mighty battleship tick, we stood watches at nearly every engineering station, from tending a blazing boiler to jockeying a turbine throttle in an engine room. We weren't long discovering how to brew the black gang's favorite drink, "Joe" (coffee). We gulped it beneath a roaring air blower and soon kept pace with the crew, sometimes drinking 10 cups a watch.

Reveille! Grab a Brush!

"Reveille! Reveille! Heave out and trice up." Dim ruby battle lamps blink off, and blinding overhead lights flash on.

You glance at your watch—5:30. It's too early; oh, for a few more minutes' sleep! You roll over, hoping . . .

"Hey, mister! Hit the deck! Make up that bunk and clear the compartment."

You stumble around trying to sort out your dungarees from piles of your shipmates'.

Ten minutes after reveille the Navy is after you again.

"Turn to! Scrub down all weather decks! Clamp down all living spaces!"

You stagger up through the hatch and greet the morning. Your fervent hope of meeting a torrent of rain (your only escape from scrubbing) is shattered by the glaring sun.

Finally you reach your division's cleaning area. Any fellow earlier than you already has the deck awash. Last thoughts of sleep die out when the hose tender arches a chilly stream of water over your shivering bare feet.

A bosun's mate bawls for action. "O.K.! O.K.! Grab a brush and get moving."

A few of you jam sticks (the standard Navy handles) into scrub brushes and, with a hose backing you up, you soon have the area covered. Others follow the brushes, clearing off the water with rubber squeegees. If any salt streaks appear on deck, the job has to be done over again (Plate VI).

Just before the first call to breakfast, the bosun's mate grumbles, "O.K., secure! Every-

body on deck sooner tomorrow morning."

Breakfast!

Long before the bosun's shrill call to the first mess, two chow lines begin to form on either side of the ship. Soon they lead all the way to the stern and double back, so the hindmost man actually heads away from his meal.

Folding benches and portable tables fill the eight mess compartments, which between meals double as classrooms, theaters, and places of worship (page 718).

To feed the crew expeditiously, serving is done cafeteria style.

If you're in a hurry, you may stow your chow in five minutes; lingering is not encouraged. The entire crew must be fed in three chow calls, each 15 minutes in length.

For heavy eaters, survival depends on the number of times they contrive to go through the line. A tasty dessert always means a lasting line.

Seagoing Housemaids Have a Field Day

Field day, to one who doesn't know the secret, sounds like a day of merrymaking or suggests a track event.

But field day in the Navy serves the ship as a housewife's weekly cleaning day. Every bulkhead is scrubbed, paintwork washed, all brightwork polished (Plate VII). Last, but not least, the teak decks are holystoned.

This nautical word may be familiar, but have you ever seen a holystone in action? From painful memory, every admiral can give a vivid description of the tool.

Wooden decks once were holystoned every day, but heavy wear by sand and stone meant expensive replacements. Therefore, today's seamen turn to with their "boiler bricks" and bent backs but once a week.

To holystone, one needs equipment valued at less than a quarter and a 30-second lecture, including instruction in elementary wrestling. The instruments of torture are a long stick, sand, water, and a halved fire brick. The stick fits a small hole in the brick.

Do you want to learn the proper grip and stance? O.K., bend over double and take hold of a broom with your left hand about 18 inches from the bottom. Then place the upper half of the handle against your right hip. With your right hand, reach under the stick and grab your left wrist. This hold, a perfect double arm lock, enables you to push down on the stone and at the same time slide it back and forth sideways.

Five to 30 midshipmen line up along a plank (page 716). With one to count cadence, the entire group should move in rhythm. But there's always some knucklehead who delights in doing things the opposite way. The stroke is about 20 inches, right, left, right, left, until 20 passes are made. Then with the command, "Shift," the men step back or forward together to the adjacent plank.

This work is as backbreaking as any ever devised, and there is no way to beat the system. Should a fellow slack up, the stick slips and trips the brick, snarling the rhythm.

Field day for those down in the engine spaces is certainly the most unfavorable aboard ship. Its dirtiest form is boiler-tube cleaning. Stripped to their waists and armed with wire brushes, the black gang worms through a small hatch into a jet-black boiler. Here, with an extension cord and bulb for illumination, the lads scrape the carbon-caked water tubes. Often a chisel is needed to loosen the scale. The work isn't as backbreaking as holystoning, but it is certainly the dirtiest aboard ship.

Or you might find yourself confined down in the bilge, or double bottom, scraping rust and cracked paint and then repainting. A mixture of slime and yellow chrome forms a colorful but greasy coating on blue dungarees.

Now you can understand the luxury of drawing a morning or afternoon watch on field day.

We Drill with Dummy Guns

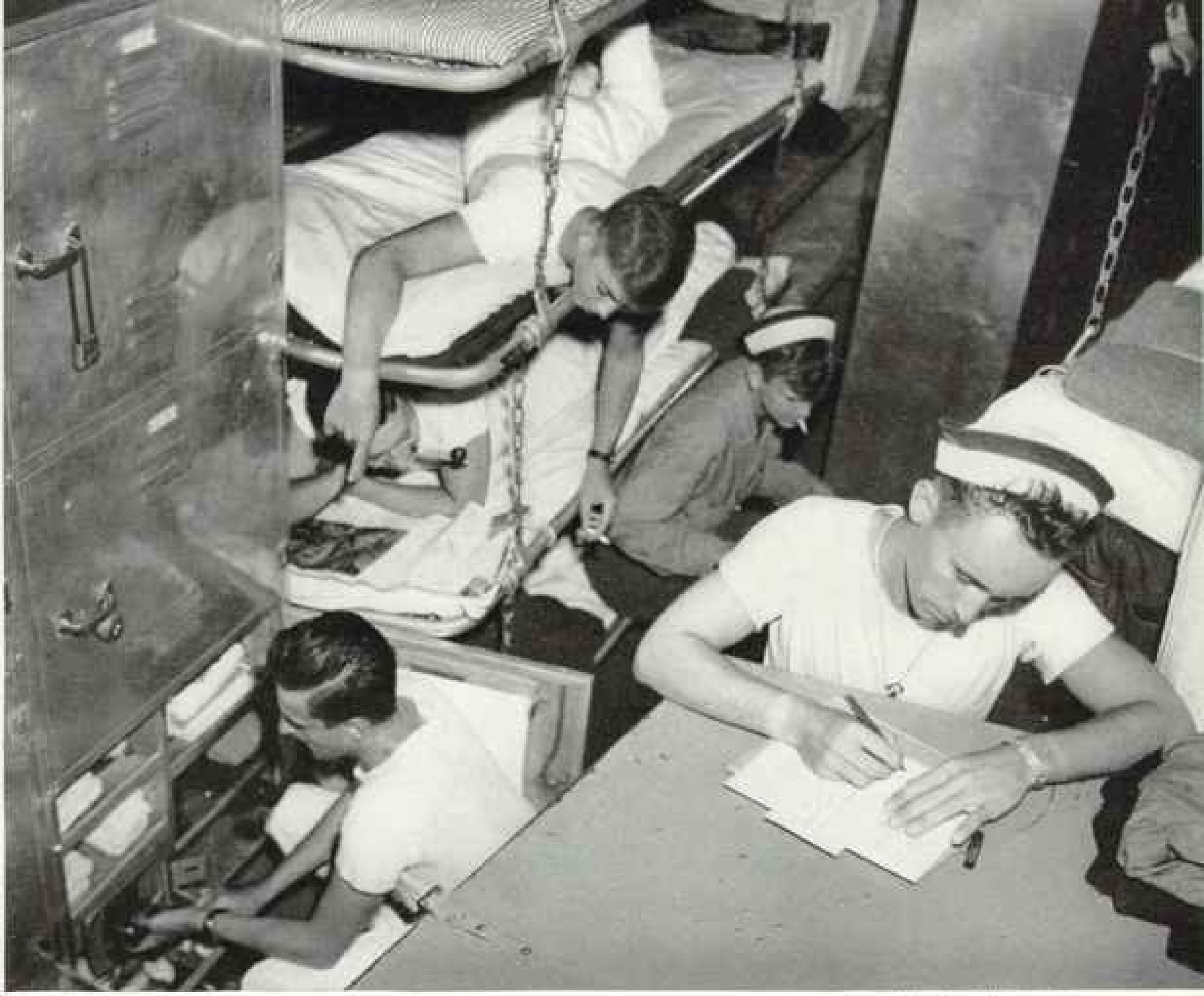
After two weeks at sea we took over the defense of the ship. With the exception of officer safety observers, the 40-mm. antiaircraft guns and dual-purpose (air and surface firing) 5-inch batteries were manned by youngsters and first classmen. So were the nine 16-inch guns in the three turrets.

Daily drills soon made us as proficient as the ship's company crew. At the first note of General Quarters, we double-timed to our mounts and turrets. Unless actual firing was scheduled, we practiced training the guns and simulated loading and firing them.

But you don't learn to load these weapons by tossing live ammunition around—you might burn your fingers! So for the first two weeks we viewed Navy training films and practiced on loading machines (Plate XI).

These dummy gun mounts produced only loud and annoying bangs. Tangible products were bruised toes and sprained fingers. Using dummy powder bags and counterfeit shells, the 5-inch loading machine operated with seemingly perpetual motion, its "firing" halted only by an officer whose stop watch was our whip (Plate XIII). Two men heaved a powder bag and shell into the breech; another "fired" them forward into the hands of two others. The operation grew monotonous, but efficient.

Our targets usually were red sleeves about



Alexander G. H. Grosvenor

***New Jersey's* Cruising Youngsters Bunk Sardine-fashion in Tiers of Four**

Each man has a locker so small that he wonders how he can cram all his gear into it (page 711). One lad uses a peacoat locker top, his compartment's popular card table, as a writing desk.

30 feet long, towed by carrier planes. As a special treat, tiny drones were launched from catapults aft (Plate XIV). These radio-controlled planes, guided by an aviator on *New Jersey's* fantail, made *kamikaze*-like passes over the ship from every angle. Pursuing erratic courses, they were harder to knock down than the sleeves.

"Hummingbirds" Deliver the News

"In the old days, when I was at sea . . ." Who hasn't heard these words from some salt-crusted seaman of yesteryear? Imagine what he'd say if he saw a helicopter delivering the morning newspaper!

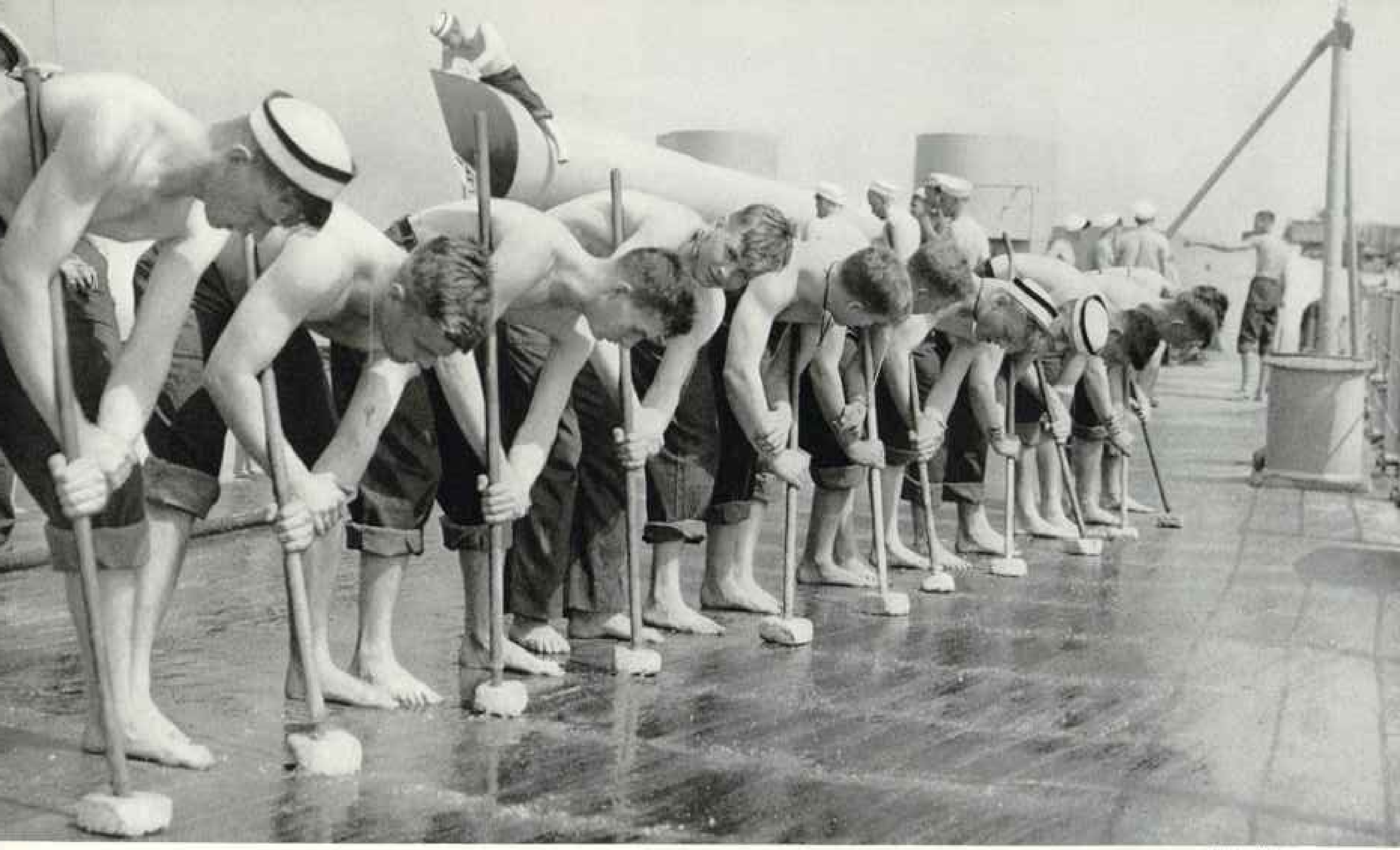
Each day around 0630 (6:30 a. m.) one of these mechanical hummingbirds, operating from the *Randolph*, made the rounds of every ship, delivering packets of guard mail and the *Cruise News*, the squadron's daily newspaper.

Transfer of mail took only about 30 seconds. On approaching the ship, the co-pilot lowered a satchel by hand. Petty officers on *New Jersey's* forecastle detached it and hooked on their own outgoing mail.

Occasionally, too, a hitchhiking officer was dropped off or picked up (Plate VIII). While the 'copter hovered above the deck, a steel line was lowered by winch mounted on the helicopter's roof and hooked to a linen strap under the arms of the passenger. Then the pilot hoisted him until he could swing into the cockpit.

Our first landfall in the British Isles was Butt of Lewis, northernmost point of Lewis, largest island of the Hebrides. In a few hours the sheer cliffs of Cape Wrath drew abreast as we continued eastward to Dunnet Head, sentinel of the western approach to Pentland Firth.

It was a beautiful Sunday morning when we entered this 7-mile gap between the Orkneys and the mainland. The waters just inside the Firth were so placid it was difficult to believe the warning of the *British Islands Pilot*, which cautions vessels, in fair weather or foul, to expect extremely turbulent waters.



Stephen Paul

Arms Locked Around Sticks, Youngsters Holystone *Wisconsin's* Deck. Once in Line, No One Can Shirk This Backbreaking Job

Middies Monopolize Elizabeth and Her Fiancé

Last summer twenty lucky midshipmen were invited to the Buckingham Palace garden party honoring Princess Elizabeth and Lt. Philip Mountbatten.

Here three Americans (center, right) have gained the Princess's side. Mountbatten (in Royal Navy uniform) stands at her right.

"Their naturalness and friendly nature quickly put us at ease," one of the midshipmen said. "Soon we were chatting gaily and even joking. . . . Our talk, which lasted 10 or 12 minutes, was finally interrupted by the fidgeting ushers, who realized we had more than tripled the usual allotment of time."

Later the Americans proceeded to rescue Princess Margaret Rose from her seeming boredom. Said one: "I was tempted to ask for a date, but courage failed me."

For once, the King is not the main center of attention. He stands at left center talking with civilians (page 720).

Stephen Paul

Alexander G. B. Grosvenor

Chow Time Knows No Slackers; Every Man Aboard Ship Does His Duty Nobly

Performance is especially noteworthy whenever the Navy serves a tasty dessert; then some men go through the cafeteria line twice (page 714). Even in hot weather, many of these lads drink a dozen cups of coffee a day.

The most treacherous spot is a narrow, ever-shifting belt where the 7-knot current from the North Sea clashes with tides moving in from the Atlantic. The rocky coasts of northern Scotland and the Orkneys act as a funnel, causing the waters to converge in the Firth.

This belt of water is marked with violent eddies and treacherous whirlpools. Even with such splendid weather as we enjoyed, our 45,000-ton ship was twisted like a small steamer. Steering was difficult; standing required a balancing act.

Next morning we entered the Firth of Forth, the main estuary on the east coast of Scotland. Sir Walter Scott and Robert Louis Stevenson sang the praises of the view from the Highlands, where the Forth lies spread out "like a blue floor," bordered by golden sands and green fields.

Task Force 81 entered the Firth on a gray, rainy day. We saw, not the golden sands or blue floor, but only a cold gray blanket, spotted here and there by brownish hamlets and dark, sleeping ships. Ahead arched the Forth's famed cantilever bridge (Plate XVII).

As we sailed below, our mast almost brushing the span, five hooky-playing Scottish children leaned out and waved a large American flag. So slight was our clearance that they could almost have stepped down into our lookout tower.

Those smiling youngsters typified the Scotland we saw during our visit. Scotland to us was a land of rugged scenery and never-shining sun. Its fiercely proud, liberty-loving people made us feel at home in this, our first port of call (Plates XVIII to XXV).*

Oslo Welcomes the Middies

Just before breakfast on June 30, two days out of Rosyth, our two battleships swung north into Oslofjord, leaving the Skagerrak astern. The other ships of our squadron had

* See, in the National Geographic Magazine, "Bonnie Scotland, Postwar Style," by Isobel Wylie Hutchison, May, 1946.

left for ports in Denmark and Sweden.

Some 20 miles up this deep, forest-banked fjord, we exchanged salutes with Karljohansvern, headquarters of the Norwegian Navy.

Scores of graceful sailboats, heeling gently to the morning breeze, joined in welcoming us to Oslo. Friendly cheers were frequently exchanged, particularly when a boat's crew was feminine.

Our 5-day visit to the Norwegian capital was high-lighted by shopping sprees, social functions, and country tours. Bartering with the store clerks wasn't difficult, as English was fairly well known. Most of us sought brilliantly decorated ski sweaters and Norse winter outfits. It seemed strange to see skis being brought on board in the evening by perspiring new owners.

Some of us took an electric train up to Frognerseteren, on a hill northwest of Oslo, which is a center of Norway's famous winter sports.

Looking down some 1,500 feet, we beheld a panorama of rare beauty. Our view stretched 50 to 70 miles about the compass. To the east the pine-covered hills of the Swedish frontier dotted the horizon. To the south lay Oslo, its fjord winding away into the distant mist. Our anchored battleships seemed tiny and insignificant.

Viking Ships Re-create the Past

Oslo gave a round of dances and parties in our honor. At the American Embassy's dance, two Navy orchestras from the squadron played our favorite numbers. Norwegian girls, beautiful as they were gracious, danced with us to the strains of American music.

Oslo's hospitality seemed to have no limit. There were few middies who didn't enjoy a home-cooked meal. One mother insisted that a midshipman date her son's fiancée while the poor lad remained home!

To many, Oslo's museum of Viking ships was the most interesting sight in Norway. Found entombed in blue clay near Oslofjord, these relics offer standing proof of Norway's early maritime prowess.

When Viking chieftains died, they were often buried in their ships, along with their possessions. The Oseberg ship contained such an abundance of articles that it gave a reliable picture of the daily life of the Vikings around A. D. 800.

A more advanced link in the country's nautical history we found at the Fram House. The *Fram*, built in 1891-92, was specially designed for polar exploration and built by Colin Archer, of Larvik. At points her sloping sides are almost a yard thick. Her hull is rounded so as to rise out of the ice if squeezed by the pack. When the *Fram* was frozen in on Dr. Fridtjof Nansen's polar expedition (1893-96), its scientific design and structural strength enabled it to overcome ice pressure that would have crushed conventional ships.

A visit to the Royal Yacht Club on the Frognerkilen would excite any sailor with admiration for the seafaring Norwegians. Here we found a fleet of 6-meter and 20-square-meter boats. The navigators of the clumsy Viking longboats would have gaped in awe could they have seen these slim, graceful sailboats skimming along in the class races.

Our Norwegian visit ended with a dance on the *Wisconsin*. "Wisky's" decks, surrounded by decorated life lines, presented an unusual dance floor. Lights and signal flags gave color to the scene. A lavish spread in the officers' wardroom satisfied the hungriest "chow hounds."

Leaving Norway, we witnessed a magnificent demonstration of seamanship. Crown Prince Olav reviewed our battleship division as we steamed for Portsmouth, England. Rather than use a destroyer or a large yacht, he stood in the cockpit of a 50-foot cruiser tossing and yawing in the choppy mouth of Oslofjord.

Throughout the passing of our ships, the Prince adhered to the adage of the sea, "One hand for the ship and one for yourself." Never before had we seen a boat do four-dimensional gymnastics. Yet at all times the Prince had his right hand raised smartly in salute as *Wisconsin* fired the 21 guns reserved for chiefs of state and for royalty.

Nelson's *Victory* Almost 200 Years Old

During our stay in Portsmouth, most midshipmen visited H.M.S. *Victory*, Nelson's flagship at Trafalgar. At the time of her launching in 1765, this 2,162-ton man-o'-war was the fastest first-rate of her size in the Navy. Others had gun decks 175 feet in length, but *Victory's* was 186 feet. The added length gave her finer lines and extra speed.

Midshipmen were given the run of the ship. Those who desired could join tours conducted by British petty officers.

Interesting yarns could be coaxed from the guides. We were told, for example, that strict naval etiquette was enforced aboard a flagship even in Nelson's time. An admiral always walked on the starboard side of the quarterdeck. But Nelson, disliking protocol, was often seen on the captain's side. This custom perhaps accounted for his death. At Trafalgar

he was encroaching on Capt. Thomas Masterman Hardy's promenade when he was mortally wounded by a French sniper's bullet.

On descending from the weather deck, we saw batteries of muzzle-loaders, above which *Victory's* crew of 800 men strung their hammocks. The two lower gun decks, crowded as they must have been, were often their home for years.

In the gun room we saw the crude muscle-powered steering apparatus used to navigate the ship in emergencies. Her wheel shot away by a French broadside, *Victory* was steered at Trafalgar by men pulling on tackles attached to this monstrous tiller.

On the lowest of the five decks, the orlop, Nelson died. The wounded admiral early in the battle was carried below to the pit (sick bay). Here, within a few feet of the midshipmen's mess, Nelson spoke his dying words: "Thank God, I have done my duty."

Close by we noticed crude instruments used by surgeons of Nelson's time. The most impressive thing about the pit was the illumination the ship's surgeon did not have. If you would enter a dark coal bin and attempt to read this magazine with the light from one small candle, you would understand the difficulties experienced by *Victory's* surgeon, Mr. Beatty, as he worked during battle.

On the bulkhead hung a painting, executed from eyewitness accounts, showing the death of Nelson, with his surgeon, aides, and Captain Hardy grimly grouped about him.

As our tour ended, one midshipman remarked that Nelson's sailors were lucky—they had no hot, noisy, engineering watches to stand. We all agreed wholeheartedly, until a ship's officer told us it was not unusual for large men-of-war to spend two or three days coming the three miles from Spithead into the Dockyard. Later we learned that jack-tars' wives often came aboard at Spithead and stayed until the ships docked.

Several midshipmen attended a dinner aboard *Victory*. Their host was Admiral Lord Fraser, Commander in Chief of the Portsmouth area, who flew his flag in *Victory*. In wartime Lord Fraser was the Commander in Chief of the British Pacific Fleet. Lately he was appointed First Sea Lord.

One of the fortunate midshipmen reported:

"We were welcomed by the OD and taken aft to Lord Fraser's cabin, the same cabin Nelson used at sea. Here we chatted with the Admiral and his other guests before entering Nelson's dining cabin, just forward of the main cabin. His silverware, candelabra, and table pieces were used that evening; and we dined and wined in the same manner as did Lord Nelson and his captains."

Admiral Fraser spun a yarn recounting *Victory's* role at Trafalgar, where she and her attendant ships wrecked Napoleon's plans for invading England. Later he pointed out a recently repaired wound in the hull—a memento of Hitler's blitz of 1940.

Princess Elizabeth Greets Midshipmen

Twenty midshipmen consider themselves the most fortunate lads in the squadron—they attended the King's garden party at Buckingham Palace (page 717). Here's how a royal guest depicts the memorable occasion:

"Our group of 20, squired by a Navy 'four-striper,' was composed of ranking first classmen, class officers, and a few youngsters. As we passed through the palace gate, we encountered throngs of Britons, eager for a glimpse of the newly engaged Elizabeth and Philip. Eight thousand dignitaries formed an almost impregnable barrier around the rear of the palace. The great number of guests surprised us; we had expected a small, informal party, and everyone had envisioned long chats with the Royal Family. What an illusion!

"Princess Elizabeth, with Lieutenant Mountbatten at her side, and King George emerged from the palace and began filtering through the crowd, with an army of ushers opening a path as they slowly advanced across the spacious lawn. Also included in the royal party were a number of ranking military officers, their duty being to select a few from the encircling throng and present them to Elizabeth and her fiancé or to the King.

"Our midshipmen's group had long since dissolved, each seeking to get the closest view of the royal party. While elbowing my way into the path of the slowly advancing group, I noticed our captain had caught the eye of an ushering Air Force officer. This unexpected opportunity of meeting the Princess and her fiancé was not to be lost because of the intervening crowd. By a bit of fancy dodging and ducking and numerous apologies, I was soon standing nervously with two other shipmates, waiting to be introduced to Elizabeth and Philip.

"After the presentation, their naturalness and friendly nature quickly put us at ease. Soon we were chatting gaily and even joking as if with an old acquaintance. Philip seemed extremely interested in the Academy, and we swapped a few tales of Dartmouth and Annapolis. When questioned about his class ring, one of the first classmen slid his off and, handing it to Philip, explained the tradition behind it and its presentation at the famed June Week ring dance by his O.A.O.

"Not to be outdone by her fiancé, Elizabeth inquired about the class insignia worn on the

sleeves of the two upper classmen (mine still being quite bare from plebe year).

"Our talk, which lasted for 10 or 12 minutes, was finally interrupted by the fidgeting ushers, who realized we had more than tripled the usual allotment of time. With words of congratulation and good luck, we moved off into the crowd."

As if meeting Elizabeth and Philip wasn't enough, our guest continues:

"Later in this eventful afternoon, a few of us were able to penetrate the cordon about the other royal group with Queen Elizabeth and Princess Margaret Rose in the center. Upon being presented, two of us 'gallantly' proceeded to rescue Margaret from her seeming boredom. I was tempted to ask for a date, but not having experienced royal reactions to such a bold request, my courage failed me.

"Soon the Royal Family terminated their interviewing and sought refreshments under the awning of a spacious tent, similar to the many caterers' tents that bordered the lawn. Reports have it that the midshipmen carried out a like action with 'great boldness, fierce determination, and clever maneuvering.'

"The number of midshipmen who 'forgot' or 'misplaced' their raincapes was astounding —anything for a last fleeting glimpse of the beautiful and ornate palace interior. On agreeing that 'Operation Buckingham' had been completed successfully, we 'shoved off,' armed with a story for our grandchildren."

Down to the Balmy Tropics

Within a week after leaving England we were south of the 30th parallel, basking in the tropical sun and watching hundreds of flying fish skimming along the Gulf Stream.

In the afternoons you saw only two types of working youngsters: those carrying ammunition and others firing the never-satiated guns.

By nightfall all hands were ready to gather aft near the movie screen and enjoy an hour or so with Hollywood's stars of the present and past.

Our theater was improvised and didn't have a ticket window. Our "inexpensive" seats were sections of the deck; the "reserved seats" were boxes and benches borrowed from the mess halls; and the balcony was atop the No. 3 turret or the roof of the steel projection booth, the only permanent fixture of our theater. Although we didn't have murals on all sides and "20° cooler inside" air-conditioning, we did have a glistening canopy of stars and the night-cooled trade winds.

The warmth of the Tropics once more brought our Sunday services up to the fantail from a confining chow hall below. Your imagination may fail you if we say shipboard services are sometimes beautiful. Picture, however, this scene:

The spell cast by a humming organ, deep masculine voices, and the sound of the gentle swishing and lapping of waves falls upon you as you kneel to worship. Beneath the cloaked muzzles of 16-inch rifles stands your chaplain behind his lectern. Close by is his small portable altar. As he delivers a short, pithy sermon, a benign sun beams down from a clear blue sky. A faint breeze cools your face. Your eyes catch a rolling destroyer to starboard. Again the choir sings a familiar hymn and the service is over (Plate XVI).

Before long *New Jersey* dropped her hook in Guantánamo Bay, Cuba.* We were permitted to go ashore in our "white works," a comfortable summer uniform distinguishable from an enlisted man's whites by the blue band around the top of the hat (Plate IV).

Leaving the fleet landing, we had our choice of two roads, one running east to the Navy recreation center and its ships' service store, the other going west to the marine post and PX.

At both facilities, ice cream, canned fruit, and 35-cent steak sandwiches were plentiful. Stores were well stocked, and smart lads who saved their cruise allowance could now take advantage of Guantánamo's bargains. Most of our gifts for the folks at home were bought here tax free.

During our first liberty the youngster class was introduced to Chief Hatuey, a famed Indian rebel of early Spanish days, whose face (mostly nose) adorns bottles of Cuban beer sold on the station. There's a saying that "you can't beat the Chief—he always wins." After a few of his beers we understood why.

We Bombard Culebra, a Target Island

On our departure from Cuba we began gunnery practice in earnest. Now we were going to find out if all the hours spent on dummy shells had been worth while. For the first time the big 16's were to be fired.

Our target was Culebra, a small island off Puerto Rico reserved by the Navy for fleet gunnery practice. We commenced bombardment at 0900 one clear morning.

We sailed up and down our firing track rifling our 5-inch and 16-inch shells into the beach. Control officers and range-finder operators kept a close watch on *New Jersey's* shooting as well as on the work of her sister and rival, *Wisconsin*.

Shortly after noon, our mission completed,

* See, in the National Geographic Magazine, "Cuba—American Sugar Bowl," by Melville Bell Grosvenor, January, 1947.

"Secure from General Quarters" was piped throughout the ship.

That afternoon the Task Force rendezvoused and we steamed off. We were on the road back.

Virginia Gives the "Welcome Back"

On August 12 the Virginia coast materialized out of the offshore mist.

As if trying to surpass European hospitality, the people of Tidewater Virginia went all out to entertain the midshipmen. Norfolk gave two grand balls.

Virginia Beach was swamped with middies and their hostesses. Rare was the fellow who couldn't boast that he had been looking at the pigeons, minding his own business, when a beautiful girl drove up in a shining convertible and asked, "Going to the beach?"

We devoted the last week of our cruise to night gunnery and submarine warfare. All men in the first class were dispersed among destroyers and submarines. The rest of us were assigned to antisubmarine lookout watches.

During the day the U-boats split up, five to each of the two battleships, and simulated attacks on us. They fired dummy torpedoes set to run five feet below our maximum draft.

Many of us believed that spotting a periscope was an easy task. Experience revealed our error.

In establishing a position to fire her "fish," a sub raises its periscope only momentarily. Even if a gunner knows the scope's position, he has a difficult task picking out that "eye" among the whitecaps.

There were many tales in evening "bull sessions" of a lookout's spotting a submarine by first detecting a torpedo speeding at his ship.

"Tin fish" travel about 45 knots, and their trail of air bubbles appears about 75 feet behind, depending on the depth. We were thankful they had been set too deep; otherwise, as many as 10 a day would have made direct hits.

We all came to appreciate the effectiveness of the Navy's underwater fleet. Show us the man who doesn't respect the torpedo speeding directly at him!*

After sundown the 5- and 16-inch batteries were put to work firing on target sleds towed by tugs.

These night-firing exhibitions were spectacular and, in fact, enjoyable once we got used to the roar of the 16's and the ear-splitting cracks of the secondary battery.

Barrages began with the 5's firing star shells to light up the target. Then, its turrets trained, the main battery let go with 2,700-pound calling cards.

These weighty shells are sped by brilliant orange flames flashing 30 feet beyond the muzzles. Instantly, light vanishes, and the ship is left in darkness. As your ears recover, you hear the shell cleaving the distant atmosphere. The sound resembles the swoosh of a jet plane. Long after firing has ceased, you remember the shell's weird moan.

Midshipmen Get Air Training

Meanwhile the second classmen, quartered aboard the carriers, were getting instruction in naval aviation. In Avengers and Helldivers they made observation hops lasting two to three hours. The purpose of these flights was to acquaint them with air power's role in naval tactics.

Riding rear seats, they were in constant communication with their experienced pilots, who gave them a play-by-play description of what was going on. Before each flight they were briefed in ready rooms along with the pilots, and on landing they returned to get a full explanation of the maneuvers.

Four days out of Annapolis one plane went into the drink. Within five minutes pilot and midshipman were picked up by a destroyer, while an anxious helicopter hovered overhead.

Between firing runs we cleaned, scrubbed, and painted *New Jersey* to make her shipshape for home-coming.

Heretofore, first class had told us, "Scrub that hatch," but now our class ran the show. Classmates served as division officers and bosun mates.

Realizing that leave was but a few days away, we sang lusty chanteys as we worked. Decks and brass were never cleaner.

Jersey's Anchor Rattles "Home"

As the Task Force steamed up Chesapeake Bay, we packed our gear and said "So long" to the Navy regulars who had been our shipmates.

We appeared off Annapolis the night of August 25-26, and, as tradition demands, the senior class's "anchor man" (who has the lowest standing) knocked open the pelican hook of the anchor chain. The huge links rattled across the forecastle and the hook splashed home.

Dawn lit the Chapel dome and the radio towers on Greenbury Point. Motor launches put out to meet us. Midshipmen's cruise was over.†

* See "Your Navy as Peace Insurance," by Fleet Admiral Chester W. Nimitz, National Geographic Magazine, June, 1946.

† For additional articles on the U. S. Navy, see "National Geographic Magazine Cumulative Index, 1899-1947."

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Kodachrome by Alexander G. B. Goodyear

Good-bye, Textbooks—Hello, Salt Water! 2,100 Midshipmen Start a Training Cruise

Carrier, battleship, and destroyer lead *New Jersey* on the Naval Academy's first cruise into north European waters in nine years. Middies, putting classroom theory into practice, learn shipboard duties.

Kodachrome by B. Anthony Stewart

On a Carrier's Bridge, an Array of Eager Faces Scans the Prospect of Liberty on a Foreign Shore

Randolph's starred ribbons show she served in the Atlantic and off the Philippines, and was hit twice during three Pacific battles.

On the Captain's Deck, Academy Officers Get the Day's Orders

"All hands to quarters for muster!" This call dates back to the earliest days of the United States Navy. Upon hearing it, *New Jersey's* midshipmen officers hurry to the captain's forward deck.

Here the midshipman unit executive officer reads the morning's orders and sets forth the current "do's" and "don't's" for the Annapolis contingent.

Wearing dungarees, seven first-class midshipmen division officers take notes. Later they'll pass out all the "hot dope" to their shipmates at division parades.

Men in the front rank are naval officers attached to the Academy and assigned to the cruise to instruct the midshipmen.

Kodachrome by Alexander G. B. Governor

Kodachrome by Alexander G. R. Gourvitch

New Jersey's **Liberty Party Skims past *Wisconsin* on Its Way to Inspect Guantánamo Bay and the Cubans**

Soft hats with narrow blue bands denote midshipmen youngsters just graduated from the plebe class. Visored caps are worn by first classmen, or seniors.

"All Hands Air Bedding!" The Order Rings Every Guntub and Festoons the Life Lines

On a sunny day once every two weeks the call is sounded over the ship's public-address system. Soon topsides are covered with blankets, mattresses, and flapping white mattress covers. Seagoing "housemaids" (right) seize the chow-hour opportunity to play cards, write letters, and acquire a sun tan.

Kodachromes by Alexander G. B. Grosvenor

Kodachrome by Alexander G. B. Grosvenor

When the Boatswain's Mate Pipes, "Now Wash Down and Dry All Weather Decks," Barefoot Admirals-to-be Turn To with Squeegees

Under the watchful eye of a first-class midshipman "bosun," second-year men dry the deck lest evaporating sea water streak it with salt.

Paint the Bulkheads! Shine the Brass! Youngsters Learn the Navy Way that These Tasks Are Never Finished

Ten minutes after the middies had shined turnbuckles and pelican hooks on the life lines (right), salt air tarnished them again.

Kodachromes by Alexander G. B. Grosvenor

Kodachrome by William J. Aston

From the Sky, an Officer Drops In on *New Jersey* for a Task Force Conference

Each morning a helicopter delivered the *Cruise News*, the squadron's daily newspaper, published aboard *Wisconsin*. Always an interested group turned out with cameras. Here the battleship refuels a destroyer.

IX **Summer's Classes Move Topside. Youngsters Get a Lecture on Seamanship**

Three one-hour drills a day remind these "world tourists" that they're still students.

Kodachromes by Alexander G. B. Grosvenor

Reservist and Academy Man Team Up to Fix Their Ship's Position by the Sun

Some 100 ROTC (Reserve Officers' Training Corps) men made the 1947 training cruise. One of them holds a stop watch while his Annapolis shipmate shoots the sun with a sextant.

Kodachrome by Alexander G. R. Genereux

Nursing a Tanker, *Wisconsin* Gulps Thousands of Gallons of Oil. *New Jersey* (Right) Makes Ready to Refuel at the Same Time

These two 45,000-ton battleships, both combat veterans, have been retired to the "mothball fleet" owing to lack of manpower.

XI A Novice Learns How to Load 40-mm. Antiaircraft Shells

Ammunition and guns are dummies, producing only loud noises.

Left: An officer prepares to ride a "Halsey chair" across a taut line to a ship alongside. If the lines slacken, he'll get a ducking.

Kodachromes by Alexander G. B. Grossner

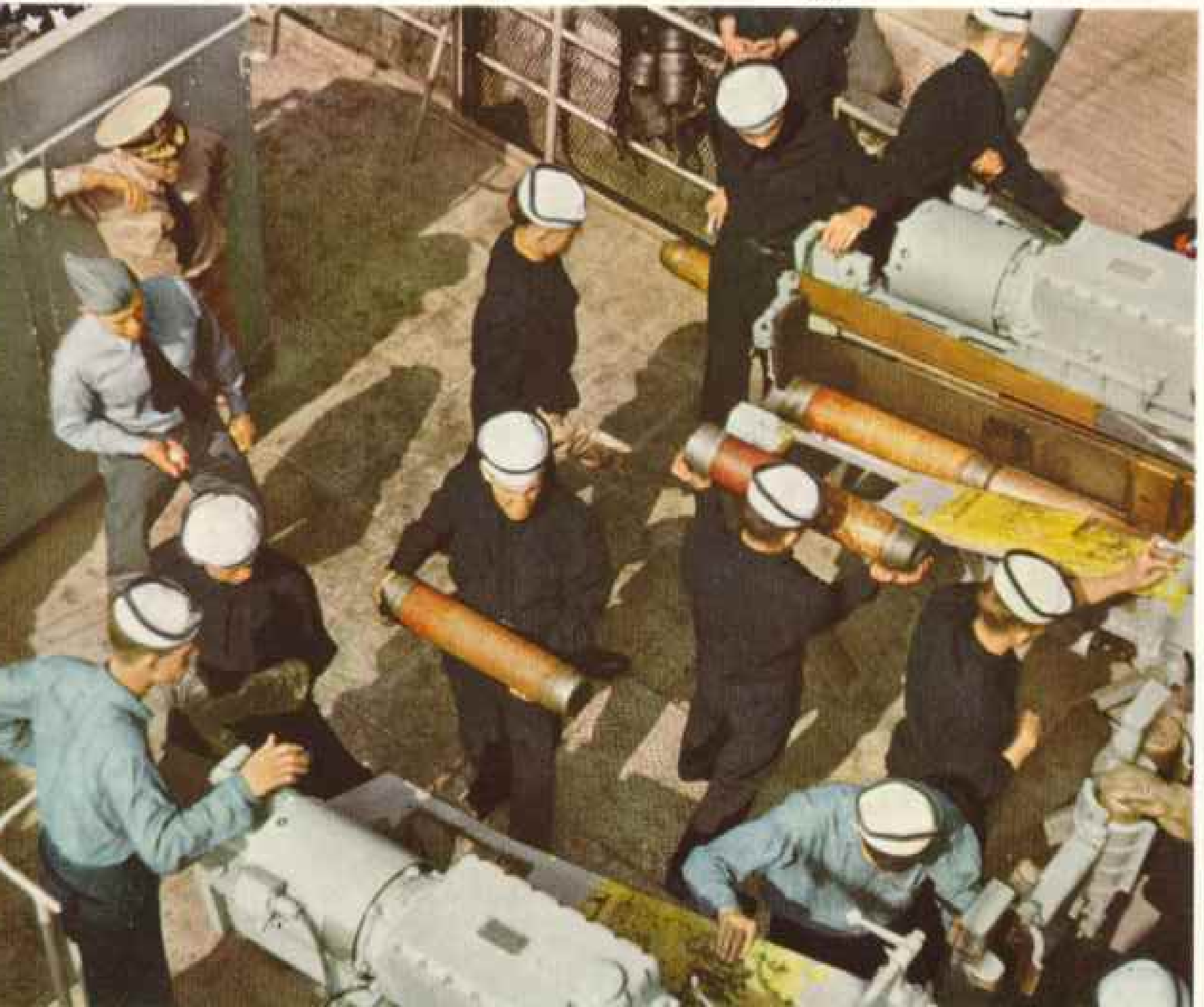
Kodachrome by Alexander G. B. Genereaux

New Jersey's 16-inch Guns Scowl on Midshipmen Making Merry in a "Happy Hour," Their Own Uninhibited Horseplay

Here, to the crew's delight, the boys are free to caricature the skipper or exec. Boxing and wrestling exhibitions are always popular.

Gun Loaders, Timed by Stop Watch (Left), Train for Speed on a Dummy 5-inch Mount

Faster and faster they heave in powder cases and shells, until they become as proficient as bluejackets. This practice loading machine duplicates an actual gun save for twin barrels and turret housing.



100 Pounds of Backache

"Pass the Ammunition" is more work than song. Hauling the tins up six decks quiets any singing.

Kodachromes by Alexander G. R. Genereux

XIV Toy Planes, Steered by Radio, Give Middies Practice in Antiaircraft Gunnery

Usually the battleship's gunners fire at sleeves towed by a carrier's planes. Now these catapult-launched drones, diving and twisting, will simulate the unpredictable tactics of *kamikaze* pilots.

Kodachrome by Alexander G. B. Grosvenor

Youngsters Use Elbow Grease to Haul Overflowing Laundry Bags Aft: Guantánamo Bay

As most ships are equipped with washers, only an ambitious lad need do his own laundry. The chance of getting it all back is almost nil, but that's better than doing it yourself.

 Kodachrome by Alexander G. B. Grosvenor

Middies Soak Up Lifeguard Tan in the Caribbean to Impress Their Girl Friends

Kodachrome by Alexander C. B. Gholstone

New Jersey's Guns Are Muffled; the Heads of Fighting Men Are Bowed in Prayer

Under the open sky, divine service was held each Sunday, just as it was at the Naval Academy's chapel during the school year. Men were not required to attend, but usually all turned out.

Kodachrome by R. Anthony Stewart

Scotland! The Highlands! A Boatload of Anticipation Approaches the Forth Bridge

From 10 a. m. until midnight naval education ceased so that these midshipmen and enlisted men (soft caps) might broaden their horizons. Five days' liberty in Edinburgh taught them that Scots were much like Americans.

Kodachrome by B. Anthony Stewart

Yanks and Scots Exchange Visits. Liberty Boats, Having Landed Midshipmen, Take On Civilians for a Tour of the Squadron

On a Misty July Morning Three Scottish Lassies Proudly Show Two Americans the Sights of Edinburgh

"Auld Reekie" lives up to its smoky reputation as a train steams past. The old castle rises above Princes Street Gardens. On fair days the park and hillside were dotted with midshipmen and their "drags" (girl friends). Huge crowds gathered when Navy bands from the squadron gave concerts in the park.

Kodachrome by B. Anthony Stewart

Midshipmen and Schoolgirls Look Down from the Parapet of Edinburgh Castle into Princes Street Gardens

Tall Gothic spire is a monument to Sir Walter Scott. The railroad station-hotel's clock gleams through the mist (right).

A Highland Sentry Leads a Tour of the Castle, Stronghold of Scottish Fighting Men for 13 Centuries or More

This veteran sergeant bears the sly look of William Bendix, the motion-picture actor, bent on a rascally mission. In fact, he is entertaining the Americans with a horror story of what Scotland's national drink will do to their insides if they don't watch out.

Kodachrome by Melville Bell Grosvenor

Lads and Lassies Practice a Highland Dance on the Sod in King's Park, Edinburgh

Here the photographer got unexpected recruits when a band of children, going home from school, stopped to watch proceedings. Arthur's Seat, a hill of volcanic origin, rises in the background.

© National Geographic Society. Kodachromes by B. Anthony Stewart.

Partners Whirl in the Strathspey and Reel; a Midshipman Takes a Bagpipe Lesson

These girls are the champion Highland dancers of 1947. They are to Scotland what prize-winning bathing beauties are to the United States. Girls wear Napier tartan (left, below) and dress Buchanan.

Kodachrome by B. Anthony Stewart

Midshipmen Love Photography. At Times the Cruise Resembled a Camera Club in Action

This young man takes a color shot of the Princes Street floral clock. Edinburgh's music festival accounts for the composers' names. A ladder enables the gardener to pull weeds without injuring the flowers.

XXV Scotland and America Cement a Friendship Beneath an Umbrella Built for One

The girl on the right is the hostess at an Edinburgh garden party (below).

Kodachrome by Alexander H. B. Grosvenor

Kodachrome by R. Anthony Stewart

A Toast to Four Fair Lassies Is Proposed in Scotch and Drunk in Tea

A. H. Alexander (right), an automobile distributor, gave the party for the midshipmen. His daughter, Joan (foreground), invited three of her girl friends. Everyone looks happy but the dog.

Thatched Roof Realizes the American Vision of Rural England

From the standpoint of comfort, thatch has no advantage over slate or shingle. In fact, some tenants complain that the straw invites nesting birds and mice.

However, thatch appeals to persons who love to re-create the past, especially those of retirement age. Where an aging American dreams of settling down on a Florida houseboat or in a California orange grove, an Englishman creates fond images of a thatched cottage in a cool, green village.

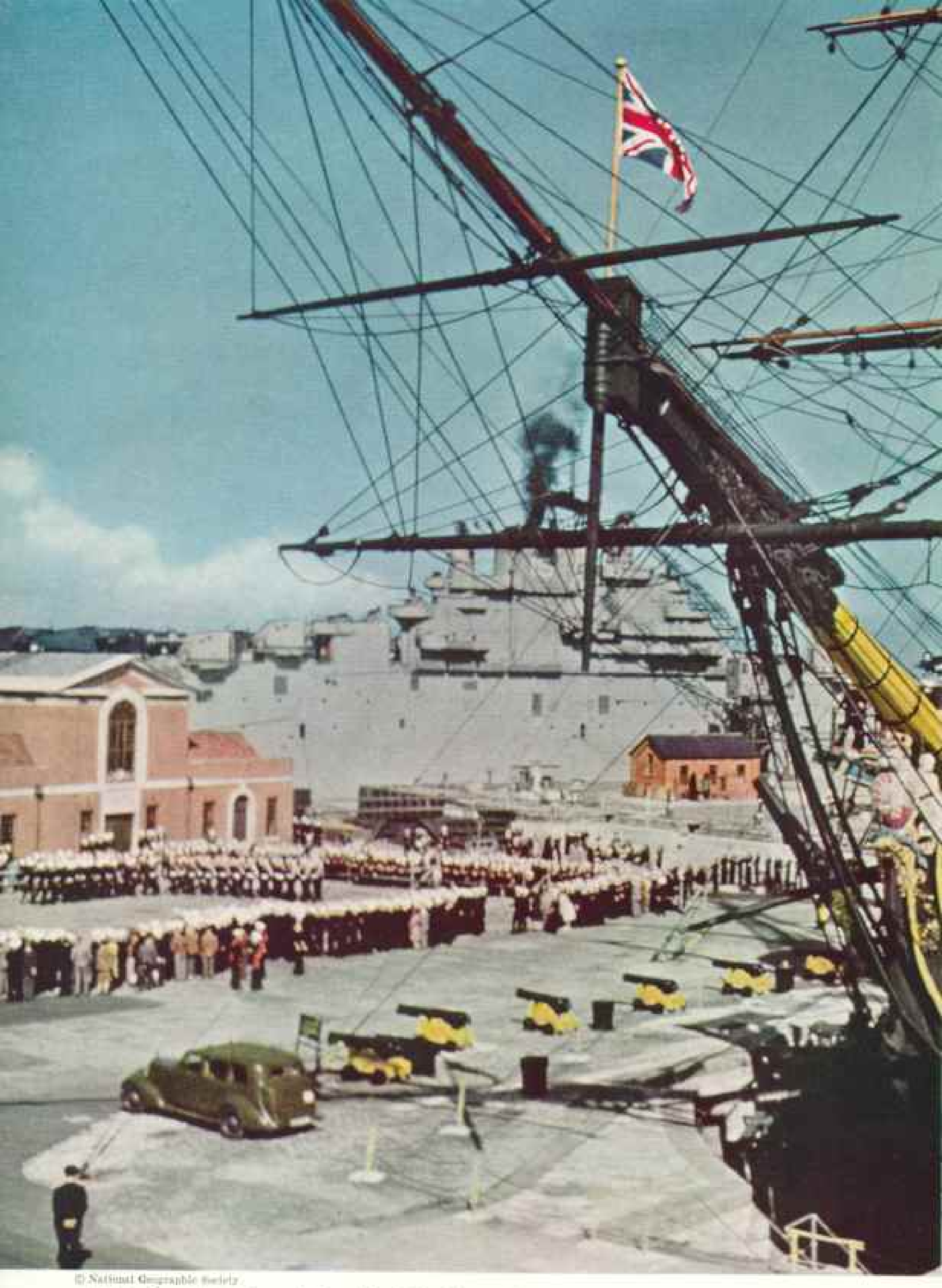
This elderly cyclist spent a large part of his life in the American Tropics. Upon finishing his work, the construction of a railroad in Brazil, he retired to Ringwood, a village on the outskirts of the New Forest.

Having read of the midshipman's visit to near-by Portsmouth (Plate XXVIII), he was not surprised one day to find them pointing their cameras at his home. Pleased by their admiration, he invited them to tea with his wife.

Kodachrome by B. Anthony Stewart

Who Built It? When? And Why? Middies Ask at Stonehenge, Prehistoric Britons' Monument to Forgotten Gods

Archeologists believe this circle served as a sepulcher or a sun temple. Britain's guided tours made a hit with the Annapolis lads.



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U.S.S. *Randolph*, Commissioned in 1944, Moors Close to H.M.S. *Victory*, Launched in 1765

At Portsmouth docks the American midshipmen form a square and watch British seamen drill and perform the sailor's hornpipe in their honor. Admirals of the two nations review proceedings from *Victory's* deck.

Kodachrome by R. Anthony Stewart

On the Quarter-deck Lord Nelson Fell Mortally Wounded at the Battle of Trafalgar

Victory carried the flags of many famous admirals. Under Nelson, she saw Napoleon's hope of naval supremacy dashed. Englishmen make pilgrimages to *Victory* as Americans do to Mount Vernon.

Kodachrome by B. Anthony Stewart

A Jungle of Weeds and Wildflowers Grows on the Grave of Historic London Landmarks

Midshipmen, guidebooks in hand, survey the bomb damage around St. Paul's, which escaped destruction as if by divine intervention.

Off Portsmouth a Nostalgic Band Stands on *New Jersey's* Stern and Watches *America* Sailing Home

Soon the midshipmen will head south to Cuba. Just ahead of the liner, an antiaircraft island springs out of the Solent.

Kodachrome by Alexander G. B. Grosvenor

XXXII A "Beefeater" Guides an Annapolis Company Through the Tower of London

Yeomen warders, a semimilitary force uniformed in antique style, are quartered within the Tower with their families. This man got his job as a reward for war service (note his ribbons).

Kodachromes by B. Anthony Stewart

A Scarlet Mob Queries a Future Officer about the Hard Life of an Old Salt

These lads attend Melville College, a public (meaning private) school formerly called Edinburgh Institution. How they keep jackets clean can be answered only by the fact that they don't wrestle in them.

Sea Bird Cities Off Audubon's Labrador

By Arthur A. Allen

Professor of Ornithology, Cornell University

With Illustrations from Photographs by the Author

FROM vast reaches of the sea, bizarre birds congregate to breed on islands in the Gulf of St. Lawrence south of the lonely Labrador Peninsula, which John James Audubon more than a century ago called "wonderfully grand, wild—aye, and terrific."

Those adjectives still apply, as we discovered on a trip for the National Geographic Society to photograph in color the sea birds the great naturalist painstakingly drew and painted. Often he worked 17 hours a day to draw details of color and form that cameras now catch in split seconds.*

All traffic to the north shore of the Gulf is by boat in summer and dog sledge in winter, or by plane, since no roads reach into this wild region. Though actually a part of Quebec, it is still often called Labrador as it was in Audubon's day (map, page 759).

Kittiwake Homes on Sheer Cliffs

Leaving our station wagon at Rimouski, Quebec, on the broad estuary of the St. Lawrence River, Mrs. Allen and I boarded the steamship *Matane I* and arrived next morning at Seven Islands (Sept Iles), on this coast of storms. There we were met by Game Warden Ben Bijoud, who had instructions from Ottawa to take us to the bird sanctuary on Carrousel Island near by. Like everyone else on the coast, he went out of his way to be helpful.

It was June and a new generation of birds was just emerging. On two of the vertical cliffs facing the sea we found 300 nesting kittiwake gulls.

Kittiwakes derive their name from their three-syllable call. About the fishing banks they are among the most familiar birds, especially in winter. Then they often assemble in thousands and are known as "winter birds." They never venture inland, however, and are rare even about the harbors, where they are called "offshore gulls."

Unlike most other species of gulls, the kittiwakes always select narrow shelves on sheer cliffs for their homes and build substantial nests of seaweed which will not blow off in the storms that so often batter the rocks below.

Landing at the foot of the cliff in the lighthouse keeper's boat, we rigged up a blind on a ledge about 20 feet from the nests.

Luckily, the birds paid little attention to the blind. Soon after the boat disappeared, they came back, and I was able to observe them at close range. Their dark eyes gave them a much gentler expression than the pale-yellow eyes of other gulls on this coast, and their small black feet were likewise distinctive.

Day-old youngsters, visible in some of the nests, were covered with fluffy pale-gray down without the dark spots that are so conspicuous on most young gulls.

My contemplation of the home life of these interesting visitors from the high seas was suddenly interrupted by a gust of wind that caused the blind to careen. In my efforts to hold it in place, I felt one foot slip from the ledge and had a momentary vision of camera, blind, and photographer plunging into the sea thirty feet below.

It proved fortunate that we made photographs the first day, because thereafter we had high winds or fog which would have made the approach to the cliffs most dangerous.

On Carrousel Island there was also a colony of some 1,100 herring gulls. A few great black-backed gulls, or "saddlebacks," and a couple of hundred razor-billed auks and black guillemots were incubating their eggs in the numerous fissures in the rocks. About 150 eider ducks were breeding on the island, and more than 300 double-crested cormorants could be seen nesting in the tops of the dead spruces on the highest part of the island.

Miss the Boat and You Wait a Week

From this lonely rock of whirring wings and raucous, haunting cries, we returned to Seven Islands to catch the steamship *Sable Isle*, scheduled to dock the next morning at 6 on its way to Harrington Harbour.

* Dr. Allen, a pioneer in color photography of birds, is making a comprehensive series of color plates of the principal species in various sections of North America under a grant of funds from the National Geographic Society. One hundred and nineteen of his remarkable color photographs of birds have appeared in previous issues of the National Geographic Magazine as illustrations for the following articles: "Birds of Timberline and Tundra," September, 1946; "Sights and Sounds of the Winged World," June, 1945; "Touring for Birds with Microphone and Color Camera," June, 1944; "Birds on the Home Front," July, 1943; "Ambassadors of Good Will," June, 1942; and "Stalking Birds with a Color Camera," June, 1939, all by Arthur A. Allen. Dr. Allen's contributions to the National Geographic Magazine also include "Hunting with a Microphone the Voices of Vanishing Birds," June, 1937.

Because of the wind we saw few birds in the spruce woods behind the village. But ruby-crowned kinglets, fox sparrows, redstarts, and yellow-bellied flycatchers were not uncommon; and along a sandy ridge covered with spruce and scattered jack pines we found a pair of yellow palm warblers, as Dr. Harrison F. Lewis had promised us we should.

It was Dr. Lewis who first introduced me to this coast in 1928. Then Chief Federal Migratory Bird Officer for Ontario and Quebec, he had explored the north coast for sites for sea bird sanctuaries in 1925, as provided for by the treaty of 1916 between Canada and the United States for protection of migratory birds. His successor, Dr. Oliver H. Hewitt, was awaiting us at Harrington Harbour.

Not at 6 but at 4 in the morning, Mr. Bijoud rushed to the inn with the news that the *Sable Isle* had already docked and probably would stay only 15 minutes. We were dressed and had moved our 12 pieces of luggage to the pier in 14 minutes and 55 seconds.

This was our first taste of the advertised "vagabond cruises" along the north shore. Because of whims of wind, fog, and tide, no definite schedule of arrival and departure can be maintained, and the passenger who isn't ready will wait a week for the next boat.

Once aboard, if he is lucky he gets a cabin, but if there are many passengers—and there often are—he may have to be content with the dining salon upholstery.

Decks are crowded with oil drums which, though empty, permeate the air with the odor of seal or cod. At his destination the "vagabond" is as likely to be cast ashore in the middle of the night as at noon, and he may walk down a gangplank in a dignified manner or climb down a ladder into a bobbing dory.

After braving the chill blasts that whipped off the icebergs to the east, we found a warmish spot in the lee of the pilothouse where friendly fumes from the kitchen poured out of a ventilator.

Montagnais Indians Crowd the Wharves

Most of our fellow passengers were fishermen and small businessmen traveling from town to town. But some were sportsmen heading for clubs on the Moisie, the Godbout, or other famous salmon streams, and still dreaming about the big ones that got away last year.

Others were young men taking summer jobs with construction companies. A few were girls returning from school or employment in Quebec and Montreal and looking forward to the simple pleasures of their rugged homes.

On the boat was an interesting admixture of Anglican ministers and Catholic priests. Their flocks included many Montagnais Indians, who crowded about the wharves to shake the clergyman's hand and hear his words of encouragement—the men white-jacketed and gaunt, the women bulky and ungraceful in their voluminous multicolored petticoats and tight bodices.

Invariably the Indian women dressed their black hair as of old, rolled into buns over their ears. Atop this coiffure they perched their time-honored but unbecoming liberty-bell hats, broadly striped with red and blue.

Despite their uncomfortable costumes, their bowlegs and swinging hips, the women are remarkably hardy. Women and children travel with the men up the rocky streams for hundreds of miles in late summer to trap all winter in the interior.

They all come out in the spring to trade their furs at the Hudson's Bay posts for the next year's provisions, but during the summer they loiter about the posts, do a little fishing, repair their canoes, and rest up for the next trek into the interior.

Cold Breath of the Labrador Current

To the eastbound traveler along the coast, the effect of a branch of the cold Labrador Current, which flows through the Strait of Belle Isle, becomes more and more apparent. Trees become stunted and disappear; rocks with a deep covering of reindeer moss, curlewberry, and other creeping or sprawling vegetation take their place.

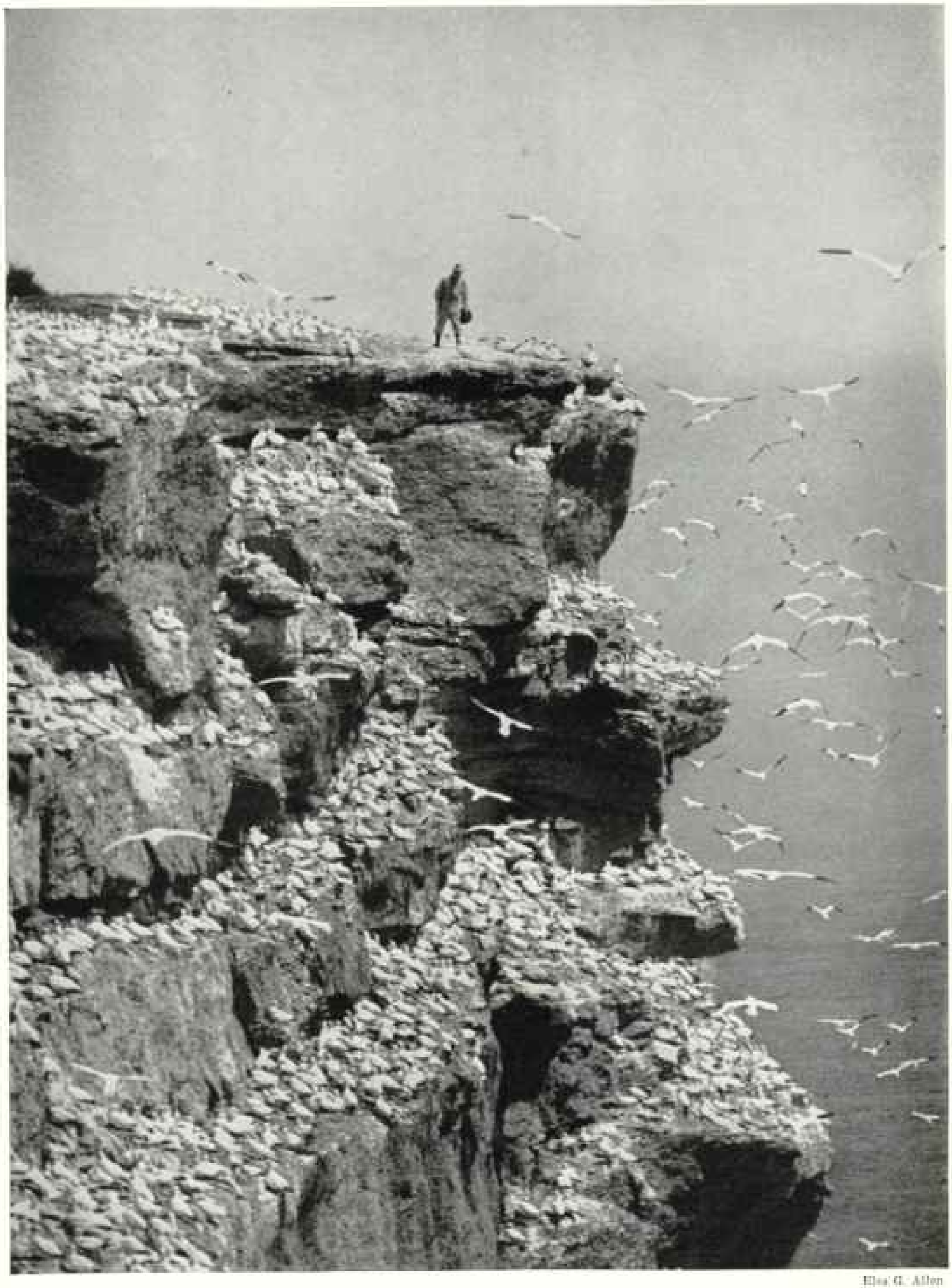
The shore for hundreds of miles is broken up into innumerable islands surrounded by waters studded with rocks and reefs which plague the mariner.

Trees, sometimes of fair size, grow along the sheltered stream valleys on the mainland, but elsewhere, for every acre of trees, there are a thousand acres of moss stretching far inland until the effect of the Labrador Current is finally lost.

The interior is heavily forested, but adjacent to the cold water Arctic conditions prevail; deep snowdrifts lurk behind the sheltering cliffs, and icebergs float with the current in mid-July.

We reached Harrington Harbour in two days. There we were met by Dr. Hewitt and his boatman, Samuel Robertson V, in the patrol boat *Alca of Ottawa*, 38-foot cruiser built on the coast.

The Robertsons have lived at La Tabatière since before Audubon's time. Audubon tells of meeting with Samuel Robertson I at the same spot in 1833. So little has been the change of blood in the population of this coast



Elsa G. Allen

As if a Feather Mattress Had Burst, Gannets Cover Bonaventure Cliffs with White

On these ledges the birds have nested uncounted centuries. Accustomed to sanctuary, they treated the author (hat in hand) with indifference. As they soared past on black-tipped wings with a yard-wide spread, "they gave an impression of abstract power perfectly at home in storm or fog" (page 774 and Plates III-VI and VIII).

Dr. Oliver Austin

"Comparisons Are Odious," Says the Author's Wife

For two hours Elsa Allen twitted her husband for failure to match her four-pound brook trout, caught in the Blanc Sablon River. Then he landed his four-and-three-quarter pounder. On the next day he hooked a monster—"a yard long if he was an inch"—but his tackle snapped and he "quit fishing because the fish were too big" (page 762).

that our Sam had an uncle or a cousin in nearly every port we visited. He himself was as familiar with all the rocks and reefs from Harrington to Blanc Sablon as with his own dooryard, for at the age of 11 he had started carrying the mail with his father, by boat in summer and by dog team in winter.

Seeking Birds in Wind and Fog

It was now June 25, and for the next five weeks the four of us were to live snugly on the *Alca* with all of our luggage and equipment—especially snugly for the last two weeks when we had two more passengers. Fortunately, no one suffered from claustrophobia, although our heads became almost callused bumping the cabin roof, and we suffered miscellaneous bruises when the sea got rough.

Our first official inspection was that of the St. Mary Islands Sanctuary, about 13 miles from Harrington in the open gulf. Here wind and fog have full sway and often isolate Fred Osborne, the lighthouse keeper and caretaker of the sanctuary, for days at a time.

We had good weather the day of our arrival, but during the following week fog, rain, and high wind were almost continuous. At times we could scarcely see the shore from our mooring in the narrow, well-protected harbor, and again we could see waves dashing 40 feet into the air as they hit the outer rocks.

Working fast to seize the few hours of sunshine, we explored most of the sanctuary. We took the bird census and made studies of the common cormorants and murres of Cliff Island, the red-throated loons and black guillemots of Harbour Island, and puffins of Middle Island, and the eiders, auks, and puffins of Middle Island.

Some species, like the murres and cormorants, breed in compact little groups on cliffs which they have occupied since long before records began. Others, like the eiders and black guillemots, scatter more widely, and, although they are often seen in flocks, they nest in isolated pairs.

The guillemots choose narrow crevices in the rocks, the eiders more open spots on the tundra. Never more than one pair of red-throated loons occupies each of the small freshwater lakes, and seldom more than one pair of great black-backed gulls nests in a colony of

Drawn by Theodora Price and Irvin E. Allerton

Thousands of Sea Birds Call Quebec's Rock-bound, Fog-ridden Shores "Home"

From Rimouski to Blanc Sablon the author took a summer's leisurely voyage. On the jagged cliffs of island sanctuaries he and his companions counted 99,000 nesting birds (page 773).

herring gulls or on a rocky headland. In all, there were 16,000 to 17,000 birds nesting in this sanctuary.

Year after year the murres, returning from the open sea, show up on their nesting ledges on the same date, and each bird apparently occupies exactly the same spot it used the previous year.

Murre Returns Yearly to Same Spot

For ten years now, a single Brünnich's murre has claimed foothold on a narrow shelf of Cliff Island facing the sea. Here he stands in the middle of a flock of common murres—the tenth bird from the right and the fifteenth from the left. Storms may rage, but nothing budges him from this particular spot. Of course he leaves it to go fishing, but he returns soon to the same few square inches.

Ten years ago Dr. Robert Johnson, at that time a graduate student at Cornell, banded a black guillemot that was incubating its two eggs in a deep crevice near the mooring in the harbor. When we inspected the crack this year, lo! the bird was there again, for we could see a thin, very worn band on its little red leg.

We had an interesting time on Cliff Island with the European, or "common" cormorants. These are not common in the usual sense, since there are only three or four colonies of them on this continent. The really common cormorant of North America is the smaller, double-crested species, which occurs in one or another of its races from the Arctic to the Tropics and from the Atlantic to the Pacific.

The larger bird, with white bordering its pouch and with a blue-black neck and breast, was originally called the common cormorant because it was found also in Europe and Asia. Some of these common cormorants were still incubating eggs, but the majority had black, woolly young, a few nearly as large as their parents.

After I was safely hidden in a blind and my accomplices had disappeared over the ridge, the old birds returned to their nests all about me. Youngsters were clamoring for food, but no meals were served during the next half hour. I began to fear that I might miss the amazing spectacle, for the fog, which already concealed the sea below me, began to rise and obscure the birds.

Cormorant Cafeteria

At last, however, one little brood that had been stretching up their necks with quivering pouches began to get results. What a party it was, as both father and mother opened their blue-lined mouths and let the children dive down their throats for dinner (page 760).

During this grotesque performance the herring gulls hovered low overhead or darted into the melee whenever one of the youngsters brought out a fish too large for it to swallow.

Absorbed in the antics of the cormorants, I tarried till we had to start back to Harbour Island in fog so dense that we had to depend on the foghorn for general direction and trust to luck to avoid two dangerous shoals. Our thoughtful host became alarmed about us, however, and we had covered scarcely a mile before the chugging of Fred's motor told us he was on his way to guide us among the dangerous rocks. By the time we were back in our harbor, it was dark.

Young Cormorants Ram Their Heads Far Down Their Parents' Throats for Food

Into the gaping lunch basket this Cliff Island youngster thrusts a probing beak and fastens onto the plièce de résistance. Like a dentist pulling an obdurate tooth, he yanks his elder's head from side to side until a fish pops out. Often, when the fish is too big for him to swallow, a watchful herring gull darts down and gobbles it up. These are common cormorants (page 759).

Elsa (Mrs. Allen) had rescued a newly hatched red-throated loon from a black-backed gull, intending to give it for adoption to the pair nesting on Harbour Island. Since it was now too late an hour to disturb the loons, and since someone would have to keep it warm during the night, we matched pennies. Thus it fell to my lot to sleep with a baby loon.

Foster Mother to a Baby Loon

I fashioned a little box that would fit into my sleeping bag—large enough to give me some warning if I turned over on it, yet small enough not to dissipate the heat. The next morning the baby loon was alive and wheezing for a fish. Our next problem was to introduce him to the Harbour Island loons.

By some strange quirk in loon psychology, the youngster now regarded me as his mother. He followed me around the pond and tried to get into the blind with me. We finally had to tie him in the loon's nest until he felt acquainted with his new mother.

Fortunately, red-throated loons (Plate VII) brood their young for some time in the nest where they are hatched, returning to it from their swims on the pond whenever the youngsters get cold. Either loons cannot count or they have that same friendly spirit toward travelers in distress that we noted in the human inhabitants of this area, because I soon observed that the little orphan was definitely adopted.

Returning to Harrington after a stormy week, we visited the Grenfell Mission and hospital, the westernmost of a chain of institutions founded along the coast by Dr. Wilfred Grenfell. He felt the lure and poverty of Labrador so keenly that he devoted his life to these fisherfolk and brought them what they most need in times of distress: doctor's care and hospitals.

More recently the missions have invited teachers to help in developing new home industries, thus adding to the meager income of the families. Now many of the people devote the long winters to wood carving and making hooked rugs, for which the mission finds a ready market. Most of the doctors and teachers volunteer their services, and many a college student has passed a soul-satisfying summer at one of the Grenfell Missions.

La Tabatière, Six-family Town

Our next stop was planned for the mainland at the six-family community of La Tabatière, home of the Robertsons, in an area of stunted Hudsonian forest surrounded by Arctic tundra. Theoretically, such a sheltered area with its innumerable "edges" of woods should have supported an abundance of wildlife, but actually birds were scarce.

Fox sparrows and white-crowned sparrows were the most numerous; Lincoln's sparrows and gray-cheeked thrushes could be heard occasionally; Wilson's and black-poll warblers were not uncommon, and there were scattered Tennessee warblers, mourning warblers, and yellow-bellied flycatchers, which we know as transient visitors in the States in their passage to and from their winter homes in South and Central America.

There were, of course, some robins and juncos, a few red-breasted nuthatches, winter wrens, ruby-crowned kinglets, white-throated sparrows, and yellow warblers, so common much farther south, and a few flocks of crossbills and pine siskins, already finished nesting. The birds were so scattered, however, and the tangled spruces made observation so difficult that we were lucky if we found one or two nests in a morning's hunt.

Although offered rewards, the few children living about the harbor could give us little help. Their eyes evidently were trained for the sea, and the only land birds they knew at all were the dooryard "stripities" (white-crowned sparrows), "brown bobbers" (fox sparrows), and "brown diggers" (gray-cheeked thrushes). We had to content ourselves with studies of the fox sparrow, gray-cheeked thrush, and Wilson's warbler.

Before leaving La Tabatière we enjoyed a fine dinner at the comfortable home of our boatman's parents, Mr. and Mrs. Sam Robertson IV. Although isolated from centers of culture and industry, they keep in touch with the world of affairs by radio, and the mail-order houses enable them and their scattered neighbors to enjoy many modern conveniences.

The mail boat, piloted by Sam's brother, arrived while we were there, piled high with bags of parcel post, but with only half a bag of first-class mail for the whole coast from Harrington to Blanc Sablon.

From La Tabatière a few hours' run took us to Gull Island in St. Augustin Sanctuary and a fine colony of ring-billed, herring, and great black-backed gulls, as well as eider ducks. A little flock of green-winged teal and a few black ducks were frequenting one of the ponds; also a couple of least sandpipers and a greater yellow-legs. But none of these was nesting.

I was surprised to find eider ducks nesting within 15 feet of black-backed gulls' nests, since the birds apparently are ancestral enemies (Plates VII and VIII). The gulls never miss an opportunity to steal an egg or carry off a young eider. Indeed, the saddleback is the most unpopular bird on the coast because of these depredations.

Even among the fishermen, who, formerly at least, were accustomed to taking the eiders' eggs for their own use, the sight of a saddleback doing the same thing arouses anger; when they see one pounce on a young eider, they become quite vindictive. Often it is their own approach that gives the gull his opportunity, for the boat frightens the mother away and leaves the ducklings unprotected.

The great black-backed gulls have learned to watch for just such eventualities, and many times we ourselves, after passing a family of eiders and scaring away the mother, looked back to see a pair of blackbacks harrying the little flock. If the mother did not promptly return, the youngsters would keep diving until exhausted and then were easy prey.

Eider Routs a Black-backed Gull

I set up a blind one morning near a blackback's nest and some ten feet from an eider's nest, and awaited the arrival of either bird.

The eider came first, flying to a small pond about 100 feet from the nest and walking the rest of the way. Evidently she did not like the blind. She sat down on the rocks about 15 feet from her nest. Because of the location of the gull's nest on the end of a little ridge, her enemy's natural approach was past this rock, unless he flew directly to his nest.

Finally the gull circled about, landed beyond the duck, and started to walk past the rock where the duck was contentedly resting.

Never have I seen greater fury than the bristling rage that greeted this gull when he started to enter the eider's territory. All her feathers stood on end, her bill opened, she made jabbing motions in his direction, and then she flew at him with such force that she bowled him over.

Picking himself up, the gull grabbed a small stick in his bill and advanced toward the eider; but once again she ruffled her feathers and pointed her bill, bringing him to a dead stop. Wanting nothing more to do with such a vixen, he turned tail, walked away 25 feet, and nonchalantly sat down. There he sat for an hour.

I was obviously threatened with a stalemate. At last, however, the gull took wing, circled about, and dropped beside his eggs in an evidently unaccustomed position. He kept twisting and turning, but could not decide how to approach the eggs from that side.

What was the final outcome of the placing of the two nests in such close proximity I never learned, but I left with a feeling that, when man does not interfere, the eiders can take care of the saddlebacks all right. Undoubtedly they were doing so long before Leif the Lucky sailed the Labrador coast while searching for Vinland.

The Basin a Kettle of Fish

From Gull Island we continued our cruise in the *Alca* to Thomas Tickle, a beautiful steep-sided harbor which lay that night under a full moon. The next morning a rough run of three hours brought us to Bradore Bay. How that boat did roll! We were glad to get into the sheltered retreat of the Basin, even though it was the rendezvous of fishermen having a successful season with their cod traps.

One of the schooners, we were told, had taken 100 quintals of fish from its net one morning and found it equally loaded at night. A quintal is 112 pounds of salted, sun-dried codfish; it represents about 50 six-pound fish.

In other words, the fishermen took approximately 10,000 six-pound fish from their net in one day. That was, of course, unusual, but catches of 3,000 fish were frequent during our stay.

Stay we did for five days, because when the wind was not whipping up the sea, the fog was so thick that it would have been madness to venture forth. There was nothing we could do but read or write, but the fishermen had a full-time job and went right on cleaning their fish into the harbor.

The Basin is very shallow and the water is clear. For acres about us the bottom was white with the heads and viscera that poured overboard in an endless stream from the three schooners anchored near by. The livers were collected in hogsheads to make vitamins for pale people, and the fish themselves were split, salted, and stored away in the holds, to be dried later at Harrington or in Newfoundland at the home ports of the fishermen.

About the Basin are a couple of "summer homes" with their stages and fish sheds, but most of the fishermen come here from elsewhere, as they or their ancestors have been doing since long before Audubon's day. The two fish sheds had bars nailed across their doors and white flags flying from their roofs, indicating that they were full.

Elsa took one look at the bottom of the harbor and two whiffs of the air before she again sought refuge in the *Alca's* cabin.

But the Bradore Bay area had its pleasant side also, for though the weather prevented moving the *Alca*, we could go ashore in the dinghy and tramp the island in which the Basin is located, or row the mile to the mainland, when it was not too rough, steering by compass when we could not see through the fog.

We found a little trout stream with a couple of youngsters fishing. My first cast hooked a richly colored 10-inch speckled trout; and the boys, who were using improvised lines and bits of bacon for bait, yelled out, "That's a good hook you've got, Mister."

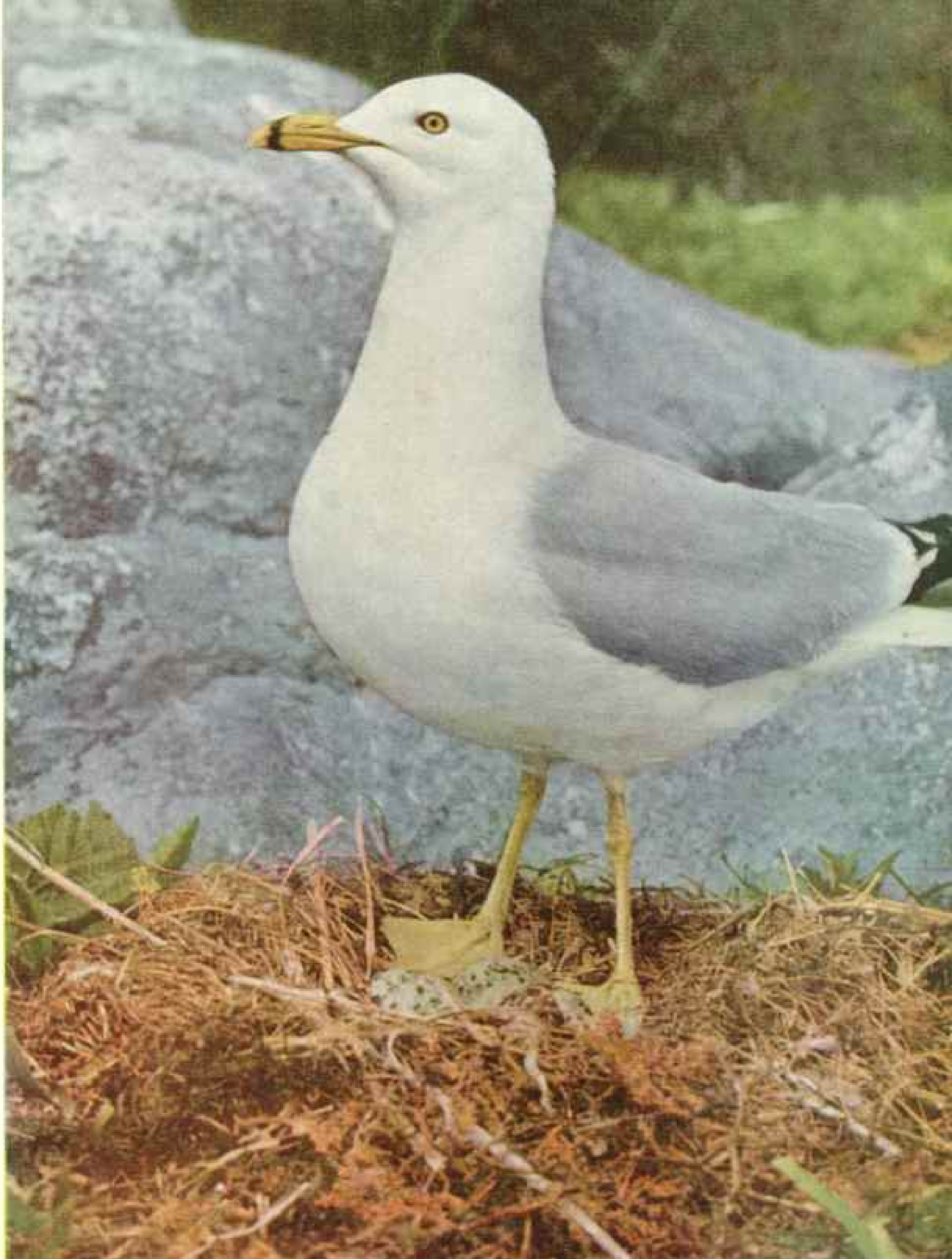
It didn't take long to fill the creel with small trout up to 15 inches in length, and we felt a bit set up, thinking back on the puny 7- and 8-inch ones at home. We did not know what was in store for us at our next stop at Blanc Sablon, where we were again marooned for three days.

The Blanc Sablon River is a much larger stream, stemming from a fair-sized lake some two miles inland and meandering down through the scrubby spruces and muskeg over a sandy bottom to the sea. The tide is not strong at this point, but it did not look like a trout stream to me. Nevertheless, we were shown a pool near the village, where it was said the fishing was good at the change of the tide.

Sure enough, when the stream began to flow out with the tide and the water was littered with bits of seaweed, the trout began to rise—not 10- or 12-inch fish, but 2- and 3-pounders. Elsa hooked a 4-pounder and by careful maneuvering slid it up on the sandy beach without a landing net. For two hours she lorded it over me. Then I hooked one that weighed four and three-quarter pounds on the Hudson's Bay Company scales, and my ego returned (page 758).

Fish Too Big—Quits Fishing!

The next day the storm continued, and Ollie Hewitt and I explored the river as far as the lake. On the way back we discovered a small pool, at the foot of the first rapids, in which lay a half dozen of the largest fish I had ever seen in a trout stream. They were probably salmon, but I shall never know, because my



Kodachrome by Arthur A. Allen

Whether to Sit and Warm the Eggs or Stand and Face the Camera—That Is the Question

Six feet away, the photographer's blind poses a problem for this ring-billed gull. Fish are her daily bread, but when migrating across prairies she accepts grasshoppers caught on the wing.

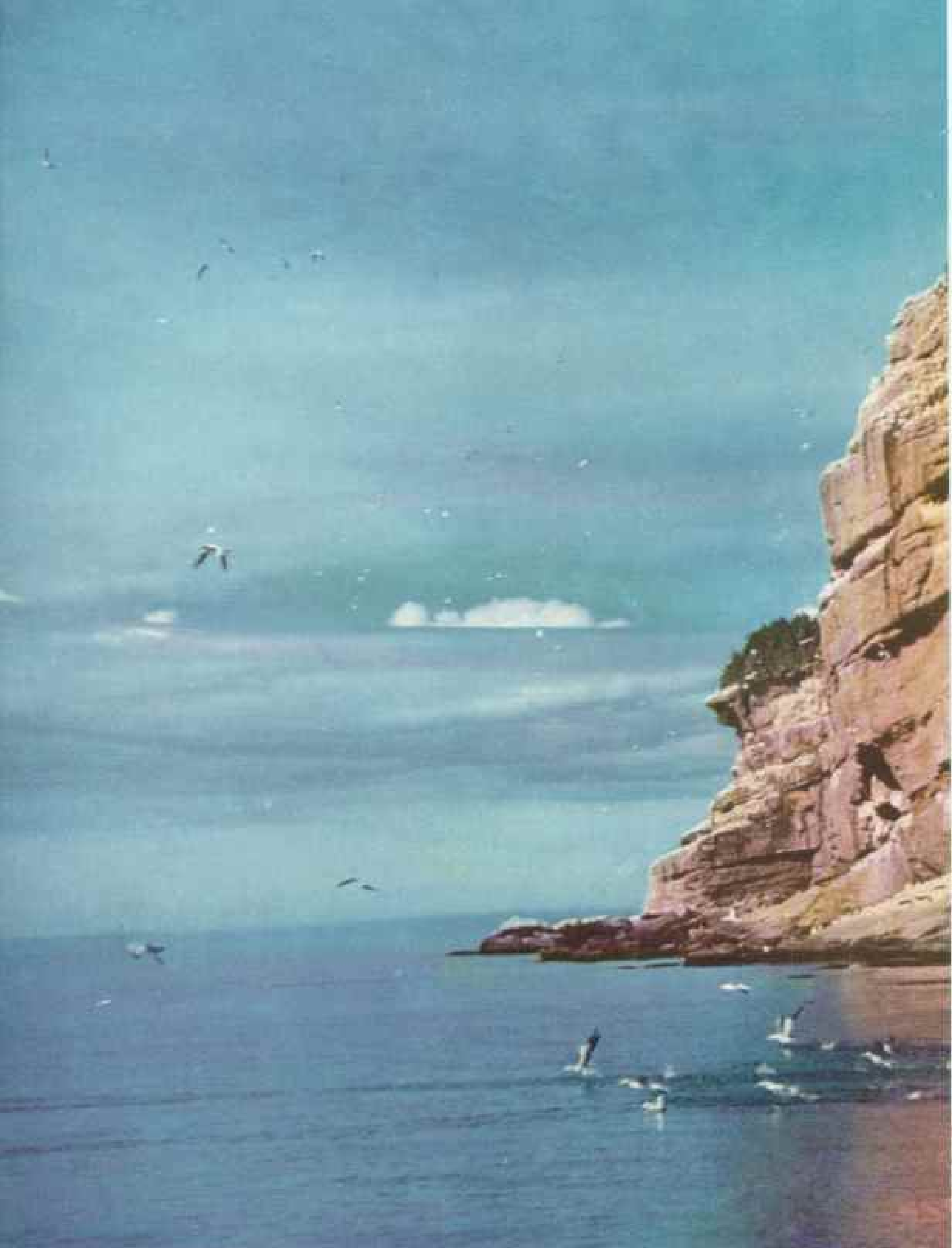
Kodachrome by Arthur A. Allen

In White Shirts and Black Jackets, the Atlantic Murres Wear Formal Dress in Their Rock Nursery

To this barren island the colony returns every May, each pair to raise a single chick. Nests they disdain; eggs go on the bare rock. Each egg is pointed so sharply that, instead of rolling away, it pivots in a circle. Mix the eggs; each pair restores its own. "Murre," the alarm cry, named the bird.

There's "No Vacancy" on Bonaventure Island, off Gaspé Peninsula. Gannets and Their Young Blanket the Ground Like Snow

Kodachrome by Arthur A. Allen



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18,000 Loving Couples Nest on Bonaventure, the Sea Birds' Skyscraper City

Once fishermen slaughtered gannets for bait; now Canada protects them. Powerful flyers, they cruise 100 miles a day or more for food. *Gannet* has the same origin as *gander;* solan goose is another name.

Kodachrome by Arthur A. Allen

Gannets Bleach Penthouse Ledges; Gulls Stake Claims on the Ground Floor

Gannets spear fish with 100-foot dives from the air, splashing water 10 feet. Their skin's pneumatic cells cushion the blow. Fish nets 14 fathoms deep have trapped diving gannets.

Kodachrome by Arthur A. Allen

Like Marble Statues, Bonaventure's Gannets Stand in Cold, Motionless Dignity

An overstuffed youngster looks like a black-tipped powder puff. Born nearly as bare as a human, he now wears down. At 13 weeks he'll outweigh his parents, so he must starve and reduce before flying.

VII Water's Expert Swimmer, the Red-throated Loon, Is Land's Clumsy Waddler

Her kind summers across the entire Arctic. Florida sees some in winter; then the red throat mark disappears. Weird and harsh, the loons' maniac cries have been mistaken for the yells of attacking Eskimos.

Kodachromes by Arthur A. Allen

Mamma Eider Plucked Her Breast to Line Her Unborn Children's Home with Down

This American eider nests off Quebec, where surplus down is gathered to make soft, warm quilts. Once the ducklings have hatched and dried, they run for the sea. Mothers often pool broods into flocks of 50.

VIII **Wings Stretched, Head Wagging Side to Side, a Gannet (Left) Avows His Love**

Three birds (right) remain aloof. Another grooms its tail. The remaining one, bestowing a benevolent look, admits she's touched. Gannets thus perform before their young, as if to teach courtship ritual.

Kodachrome by Arthur A. Allen

Great Black-backed Gull, the Atlantic Pirate, Nurses a Brood of Little Buccaneers

Lacking fish, this bold bird steals the eider's eggs and downy young. Blackback is the largest gull along our eastern coast. Occasionally it visits Florida. Usually it leads a hermit's life, shunning large flocks.

tackle in my inexperienced hands was too light for them.

The first one took the same fly that had landed the big trout the day before. He started up the rapids some ten yards until I knew I had him well hooked.

What I should have done at this point I do not know, for the fish certainly had things his own way. With a rush he cleared the water—a yard long if he was an inch! My only heavy leader parted in the middle. For the first time in my life I quit fishing because the fish were too big!

The following day the weather cleared somewhat and we were able to see the northern tip of Newfoundland across the 20-mile Strait of Belle Isle. We headed back toward Perroquet Island in Bradore Bay Sanctuary, easternmost of all the sanctuaries.

A cod net was anchored a couple of hundred yards offshore, and puffins in a large flock were having an amusing time balancing on the floats. We feared for their safety, but when we circled the net we could find only one bird that had become entangled.

A worse tragedy had befallen a half-dozen of the birds that had ventured into a seal hunter's shack from which most of the roof had blown off. Apparently the door had closed while they were inside, and they could not rise abruptly enough to fly through the open roof.

Ollie Hewitt estimated that 48,000 puffins were nesting on this island, which for hundreds of years has been honeycombed with their burrows. But on the day of our visit most of the birds were away fishing or incubating in their burrows; no more than two or three thousand were in the water about the island.

Puffins Have Big and Little Foes

While waiting in a blind for the return of the puffins, I became unpleasantly aware of armies of ticks crawling around the rocks, apparently waiting for the same birds that I was waiting for. We became well acquainted, if not intimate, during the ensuing wait. I have often counted the minutes while waiting for a tardy friend, but this time I counted the ticks, and if someone had told me there were sixty ticks a minute, I could readily have believed it.

How the puffins have survived the attacks of these hordes of bloodsuckers through the ages, and, indeed, how the ticks can thrive in this Arctic climate, is difficult to understand.

Nor are the ticks the puffins' only enemies. When Audubon visited Bras d'Or (as the bay was called in 1833), his son John collected a pair of gyrfalcons whose nest revealed remains of puffins. From my blind I watched a peregrine falcon strike down one of the puffins near its burrow, and before we left the island we found evidence of six other fresh kills.

The sanctuary is well protected now from "eggers," but the natural destruction of these charming, quizzical little birds continues and keeps them from overpopulation.

Many razor-billed auks and common murres were nesting under the gigantic jumble of stone slabs that line the shore, while on top of the island were several pairs of horned larks and pipits. Elsa found a beautiful pipit's nest, with six brown eggs, built in a curious triangular cavity in the reindeer moss atop a small boulder.

As the weather again became threatening, we left this interesting island and headed back to St. Mary Islands. The numbers of gannets cruising back and forth seemed to have increased since we traveled eastward. We heard Hudsonian curlews passing overhead, already started southward on their fall migration.

Black Flies a Scourge at Mecatina

At Mecatina Bird Sanctuary the black flies were unbearable. In spite of our efficient deterrent, they attacked our eyelids and ears and crawled down our necks wherever we neglected to smear the fly dope. At St. Mary Islands, however, they were comparatively scarce.

Here two other passengers joined us: Ollie Hewitt's brother-in-law, Tom Barry, an ardent fisherman looking for a rest from his strenuous paper business in Madawaska, Maine; and Louis Le Mieux, a student at Laval University, Quebec, who had been left at St. Mary Islands to study the great black-backed gull.

The following day Ollie and Tom went jigging for cod while Elsa and I photographed guillemots. Ollie explained to Tom that the harder he jerked the line, the larger the fish he would catch.

Tom gave the line a mighty tug and hooked one of the largest cod caught on that part of the coast—60 pounds, ten times the weight of the average cod.

With six on board we scarcely rattled around, even when the sea was rough. Two had to sleep on the tiny deck and pray it would not rain. Drying out sleeping bags was next to impossible.

Continuing our journey westward, we alternated bird islands with trout streams, putting in the good days in blinds with the birds and the foggy days with the fish.

Between Wolf Bay and Romaine is the Fog Island Sanctuary, low-lying rocks exposed to the storms of the open Gulf. Landing here is often dangerous or impossible. We were

On the Downstroke a Robin's Feathers Overlap and Grip the Air

On the upstroke, the high-speed camera shows, they open by turning edgewise (page 775). These sleepy nestlings are too young to have acquired good vision. They do not recognize the home-coming parent until his feet have touched the nest, a bowl of mud, grasses, and weed stalks just outside the author's window. A little later they'll sit up and take more notice (pages 773, 776-7).

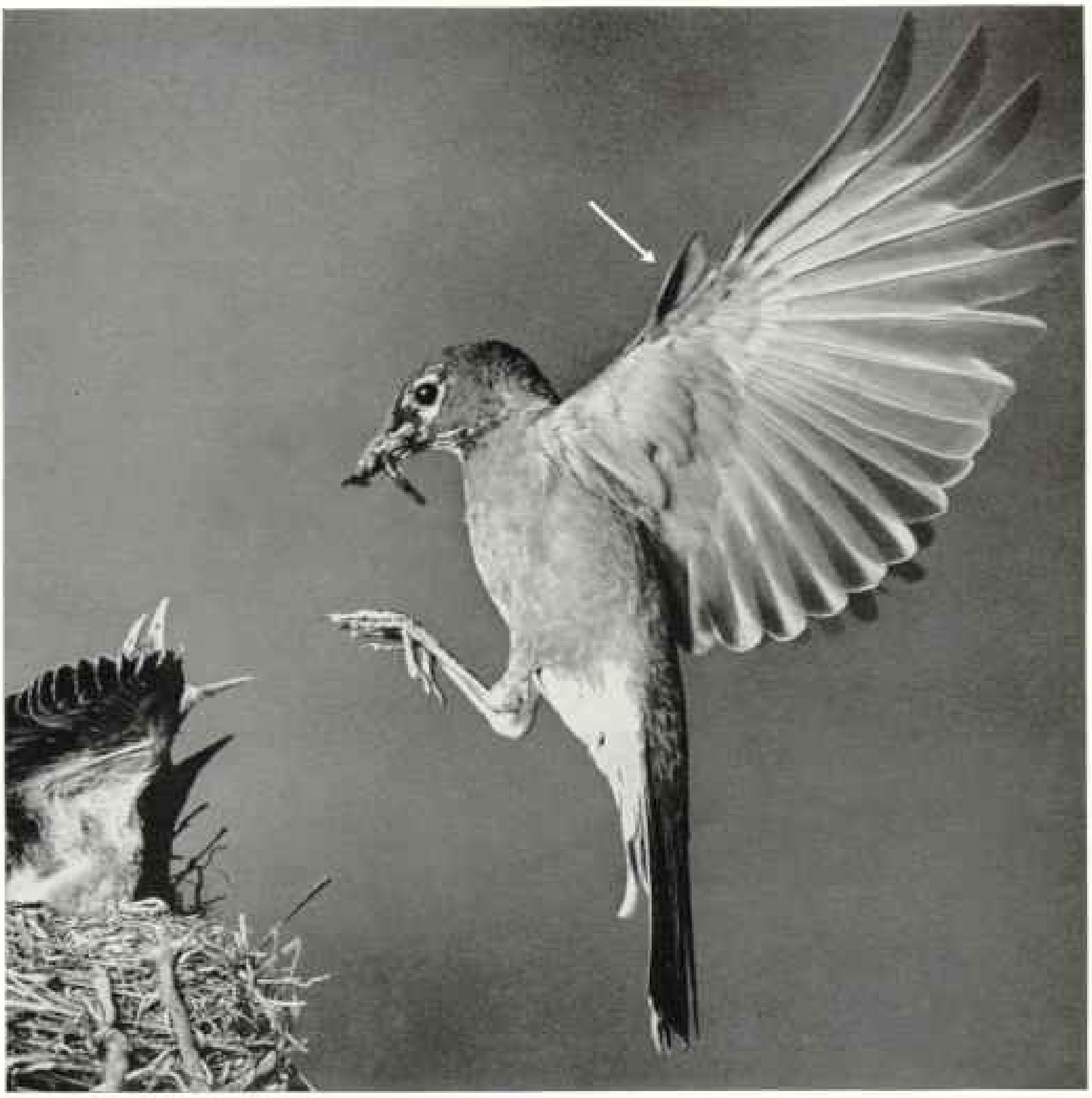
lucky in having a couple of fairly quiet hours so that we could visit a colony of murres and cormorants nesting in a much more accessible place than most, on broad, shelving rocks where we could easily walk among them.

The young murres were now nearly one-third grown and about ready to go to sea. Although they nest in dense colonies (Plate II), the murres, like the auks and the puffins, are rather solitary during the rest of the year. When the young are two or three weeks old, each family with its one chick goes off by itself to the open sea, where the youngsters finish growing up.

On an adjacent island was a fairly large colony of Caspian terns and ring-billed gulls (Plate I) with young now well feathered, scampering over the rocks, and even swimming out to sea.

The wind freshened while we were there, so we had to pull anchor and start for Romaine in a rough sea. Held up here for a day and a half by high winds, we explored the Olomane River, a beautiful salmon stream, and visited an encampment of Montagnais Indians on high rocks overlooking the bay and village.

From Romaine to Natashquan is a dangerous part of the coast for small boats, with no



Arrow Points to the Alula, or False Wing; the Worm Is Aimed at Gaping Targets

Clarified by the speed flash, the alula and the rudimentary primary just back of it are seen extended. A possible explanation is that these break the air flow and destroy its lifting power (page 778 and Plate XII). These baby robins are a few days older than they were as shown on page 772. Now that eyes focus, they give mother a rousing welcome.

shelter from the sea. We covered these sixty-odd miles in fairly good time, however, and before dark slid into a beautiful little harbor at the Little Watshishu River.

Expedition Counts 99,000 Birds

At Mingan, which we reached the next day, we were cordially entertained by Lt. Col. E. P. Kern, of the U. S. Air Forces, who built and operated the modern airport there. Mingan was an important landing field on the main northern route to Goose Bay, Labrador, and thence to Iceland.

Dr. Hewitt's inspection trip was now completed. We had visited all of the sanctuaries along this coast and counted 99,000 birds using them for rearing their young. The *Alca* could now be put up for the winter; Sam Robertson would return to La Tabatière and Ollie Hewitt to Ottawa. Elsa and I would circle the Gaspé Peninsula before returning to Cornell.

What a different country this proved to be from Audubon's Labrador! The highway followed close to the long, smooth shore. Except in a few places, the rocks were concealed by luxuriant hayfields, gardens, or forests. Goldenrod, fireweed, and vetch made great blotches of color, and the sky was a deep blue.

Thrifty homes, neat villages, horses, cows, sheep, and all those things which we had not seen for over a month enchanted us after the wild north coast. We were bound for picturesque Percé and Bonaventure Island.

Lying two miles offshore, Bonaventure Island presents to the sea a series of ledges as its soft conglomerate rock heaves off in huge blocks during winter (p. 757). These ledges, since time immemorial, have been the summer home of the strange and spectacular sea birds known as gannets. As large as some geese, they are snow-white in plumage, with black tips to their wings and an orange-buff wash to their heads (Plates III-VI and VIII).

Not shy, the gannets permitted close approach and proved to be the answer to a bird photographer's prayer. Their black-faced youngsters were still covered with long, fluffy white down which gave them the shapeless appearance of giant powder puffs with black handles.

Gannets spend the greater part of the year on the open sea, plunging like animated javelins from high in the air at the luckless mackerel or other fish that dares venture close to the surface. As they glided past us at the edge of the cliff, they turned their heads and surveyed us with a cold gray eye encircled by blue. They gave an impression of abstract power that is perfectly at home in storm or fog or whatever the wild sea has to offer.

A New Light Dawns on Bird Photography

IT ALL happened so quickly I could not see what occurred; yet here it is before me as clear as the printed page.

First I had heard the distant call of a female Cooper's hawk and seen the answering excitement of her youngsters six feet in front of the blind. A darting shadow, a flash, and the mother bird stood there glaring at me with fire in her eye. One foot grasped the branches of the synthetic nest we had built at the base of the tree; the other held a plucked starling.

But so quickly had the hawk come that I had no mental image of her in the air. I could not tell how she held her wings or tail as she approached, or whether her talons were withdrawn or fully extended. I did not even notice that she had food in her bill. I might have supposed she carried it in her claws, for she certainly had it in her foot when her image finally fixed on my retina.

Speed Flash Reveals the Unseen

A little experience with the speed-flash camera had trained my fingers to press the shutter release at precisely the right instant, so that the resulting flash of 1/5000 of a second's duration occurred when the image of the bird was passing the middle of the film. And behold, here is the whole story as I should like to have described it, and as you can now see it for yourselves in natural color: the frozen action of a predatory hawk returning to her young with a plucked bird in her bill (Plate XIV).

Caught is the look of expectancy and hunger in the eye of one of the youngsters; one sees the strength in the pinions of the old bird, and the powerful talons reaching out to grasp the nest. The colors are natural and true.

A few years ago we would have branded such a photograph a "nature fake," impossible for any camera to produce, but today it is fast becoming commonplace.

Dr. Harold E. Edgerton, of the Massachusetts Institute of Technology, first brought to the attention of eager naturalists and wildlife photographers the wonders of the new high-speed flash apparatus with his book *Flash!* and later with his marvelous hummingbird photographs in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1947.

Dr. Donald R. Griffin showed the possibilities of Edgerton's apparatus in photographing bats for the July, 1946, NATIONAL GEOGRAPHIC, and Ernest P. Walker and Edwin L. Wisherd used a similar portable speed flash in making the phenomenal photographs of flying squirrels in the May, 1947, NATIONAL GEOGRAPHIC.

My Cooper's hawk project was one of several interesting experiences during the season of 1947 when I applied the new light to old problems in bird photography.

Steve Eaton, a graduate student at Cornell, found the hawks' nest 65 feet up in a white ash tree in a dense wood lot about ten miles north of Ithaca, New York.

The tree was the tallest in this part of the woods, so there was no possibility of placing a blind in an adjacent tree.

When the eggs hatched the first of July, it occurred to me to test a new method of study which, if successful, would permit us to get a more or less complete record of what and how a Cooper's hawk feeds its young, and to

Papa Opens the Shutters of His Own Venetian Blind (Page 778)

On the wing's upstroke each flight feather turns on edge to minimize resistance of the air. A racing oarsman uses the same technique in "feathering" his oar.

reveal each rapid action by high-speed flash photography.

Accordingly, with the help of an expert climber, Paul Shepard, a student in the summer session, I built a dummy nest in a bushel basket and hung it beneath the real nest when the young were about five days old.

The hawks paid little attention to this innovation, so we transferred the young to the basket. A few hours later, the female flushed from the basket at our approach.

Next we built a blind on the ground, covering a framework with burlap. Then, during the next week, we lowered the basket ten feet a day until it was fastened to the trunk of the tree ten feet from the ground.

Perhaps the hawks were surprised at the rapid settling of the foundations of their home, but they continued to feed and brood their young with no apparent misgivings.

Later we successfully substituted for the basket a less conspicuous potato crate.

To complete our preparations, we rolled a stump against the base of the tree and built a dummy nest on top. Thus, when we were ready for our observations and photography, we had only to move the youngsters from the crate to this new bungalow in front of the blind.

Even when we added a 4-foot-square, light-blue backdrop behind the nest, the old birds continued to feed and the youngsters

Robin's Eye Winks, Not in Flirtation, but in Automatic Self-preservation

As the bird lands, the high-speed flash shows the nictitating (winking) membrane half-drawn across the eyeball. This device protects the eye against jabbing beaks as well as earthworm slime (opposite, and page 787). As a protection against dust, it functions frequently.

to behave in their characteristic domineering manner. We could see at close range the kinds of food the old birds brought; we learned (with patience) how long the youngsters had to wait between meals; and we were able to record with the speed flash the home life of these interesting predatory birds.

Two Birds a Day per Youngster

The youngsters apparently never suffered from hunger, because there always was unused food on the nest whenever we arrived. They grew normally, and the last of the three left home when it was 31 days old.

Observations were made on 11 days, during which I spent 30 hours in the blind, Paul Shepard 19, and Brina Kessel 9, at various times between 6:30 in the morning and 7:30 in the evening.

During the 58 hours that they were under observation, the young hawks were fed 28 times on ten species of birds or small mammals, including one meadow mouse, two chipmunks, eight robins, five house sparrows, two starlings, four flickers, two meadowlarks, two young red-eyed vireos, one young song sparrow, and part of one white leghorn pullet.

This was at the rate of a little more than two birds a day per youngster.

The old birds apparently were not alarmed

Father Robin in Blinders Shows the Opaque, Lifeless Eye of a Statue

Here the nictitating membrane is fully extended. Other birds use such a shield; so do most reptiles and many mammals, including dogs and cats. In man the organ is vestigial. The robin touches the back of his nestling's tongue with the worm to start throat muscles working; otherwise the dinner might crawl out.

by the flash, although they became alert and departed at any movement made in the blind, such as that of changing plateholders.

Altogether, the experiment proved successful, and in the resulting photographs others can now view incidents in the home life of a hawk without the inconvenience it caused us, and, incidentally, without the same degree of excitement or satisfaction.

"Tooth to Nail" with a Chickadee

We next turned our attention to a bird which is the antithesis of a Cooper's hawk—a friendly little chickadee with no allergies to people or to cameras.

"Don't close your eyes, Dolly," I admonished my daughter as we tried for photographs of the chickadee flying to her lips to take a peanut from her teeth.

The first series of pictures we had made were ruined by tightly closed eyes, though neither of us had noticed, at the time, that no matter how interested Dolly was in having a friendly little bird perch on her chin, she unconsciously closed her eyes when she saw it approaching her face.

The camera had caught all the eagerness and anticipation on the face of the chickadee, but Dolly had reacted in a most natural, but nonphotogenic, manner.

So this time I constantly reminded Dolly to keep her eyes open. With conscious effort she partially did so, giving added charm to the photograph of a truly wonderful experience —that of meeting a wild creature face to face (or tooth to nail, as Dolly puts it) with a natural expression of confidence (Plate XI).

An ordinary robin provided a real test of the new speed flash for a study of wing and feather action in flight. The bird had very considerately accepted for its nest site a movable shelf we had fastened to the laboratory window casing.

When the young were well grown, we lowered the shelf to a convenient height from the floor, fastened a blue backdrop behind the nest so that the photographs would not appear as if made at midnight, and set the sealed-beam flash tubes at the right heights and angle inside the laboratory.

Color film is so slow that the lens diaphragm must be set at F5.6, even with the lights two feet from the subject; so there is very little depth of focus. Indeed, one cannot get wings and body equally in focus except when the wings are held straight back (Plate XII).

Black-and-white film, however, provides sufficient speed to use a stop of F.22, and the resulting series of clear pictures of the wings in their different positions gives one a new notion of the flexibility of the feathers.

Wing a Wondrous Mechanism

There is the upstroke, for example, when not only is the wrist joint bent so that the wing as a whole offers the least resistance to the air, but the individual primaries and secondaries are all turned on edge, so that the wing opens up like a Venetian blind (page 775). One sees the robin's body right through the wing, and the wing is lifted with practically no air resistance.

On the downstroke, however, the flight feathers are beautifully imbricated, or overlapped, to give the greatest possible resistance to the air (page 772).

In photographs of the robin about to alight, we see the group of feathers borne on the thumb, and known as the alula, standing out at almost right angles to the wing. The tiny rudimentary first primary, which is found in all thrushes and for which no one has ever advanced any satisfactory explanation, likewise stands out from the rest of the wing (page 773 and Plate XII).

Can it be, as my colleague, Dr. Paul Kellogg, suggests, that these feathers, acting in conjunction, serve like the spoilers on the front edge of the wing of a plane, to break up the smooth flow of the air and destroy its lifting power? This would allow the bird to alight more accurately.

The number and relative lengths of the flight feathers in different individuals of the same species of birds are always the same, as are the actual lengths also, to within a few millimeters. Indeed, all the species in a bird family, such as the thrushes (Turdidae), which include the robin, show remarkably little variation.

In the robin photographs, for example, one sees a tiny first primary followed by four long primaries of about equal length, followed in turn by five gradually shortening primaries and six secondaries, giving the appearance of a more or less square-ended wing.

If one were to examine the wing of a wood thrush or a bluebird, or any one of the 304 species of birds found all over the world that make up the thrush family, he would find the same rudimentary primary, the same four long primaries, etc., making up the same shaped wing. There would be few exceptions.

On the other hand, if one examined any one of the 63 wrens that make up the family Troglodytidae, one would find, as in the photograph on page 788, a wing in which the primaries gradually lengthen from the first to the fifth and then shorten again as the body is approached, giving the appearance of a rounded wing.

Similarly, in all the swallow family, the Hirundinidae (page 790), the first primary is the longest, and the flight feathers shorten very abruptly toward the body, giving what is called a pointed wing.

The number of functional primaries (those borne on the modified hand) of an ordinary bird is always ten, except in a relatively few families of perching birds, where the number is nine. The number of secondaries (those borne on the forearm), however, varies considerably in different families of birds, from the six (plus two tertiaries) of the thrushes to as many as 37 in the excessively long-winged albatrosses.

Indeed, length of the wing in birds is usually gained by increasing the length of the forearm with its secondaries, rather than increasing the number or relative lengths of the primary feathers.

Birds in Flight Identified by Wings

The different shapes of the wings of a number of small birds are shown in the accompanying photographs, and one familiar with birds in flight can often identify their silhouettes against the sky by characteristic wing action and resulting steadiness or undulations in the course of flight.

Photograph by Arthur A. Allen

A High-speed Flash, Clarifying a Whirling Blur, Reveals What the Eye Never Sees

Using 1/5000th part of a second, Dr. Arthur A. Allen, Cornell ornithologist, took this and succeeding pictures with electric-flash apparatus. By freezing motion in mid-air, he proved flight techniques which he had only suspected. This male cardinal unlimbers landing gear on approaching a feeding station in Ithaca, New York. Feathers of the rounded wing, which here start the downward stroke, are nicely overlapped to catch the maximum air.

Speed Lighting Shows How a Falconer's Sparrow Hawk Stretches Legs and Talons to the Utmost for a Finger Landing

Always rewarded with a small steak, the bird learns to fly to hand when it hears its master's whistle, sometimes from the distance of a quarter mile.

Face to Face with a Chickadee

For halt, the author's daughter, Dolly Allen, holds a peanut in her teeth. Of the two, the bird performed more easily. When the chickadee darted toward her chin, Dolly blinked, spoiling a series of photographs.

A Flash Through the Window

These evening grosbeaks were tricked into posing by sunflower seeds sprinkled on a window ledge. Summertime Canadians as a rule, they winter in the United States, wandering as far south as Washington, D. C.

Photograph by Arthur A. Allen

Father Robin Spreads Wing Feathers Like the Ribs of a Fan

Here the speed flash exposes a tiny, rudimentary primary feather and the ear-shaped alula, or false wing, seen just back of the head. These feathers, standing almost at a right angle to the wing at the instant of the flash, are borne on the thumb of the bird's modified hand.

Ornithologists have not been able to agree on Nature's reason for providing the alula. Analysis at 1/5000th part of a second suggests that this process, acting like the spoiler of an airplane wing, shatters the air's smooth flow in the interest of a shorter, more accurate landing.

This cheery breadwinner, caught with an earthworm in his beak, considerately nested on a window shelf, where he made his brood a perfect camera target.

In Green-eyed Rage a Cardinal Fights His Fancied Rival

Cardinals brook no competition from other males in the territories which they select for their nests.

While flying through a garden, this bright fellow saw his reflection in a windowpane and convinced himself that he had spotted an interloper. Using beak, claws, and wings, he gave the "stranger" a good going over. When a mirror was placed on the window sill, the bird transferred his attentions. Undiscouraged by his failure to achieve more than a draw, he continued the battle for weeks.

Like other birds, the cardinal has no idea of the meaning of glass. In time of danger he may fly head on into a closed window.

Frequently nesting in the vines of a back porch, he performs in many lovable ways for the entertainment of his hosts.

Speed Lighting "Mounts" Hawks More Faithfully than Taxidermy

Cooper's hawk, commonly called chicken hawk, and not without reason, regularly feeds on small birds.

This fierce but doting parent, acting according to instinct, has decapitated its prey, a starling, and plucked most of the feathers.

An orange-colored eye is a sign of the bird's immaturity; in time it will be ruby red. The youngsters have bluish eyes. They are very hungry, having waited for three hours (as did the photographer!).

To obtain the picture, the author and one of his students spotted the birds' lodging high in a tree. They rigged this dummy nest below it and transferred the fledglings. Their deception succeeding, they lowered the nest ten feet a day until it was at camera level. Then they photographed the blissful home-coming from the privacy of a blind.

Red-tailed Hawk Pounces on Master's Gauntlet for a Meaty Reward

Falconry, like archery, goes far back into antiquity. Chinese appear to have practiced hawking 2,000 years ago. Ancient sculptures attest the sport's favor in Egypt and Persia. Greeks and Romans left written accounts. In medieval Europe falconry became a favorite pastime of the nobility.

Though gunpowder brought about its decay, the sport never died out. Today it is gaining favor among young Americans. Central Asians still train the golden eagle to hunt foxes.

Usually the hawker obtains his birds by taking nestlings or trapping adults. With hoods, lures, whistles, and gentleness he trains them until they become accustomed to man and his dogs. Many show affection toward their owners.

Though it makes an interesting pet, the red-tailed hawk is too clumsy in the air to be an accomplished hunter like the peregrine falcon. Owing to an undeserved reputation as a chicken thief, it has been relentlessly persecuted. Actually, it deserves protection as the assassin of mice, rats, gophers, snakes, and other vermin.

Leather thongs, known as jesses, are worn by this bird for tethering to its perch.

Kodachrome by Arthur A. Allen

XVI **Red Mouths Gape for May Flies Brought Home by "Old Man" Canada Warbler**

Not a sunbeam penetrates the Adirondack forest, but the speed flash lights the gloom like day.

Photographs by Arthur A. Allen

Which Child Is Hers? Scarlet Tanager Doesn't Realize She Has Two Imposters

A parasitic cowbird, unwilling to raise her brood, sneaked two eggs into the nest. Already her greedy offspring have kicked out one foster brother. Young tanager (middle) has a yellow mouth lining; the foundlings, pink.

It would take many photographs, however, and a careful study of the use of the different feathers to work out the correlation between wing shape and wing use, as practiced by different species.

Of course, certain relationships are obvious, such as the long, narrow wing of gulls for gliding, the broad, rounded wing of buzzards for soaring, and the short, rounded wing of grouse for quick bursts of speed. The numerous minor variations, some of which are manifest in the accompanying photographs, will require much study before they are fully understood.

Speed Flash Quicker than a Wink

Another action which is too quick for the human eye, but which is recorded by the speed flash, is the movement of the bird's inner eyelid, or nictitating membrane, as it is called. This translucent membrane flicks across the eyeball to remove dust or to give protection to the cornea when necessary.

When a robin feeds its young, the membrane naturally draws across the eye to keep out the bill of the youngster or to keep the sand on the worms from lodging where it should not.

An examination of the accompanying photographs of the robin shows the eyelid halfway across the eye when the birds' feet touch the nest (page 776) and completely across it during the act of feeding (page 777). The young bird's eye is protected in the same way.

The position of birds' feet in flight and upon landing has always given naturalists cause for conjecture and argument, and taxidermists and bird artists are frequently in disagreement. The tremendous forward swing or extension of the legs of hawks and falcons upon alighting or pouncing on their prey is seldom credited or shown with accuracy in paintings or in habitat groups of mounted birds.

Two of our Cornell students, Heinz Meng and Steve Collins, have been training hawks, and this gave us an opportunity to record leg action as well as wing action when the birds pounced upon dead mice or returned to their owners' fists (Plates X and XV).

It is remarkable how obedient these birds become when properly handled, celebrated though they are for their wildness.* Captured when fully adult, and knowing only the fear of man and the ferocity of killing its prey in mid-air, a peregrine falcon, after a few months of training, becomes gentle and flies to its trainer's hand at the proper whistle.

Tossed into the air, given his liberty to go where he pleases, he waits on the pleasure of his trainer and circles about until the whirling lure tells him there may be food at his owner's feet, if he strikes the imitation bird from the air.

In striking as in alighting, the hawks extend their legs to the utmost, so that the weight of their bodies in bending the tibiotarsal joint will drive the sharp claws into the victim or about the perch where the hawk alights. With the larger hawks the trainer must wear a heavy glove.

The accompanying photographs of the hawks do not show where the feet are carried during normal flight, but with binoculars they are easily seen under the tail as the birds circle overhead.

The long legs of herons and cranes trail out behind and are easily seen at a distance, but how does a small bird hold its feet in flight? Most of the accompanying photographs are of birds about to alight when the legs are being let down like landing gear. The house wren, however, still has his feet tightly pressed against his breast (page 788), and the others are apparently dropping their legs from a similar position rather than from beneath their tails.

The ridiculous posture of the sora rail (page 789) is due to the fact that when rails take off on their weak wings they continue to claw the air with their long toes as if they were still running over the mud flat, and it is only when they get well under way that their legs trail out behind like a heron's.

At First, Camera Caught Only Tails

Wing shooting with a shotgun, whether at quail, grouse, ducks, or clay pigeons, is usually not very successful for the tyro. It takes years of experience before one can confidently place a three-foot circle of shot on the exact spot where the flying target is expected to be at a somewhat uncertain fraction of a second later, depending on the distance, the speed, the wind, etc.

And so, likewise, with the high-speed flash of flying birds, if one waits until the bird is at the desired spot before pressing the release, one will photograph a blank every time, or at best get only the bird's tail on the film.

The first time any of us used the apparatus with which the accompanying photographs were made, we focused on a spot that chickadees and nuthatches were expected to pass in coming to a feeding station. They passed the spot all right, but so rapidly that out of 12 shots fired by three of us, the resulting bag of bird photographs was three chickadee tails.

*See, by Frank and John Craighead, in the National Geographic Magazine, "Life with an Indian Prince," February, 1942, and "Adventures with Birds of Prey," July, 1937.

No Welcome Mat! A House Wren's Door Bristles with Spines to Discourage Visitors

To feed seven youngsters, the pair made an astonishing number of trips daily; yet the male still found time to sing. Other busy male wrens have been known to run two households at once. Here the speed flash lights up the wren's rounded wing and the foot's flight position (page 787). Cargo is a caterpillar.

In Silent Appeal, Not Raucous Shout, These Blue Jay Babies "Open Wide"

Footloose blue jays are the very synonym of noisy chatter; yet this family carried on so quietly that its presence in the spruce next to the door almost escaped the author. There is plenty of action but no sound in this high-speed shot, which "froze" the parent's wing action at the moment of landing.

Banded and Released, a Sora Rail "Runs" Through the Air as He Would on Land

In spite of their weak wings and awkward-appearing take-off technique, some soras cross the Caribbean, to winter in Venezuela and Peru. In the Atlantic States the rails are considered game birds. Each fall they run a hunters' gantlet in the tidal marshes.

The photographer has to learn from experience his personal delay in reaction from the moment he says to himself, "Shoot," until the message is conveyed to his finger tips with the resulting flash, and he has to estimate how far the bird will travel during that delay.

Of course, there are no cripples if he does not center his birds, but there is considerable disappointment and loss of face when an otherwise perfect photograph comes out of the developer showing only the tail of a bird.

Naturally, the operator has no control over the position of the wings of the bird he is photographing and many a dud results, even when he becomes expert at centering the bird, because the wings are far forward, concealing the bird's head, or in some other awkward position.

Practice Shots at Feeding Station

We began our practice shots with the high-speed flash at a feeding station for birds, where their comings and goings could be somewhat regulated, for it is necessary to have the apparatus set up in advance, with lens and lights trained on a definite square foot of space where the action is to take place. In addition, the action has to occur on a very narrow stage, for the depth of focus is only a few inches.

Therefore, I trained the birds to feed in front of our blind on a shelf about six inches long and two inches wide, and I placed a convenient perch about two feet from the shelf on which the birds were expected to alight before flying to the feed.

I knew they would then traverse a definite path; I would have plenty of warning and could concentrate upon centering the bird on the film.

Eighteen inches, I discovered, was my delay in reaction, so that I had to push the shutter release the moment the bird left the prepared perch if I wished to catch him in the center of my film, which was focused on the square foot 12 inches distant.

Red squirrels and chipmunks do not move as quickly as birds, I discovered, for when I made the same allowance for them, as they jumped from the perch to the food shelf, they had barely reached the film when the flash recorded their jump.

Even after all these preparations, I sometimes photographed the blank blue background which I had set up behind the food shelf to avoid the blackness of most flash-

A Barn Swallow, Preferring Man's Abodes, Strikes a Phone Wire with a Wingtip

In summer, barn swallows are found from Alaska to Mexico. Winter sees some migrating as far as Argentina. Having adopted man's buildings as their own, they have become subjects of fanciful tales. Contrary to legend, they do not hibernate in the mire on pond bottoms, but they do build nests of mud (right).

bulb pictures. The reason for this was that the birds occasionally changed their minds after leaving the perch and flew to the ground or to the top of the set—and, after all, I was no mind reader.

Particularly was this true of the little chickadees, which became allergic to the flash after a few experiences. Even though they could see no motion or other indication of my intentions in the blind, they would change their course in mid-air and flit in some other direction just before the flash consummated my delayed reaction.

It was a good setup, however—like shooting skeet in preparation for the duck season—and resulted in many interesting photographs of wings in action.

Arguments over "Peck Order"

Sometimes arguments occurred among the birds on the shelf as they endeavored to establish a "peck order." It was not often that the action of both birds took place in the plane of focus, but occasionally a lucky shot resulted, such as one of a redpoll trying to land while another throws up one wing and points his bill at the newcomer in an effort to intimidate him. In most of the photographs at least one of the quarreling birds proved to be out of focus.

Luxembourg, Survivor of Invasions

By Sydney Clark

With Illustrations from Photographs by Maynard Owen Williams

LUXEMBOURG has been surviving invasions for more than a thousand years, but America's part in her latest and most arduous survival—from the Battle of the Bulge in 1944-45—was directly responsible for my own survival as a postwar pleasure traveler in the Grand Duchy.

Some twenty months after Field Marshal Karl Rudolf Gerd von Rundstedt's attack and repulse, I entered the city of Luxembourg, the capital, and at the nearest hotel nonchalantly asked for a room.

"Sorry, sir," said the clerk, in good English. "We've had to turn away over 200 people today. We have nothing at all."

Thinking the place might be especially in demand because it was a good hotel directly opposite the station, I tried another, then another, and then ten others in swift succession, becoming very unfussy indeed.

Vacationists Tax Luxembourg Hospitality

There were almost no American or British travelers in evidence, and scarcely any French, for their own Government's severe currency restrictions prevented them from touring outside of France; but it seems that I had reckoned without the Belgians. As visitors they can enter Luxembourg without passport or visa, and their francs are interchangeable at par with those of the smaller country.

All Luxembourg is holiday terrain to tens of thousands of Belgians, and their number that day was much above normal, since this was the week end of July 21, Belgium's national holiday.

It was late afternoon, and still another hotel manager was giving me his polite regrets, when a timid girl of about 14 appeared and told him her mother had a room. She would take two ladies or a man and wife, provided they would stay at least a week.

The manager turned brightly to me and asked if I would pay as if for two.

"Of course," I said eagerly, but the girl, a literalist, interposed firmly: "No. Mamma said it must be two people, and they must stay a week."

"Go along with her, anyway," said the manager. "You can talk her mother into it. Don't let the girl out of your sight."

It was a good half mile to her home, and during the walk we talked in French. As I answered the youngster's questions about Hollywood, she melted utterly and became my friend and champion. When I saw her mother, I knew that I had need of a champion.

"No, Kathy," said the dour lady very sharply in the Luxembourg patois, which my knowledge of German enabled me to grasp. "No. I told you to get two ladies or a man and his wife."

"But, Mamma, he . . ."

I interrupted and explained in German that I was an American writer come to see where my countrymen had fought in Luxembourg.

"Your Soldiers Saved My Country"

"Ein Amerikaner! Doch! And are you a friend, perhaps, of the great General Pat-ton who died and who is buried at Hamm near here?"

"I met him," I replied, making what I could of a very minor contact.

"But that doesn't matter," she said, and her whole manner had changed to one of eager hospitality. "You are an American. Your soldiers saved my country. More than 8,000 of them lie at Hamm. Come in, come in. I will show you your room."

I presently went out to see the city and to dine, and when I returned at 10 o'clock I found mother and daughter leaning out of a window to watch for me.

"Do they have chocolate in America?" called the girl.

"Yes, Kathy. We have chocolate, and gum, and tall buildings, and big cities."

"Which one do you live in?" she asked as I came into the house.

"Boston."

"And is that near New York?"

"About 300 kilometers."

She thought I said *meters* and fairly squealed. "Three hundred meters! My, that's pretty near! I'd like to live that near to New York."

"Go to bed, Kathy," called her father from another room. "Let the gentleman rest."

"Yes, Papa." But she didn't go. Her mother asked if I should like to have her wake me in the morning, but I said I had an alarm clock. Kathy pleaded to see how it worked, so I showed her.

"Tell me about the tall buildings, sir," she said irrelevantly.

"Go to bed, Kathy," from the other room.

"Yes, Papa."

A Flower-vending Countrywoman Finds Business Brisk in a Luxembourg City Square

Her eye-appealing display attracts market-day shoppers in the capital's Place Guillaume. The square and its equestrian statue honor William II, 19th-century Netherlands king and Grand Duke of Luxembourg. In the background rise the slender spires of the Cathedral of Notre Dame. The Grand Duchy and its capital share the same name. War passed the city by, although the Germans fired a few projectiles into it during the Battle of the Bulge. One struck and damaged a spire of the Cathedral.

She took my two hands and clung to them. "Is Holly Vood very pretty, sir? Do you know Bing Cros-bee? What was General Pat-ton like when you met him?"

"*Kathy, go to bed!*" The voice was thunderous.

The girl was suddenly scared, and very flustered, too. She loosened her belt and started to pull her dress over her head, but still she didn't leave. Her mother convoyed her to the kitchen, where she was to sleep on a cot, but once more she darted back and seized both my hands. Her eyes glistened. She brought out no more words but pressed my hands hard, and fled.

It was to me a moving experience. I, so recently a vagrant in Luxembourg, with no roof over my head, had been metamorphosed into an angel, a being apart, *the man from America*.

In more conventional and restrained forms I encountered similar reactions from many persons in many parts of the Grand Duchy. Despite the terrible destruction wrought by our airmen and ground forces in blasting Von Rundstedt's offensive and in driving his forces back into Germany (60,000 persons were made homeless, a fifth of the population), America is devotedly loved by Luxembourgers, high and low.

I took a bus to Hamm one day and walked a mile through the woods to reach the American cemetery. The exact number of white crosses and stars of David there was 8,412,

Sons and Daughters of the Royal Family Honor Their Father on His Birthday

Led by uniformed Prince Jean, hereditary Grand Duke, they walk to special services in the capital's historic St. Michael's church. Traditionally, the one for whom such a service is held is absent. Here Prince Jean represents his father, Prince Felix of Bourbon-Parma, consort of Grand Duchess Charlotte, constitutional ruler of Luxembourg. Father and son served in the British Army during the war.

and it must wrench the toughest heart to see them in their endless even rows.

At the time of my visit, General Patton's cross was Number 222 in Plot EE, Row 9, and it was exactly like the others except that it bore four stars. Number 220 was for Wayne A. Dexter, Number 221 for John B. Przywara. Numbers 223 and 224 were for A. F. Spellman and J. M. Opyrchal. Near by were graves marked Unknown. So George S. Patton, Jr., as dramatic and effective a leader of men as the war produced, lay in the midst of his combat soldiers, some "known only to God."

Later, General Patton's grave was moved so that the crowds it attracted would not trample on other graves (page 798).

The General was buried December 24, 1945, almost exactly a year after he launched his great effort northward into Luxembourg from France. It was his hard fate to die of an automobile accident rather than in battle, but he is no whit less revered for that. He has become somewhat of a patron saint to Luxembourg.

Smaller than Rhode Island

The area of the Grand Duchy is 999 square miles, as if the country had been sternly bidden by 19th-century treaty makers, who drew its boundaries, to "keep under a thousand" (map, page 794).

Thus Luxembourg is little more than four-fifths the size of Rhode Island. Its total population of approximately 300,000 is about the same size as that of the city of St. Paul.

Drawn by H. R. Kartwood and Irwin E. Altiman

Thrice German Troops Attacked Through Peaceful Luxembourg

Surprise thrusts into France and Belgium violated her territory in 1914, 1940, and 1944. For centuries the Grand Duchy has survived wars, invasions, and peace conferences. On March 17, 1948, the Benelux nations (Belgium, the Netherlands, and Luxembourg) joined Great Britain and France in a 50-year pact of mutual assistance and economic cooperation. Inset map places Luxembourg in this western European union; its dark-gray area shows the extent of the Von Rundstedt offensive of December, 1944.

Minnesota. Its army before World War II mustered about 250 men.

Placed by fate in a perennial path of invasion, little Luxembourg has had to weather successive gales of war. If her aggregate forces have been of minuscule proportions, her spirit has been strong; and it has always been fueled by a passionate insistence on her own integrity as a free nation. With the physical power of a babe in a whirlpool, she has fought like an athlete, using ingenuity as muscle.

To see ample evidence of this, we need not go further back than the period when Germany developed her habit of bad faith and aggression.

In 1866 the German Confederation, of which Luxembourg had been a member, fell to pieces, and the various neighbor nations of the Grand Duchy shortly gave her "parchment bulwarks" by guaranteeing her neutrality and later her absolute inviolability. In 1867 the strong fortress of the city of Luxembourg, which had been garrisoned by Prussian troops, was ordered dismantled.

Germany signed a pledge that Luxembourg's railways would never be used for war purposes. But infinity had no meaning for the Kaiser's forces, and on July 31, 1914, they seized the Luxembourg border station of Troisvierges. Two days later armored trains from the Reich, with troops and ammunition, were rolling at will through the Grand Duchy, whose violent protests were swept aside.

A fraudulent notice, previously printed at Koblenz and held in readiness, proclaimed to the people that despite "all the most strenuous efforts of His Majesty, the Emperor of Germany, to preserve peace," France had violated Luxembourg and attacked Germany from its soil, so no other course was open than to counter these attacks.

The short, ugly word for this false document was spoken, in obvious implication, by Chancellor von Bethmann-Hollweg himself, who stated on August 4:

"We have been obliged to ignore the just protests of Luxembourg.

"The injustice, I speak frankly, the injustice

that we are committing we will endeavor to make good as soon as our military aims have been attained."

Of course, if Germany had actually been attacked by France from Luxembourg soil there was no injustice. The Koblenz proclamation and the German Chancellor simply did not tell the same story.

In sober fact, France had withdrawn her troops for a depth of ten kilometers on her side of the Luxembourg border and forbidden her troops to go beyond that point, lest "incidents" occur.

Luxembourgers Chose Cause of Freedom

The Luxembourgers immediately gave their support, almost to a man, to the Allied cause. Thousands of men, having no army of their own, since their country was legally neutral, fled to France and enlisted in the French Army. Of the 3,200 Luxembourgers who fought in the Allied ranks in that war, 2,800 lost their lives.

Grand Duchess Marie Adelaide abdicated the throne in 1919 and retired to a Carmelite convent in Modena, Italy. She died in 1924 at a family castle in Bavaria at the age of 30.

Her younger sister Charlotte succeeded her and is still the reigning sovereign. In World War II she behaved with as much insight and courage as Queen Wilhelmina of the Netherlands, fighting her nation's cause from free foreign soil. She is warmly beloved, as many a Luxembourger has recently testified to me.

As the German aggression of 1939 rumbled into action, there again was Luxembourg directly in the Reich's path of conquest.

In this connection one recalls President Roosevelt's personal appeal to Hitler on April 15, 1939, requesting a pledge that he would not invade 31 specifically named countries, of which Luxembourg was one.

Hitler chose to consider it a very funny document. He read it aloud to an appreciative Reichstag, which roared with laughter at the Leader's jaunty humor. I heard it all over the radio from a Paris café and I well remember my special inner rage as Hitler read the name of Luxembourg in the list. He was in high fettle. A very funny paper this, from Warmonger Roosevelt!

After war broke out, and as late as May 9, 1940, the Nazi Government declared, "Germany does not intend to impair the integrity and independence of the Grand Duchy either now or in the future."

Manfully He Plays in the Band at Vianden's Nut Festival

Dominated by its medieval castle, Vianden stands on the banks of the frontier Our River in northeast Luxembourg. Parts of the castle, with its early Gothic banquet hall capable of seating 500 knights, date from the 13th century. Each October the town holds a festival when the English-walnut market opens.

Plowed Fields, Forests, and Trim Towns Make a Peaceful Pattern in War-torn Luxembourg

This unscathed countryside is near the historic capital city of Luxembourg in the Grand Duchy's southern agricultural section.

Air Transport Command, Official

It Contrasts Abruptly with Scenes in the Path of the Savage Battle of the Bulge

The last German offensive, in December, 1944, which Luxembourgers call "the Rundstedt Thing" (page 799), devastated the country's northern half.

General Patton Lies in the Luxembourg Soil He Liberated

Except for its gold stars, his plain cross, with "name, rank, and serial number," plus the name of his dashing Third Army, is a duplicate of thousands which stand in endless even rows in the U. S. Military Cemetery at Hamm, near the capital. Buried first in GI ranks, the general was moved front and center to spare near-by graves the trampling feet of crowds of pilgrims. To Luxembourg, Patton is the war's greatest hero (page 793).

The next day her armies rolled in. A particularly revolting Gauleiter was installed. The Chamber of Deputies and Council of State were dissolved. The Gestapo, with its foul tradition of persecution and outrage, blossomed overnight and instituted a reign of terror.

The French language, officially used in Luxembourg for some 800 years, was forbidden, and persons with French names were forced to adopt German ones. Avenue de la Liberté in the capital was changed to Adolf Hitlerstrasse. Hitler schools were established everywhere, including one in the famous Abbey of Clervaux, a desecration which cut pious Luxembourgers to the quick (page 801).

Luxembourg's reaction was instantaneous and sustained. She abandoned her long-kept neutrality, and the court and some important members of the Government fled to England and Canada. These included the Prime Minister, Pierre Dupong, who is still the Prime Minister and Minister of Finance in the politically stable Grand Duchy.

The Resistance groups of Luxembourg were strong, subtle, a constant thorn in the con-

queror's side. Germany made Luxembourg an integral part of the Greater Reich and impressed all men of military age into the German Army, but a member of the Government told me that 60 percent of the men mysteriously "disappeared." They turned up later in the Allied armies or remained under cover, working secretly with the Free French underground forces.

In spite of this, the Nazis were able to round up several thousand young men between 18 and 24 and sent them to the Russian front. Up to date, more than 2,000 Luxembourg young men are missing, in addition to the number established as killed in battle.

The Germans looted most of the homes of patriots who were in exile or whom they had deported or imprisoned. Thirty thousand Luxembourgers were forcibly deported from the country.

When the war finally turned against Germany, her forces were driven out of Luxembourg, in September, 1944. A wave of infinite relief came to the Grand Duchy. By a veritable miracle she had escaped destruction.

"The Rundstedt Thing"

But then came the awful anticlimax, the December Battle of the Bulge, which local folk bitterly call "the Rundstedt Thing." That "hangover" of war's harsh fury did what the earlier incursions had not done. Though it mercifully missed the capital by a narrow margin, except for a few projectiles, the fighting literally laid waste all the northern part of Luxembourg; it spread over to the Belgian Ardennes and ruined that section, too.

The traveler may easily cross the border from Wiltz to Bastogne and visit the wreckage of Bastogne. It is a macabre spectacle, but the Belgian town is enormously proud and grateful, despite its ruin, for the stand made there by the Americans.*

It seems to me a wonderful evidence of recuperative power that so soon after this holocaust the Belgian Ardennes and Luxembourg became again regions of high holiday.

Even Echternach, the most battered town in all Luxembourg, I found awash with tourists, hundreds of them Luxembourgers, and it was the same in ravaged Vianden and Clervaux. Every possible hotel that could make a few of its rooms habitable did so and filled them promptly with lighthearted vacationists.

The fact that the capital escaped with slight damage is a boon to all visitors, as well as to the Grand Duchy, for to me there is no more strikingly situated city in Europe. It perches on a rock base shaped like a curving and decorative M, the strokes of the letter being the dizzily deep valleys of two small streams called the Pétrusse and the Alzette.

The base of the M is a glorious semicircle of bosky park where once stood thick walls, for this city was formerly an "inland Gibraltar," one of the strongest fortresses on the Continent. Because the fortress was dismantled in favor of the parchment ramparts earlier mentioned, after the Treaty of London in 1867, the city now bristles with steeples rather than guns. But the old casemates, with their miles of underground galleries, are one of its greatest attractions.

From the lofty bastions above the river valley the scene is startling in its grandeur. Best are the views from the Boulevard Franklin D. Roosevelt and from a point, with porcelain orientation disk, where two streets called Cornice Way and Adam's Rib (Chemin de la Corniche and Côte d'Adam) meet high above a hairpin curve in the Alzette.

The grand ducal palace, which the Nazis used as a tavern, is near this point and worth seeing as a study in royal simplicity. Were it not for the alert military guards at the entrance, one would think it merely a fine private residence, one of many in the city.

Radio-Luxembourg, located in the capital, is one of Europe's most influential broadcasting stations.

Another sight, of much more urgency to the average traveler, is an advertising sign filling the sky of a side street near the palace with metal letters by day, neon glow by night, and gastronomical allure at all times. It says simply STUFF, and that is precisely what one does upon entering the establishment.

"Stuff" is the name of one of the most appealing restaurants in Europe. I found its fare and everything about it exactly the same as when I first discovered the place (and obeyed its gleaming command) in 1929.

A Paradise for the Palate

For some reason hard for the visitor to grasp, Luxembourg, even after its latest and hardest survival of invasion, very quickly recovered its capacity to provide good, ample food and to cook and serve it well. To my delight I found that a foreign partaker of it need not cope with ration tickets, as in most lands, or even pay extra for the lack of them, as in Belgium. In every Luxembourg restaurant, I, as a foreigner, was asked merely to sign a food register and record my nationality and permanent residence.

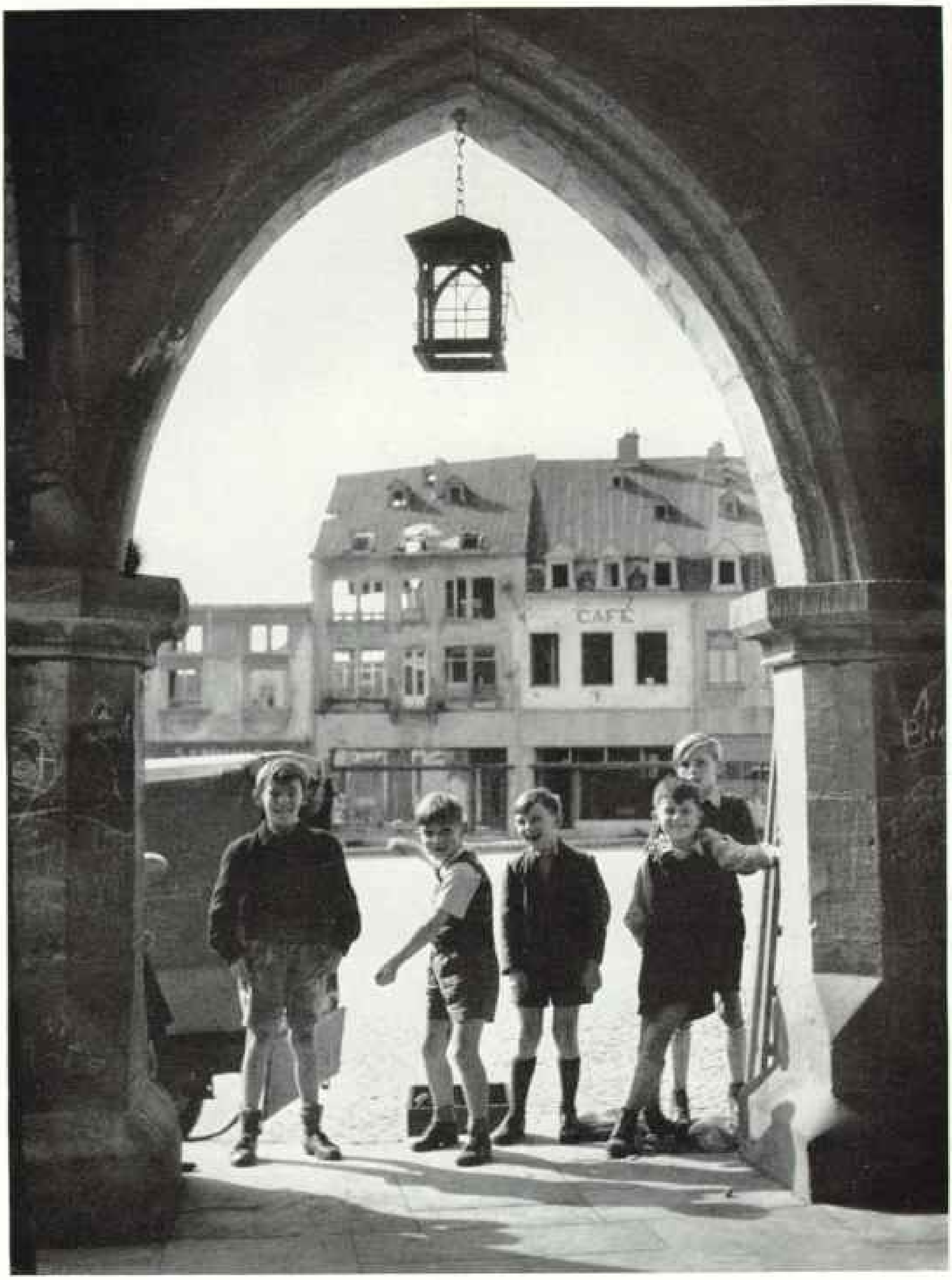
"How does Luxembourg do it?" I asked myself and then others. The best answer I could

* See "Belgium Comes Back," by Harvey Klemmer, NATIONAL GEOGRAPHIC MAGAZINE, May, 1948.

Only a Placid Mirror of Water, Meandering Between Vine-clad Hills, Separates Germany from Little Luxembourg

Flowing northward from France, the Moselle forms Luxembourg's southeast boundary with Germany. In this view down the river, the Grand Duchy is on the left. The wine town of Wormeldange faces German Wincheringen (right).

Nazi Desecration Ruined Clervaux's Abbey (Upper Left); Bitter Fighting Wrecked Its Old Château (Right), Opposite Parish Church



In Battered Echternach a Gothic Arch Frames War's Destruction and Youth's Blithe Spirit

Southern anchor of the Bulge, Echternach is Luxembourg's most war-damaged town. Though a tragic wreck, it welcomes holiday seekers to pleasure spots on the Sûre River. On Whit-Tuesday, pilgrims and townspeople dance to honor St. Willibrord, a 7th-century English missionary who founded an abbey in Echternach.

get was that the Nazis, considering Luxembourg a part of Germany, did not loot it thoroughly while they could and had no time to do so when they were being ejected.

However, the Germans did loot it considerably, and I fell back on the belief that this bucolic land is especially favored by Nature and that its people have always considered good eating a matter of special importance.

The Stuff proved an excellent place in which to examine the language of Luxembourg. On one of its beams was a gay quatrain which may be freely translated thus:

Two cats and one mouse,
Two women in one house,
Two dogs with one bone,
Quarrels come and peace
has flown.

The words for "cats," "mouse," and "house"—*Katzen*, *Maus*, and *Haus*—were all exactly the same as in German.

A patron of Stuff, noting my interest, addressed me in French and with a curious belligerence:

"The popular language here is nothing like German, monsieur, though it might seem so to you. It comes straight from Holland Dutch. Germans can't understand us Luxembourgers when we speak the national language."

I politely agreed with all he said, but the language of the Grand Duchy still looked and "listened" to me very much like German. I surveyed an advertisement on the Stuff menu, stating that a certain brand of cigars was *bekannt als de' bescht am ganze Land* (known as the best in all the land).

I took out my wallet and studied my Luxembourg paper money of the denominations of five, twenty, and fifty francs, marked *Fennef Frang*, *Zwanzeg Frang*, *Foifzeg Frang*. Each bill bore also the country's native name, which is Letzeburg (from Lützelburg—"Little Fortress"), as well as the Frenchified "Luxembourg."

I thought of the freedom cry of Luxembourg carved on a stone pillar in the Place d'Armes: *Mir Wælle Bleiwe Wat Mir Sin* (meaning "We wish to remain what we are") and mentally compared it with the German *Wir Wollen Bleiben Was Wir Sind*.

It did certainly "seem so" to me, but I remained on a plane of politeness with my self-appointed informant. It seemed to me significant that he felt shame and anger that a

A Biblical Precedent Guided Potato Growers at Digging Time

Like Boaz in dealing with Ruth, many "let fall some of the handfuls of purpose" so those who were war-poor but proud might not want (page 804). With state help potato growing has developed rapidly in Luxembourg's ravaged northern parts. In 1946 the Grand Duchy exported nearly 7,000 tons, but yield in dry 1947 was poor.

foreigner might consider his language similar to that of the detested Reich. I decided then that it would take a hundred years of patient effort for Germany to win the friendship of the little land which she has so cruelly and repeatedly violated.

A Land of Linguists

Most of the people of Luxembourg speak French (the official international language of their country) as well as German and their own idiom. Many also speak English, learned in school.

An American officer in Luxembourg during the war encountered a rosy-cheeked little boy being drawn on a sled by his mother. When the boy smiled a greeting, the officer said, "Bonjour," whereupon to his surprise the lad exclaimed to his mother in perfect English, "Why, he is French!"

In the local newspapers three different languages may appear on the same page. One article may be in German, one in French, and another in the Luxembourg idiom. For the benefit of Americans during the Battle of the Bulge, English was added to this potpourri.

Religion, government, and steel are the three foundation pillars of the Grand Duchy, and all are interestingly represented in the capital.

Religion I place first, because its power over the people is tremendous. This is a Roman Catholic land of intense, old-school piety.

For two weeks during the month of May almost the entire population of the country makes a pilgrimage to the capital to worship "Our Lady of Luxembourg, Consolatrix Afflictorum," the patroness saint of the Grand Duchy for 350 years.

At Sunday masses in the capital's cathedral, a packed congregation comes thundering in with its responses in such prodigious volume and such unison that one can have no doubt of the Church's hold on the rank and file.

The Cathedral has a special treasure—the tomb of John the Blind, as colorful and valiant a warrior as ever brandished a sword. He was Count of Luxembourg as well as King of Bohemia. When stricken blind, he still fought on, wherever a fight was to be found. He led his troops personally at the Battle of Crécy and was killed there fighting for his ally, France.

A popular story, though historians discredit it, is that the British forces were so impressed with the bravery of John the Blind that they paid him the compliment of stealing his ostrich plumes and his motto, *Ich Dien* (I Serve). These were adopted as the badge of Britain's Prince of Wales, and still remain so.

The government of the Grand Duchy centers in buildings close to the palace. There is a Chamber of Deputies of 51 members and a Council of State of 15 members, the latter appointed by the Grand Duchess for an indefinite term. Hardly ever is the country shaken by that bane of liberal democracy in Europe, the cabinet crisis, or *crise*.

Iron and steel form a tremendously stout prop of Luxembourg economy, for they are big business throughout the southern portion of the country.

More than 7,766,000 tons of minette (iron ore) were mined here in 1937, for example, and 5,000,000 tons of pig iron and steel, in about equal proportions, were produced. All this is greatly curtailed at present because of Luxembourg's difficulties in obtaining coal.

ARBED and HADIR are the composite names (made from initials) of the two largest companies, which dominate the industry. Arbed's building, on the land between the Pétrusse viaducts and the railway station, is one of the most modern and pretentious in the capital. During the Battle of the Bulge it served as Headquarters of Maj. Gen. O. P. Weyland's XIX Tactical Air Command, cooperating with General Patton's Third Army.

The steel region in the southwest is as smoky and drab as it is industrially important, but Mondorf les Bains in the southeast, Luxembourg's one bid for the society that visits spas, is as neat a little resort as ever brought wry faces to those who quaff curative waters. The whole northern half of the country is a glory of travel, despite the pitiless battering of war which laid 38 percent of the country in ruins.

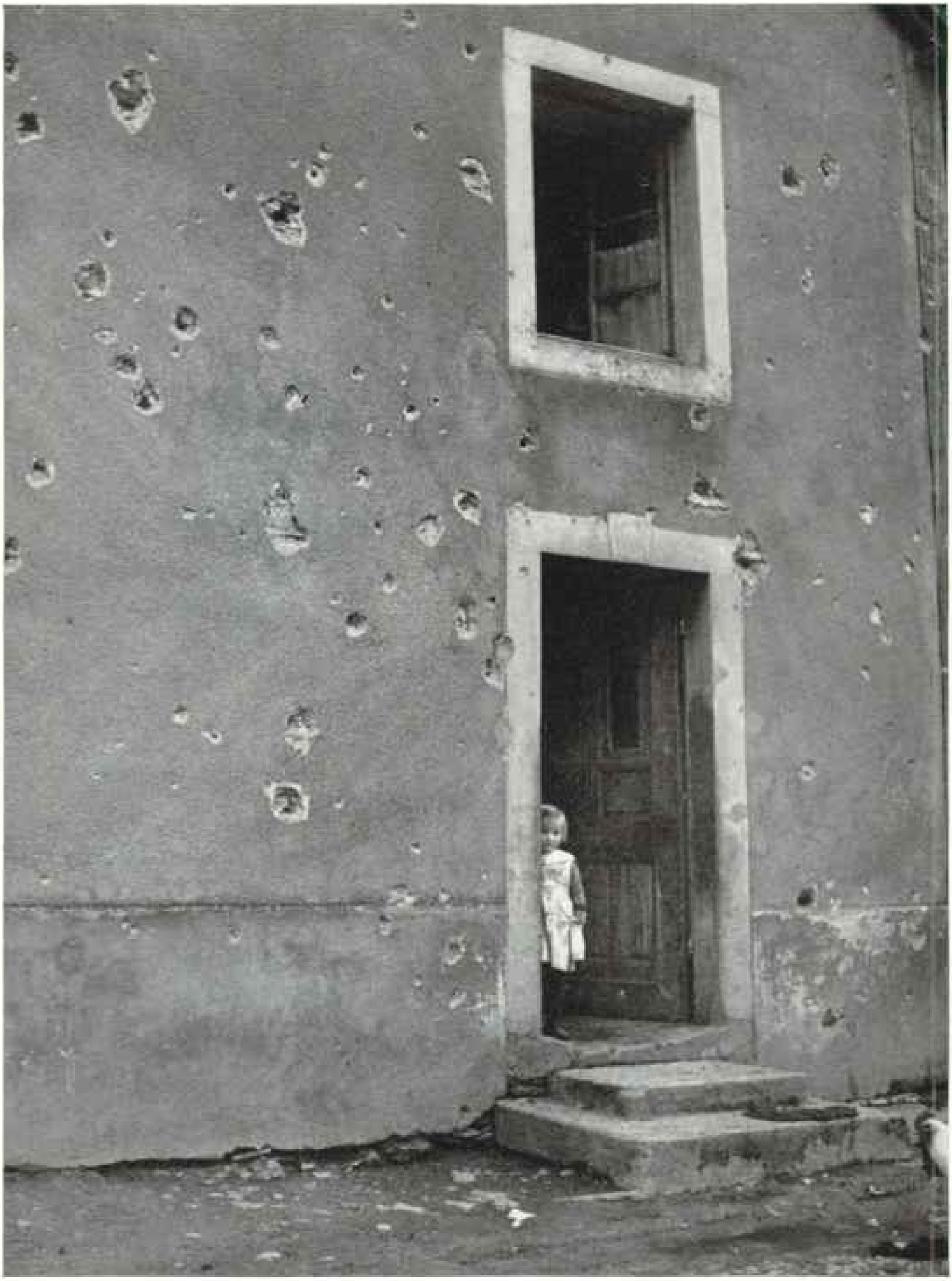
Potatoes Left for Poor and Proud

Rising from war, this little land is helping herself. From one end to the other—only a two-hour drive—one sees a country at work. New roofs are rising against rain and cold. Granny tends cattle in the dewy grass and knits warm socks for winter. Sturdy folk harvest potatoes and grain. Beside the Moselle young girls pick grapes. Children drive home the herds at dusk.

In one field Maynard Williams, who made the photographs for this article, noticed what seemed like waste: many good potatoes left on the ground.

"Our poor people are proud," his driver explained. "But anyone is allowed to pick up what the harvesters leave behind."

Echternach, scene of the famous Dancing Procession in honor of St. Willibrord, is a town of insistent "personality." It lies on the south bank of the small Sûre River, with



A War-born Youngster Ponders a Picture-taking Yank from Her Shell-pocked Home

Bashful, she shows but half her body, as if still wary of flying death. Her home town of Esch sur Sûre, near a road leading to beleaguered Bastogne, saw heavy fighting between American and German troops in the Battle of the Bulge. Because of its valley location, the town is sometimes called Esch le Trou, "Esch in the Hole."

At a Frontier Customs Station a Luxembourg Official Checks Goods Bound for Germany's French Zone

Across this temporary American-built bridge spanning the Moselle River merchandise commands far higher prices. In 1922 Belgium and Luxembourg entered into a customs union. In 1944 the Netherlands Government agreed to join it, and early in 1948 Benelux, a three-way union, went into effect.

In His Wooden Hamper He Collects Grapes for Wine

Climbing down steep vineyard slopes to a giant wheeled vat, he bends from the waist to spill his load. Luxembourg vineyards produce between one and a half and two million bottles of wine a year, mostly for export.

In Busy Luxembourg a Pinafored Youngster Lends a Hand

She cuts white grapes for the Grand Duchy's celebrated light, dry Moselle wine; 1947 was an excellent vintage year. Terraced vineyards cover some 3,000 hilly acres along the Moselle River (page 800).

Germany across the way on the north bank. A partly Roman bridge used to connect the two, but it was bombed to dust in 1944, for here Von Rundstedt launched one wing of his massive offensive.

The town is a tragic wreck, yet I found holiday in full swing. Twenty or more hotels had reopened for tourist trade (page 802).

Echternach Dances to Honor a Saint

On an earlier occasion, before the war, I witnessed the Dancing Procession, which occurs on Whit-Tuesday, the 52d day after Easter. Fifteen thousand persons participated, dancing from the German side of the river across the bridge to the town church and the tomb of their holy patron, St. Willibrord, who cured the local cattle of a bovine affliction more than a thousand years ago.*

They danced or capered five steps forward, three back, five forward, three back, and so on, forming ragged lines held together by linked handkerchiefs which the dancers clutched in either hand.

Some of the young men were dancing as hirelings for others who wanted to honor the saint but had not the strength to do so personally. But thousands of the dancers were older folk. Some of the stout old grannies, I thought, would certainly die of exhaustion after another five-and-three, but I heard of no fatality. Forty or fifty brass bands and numerous groups of violins filled all the air with sound.

A priest surveying the long line saw a cluster of girls whose arms were *bare!* He sent them home to put on their coats, though the temperature was 85°. In such matters, Luxembourg is highly conventional.

In the postwar era the Whit-Tuesday procession goes on as of yore, though it cannot cross the bridge that isn't there, and St. Willibrord's remains are no longer in the town church but in the crypt of the abbey basilica where they were placed for protection from bombing.

This basilica is itself a war victim, an almost total ruin, but Luxembourg hopes to restore it. A restoration worker took me in to see the tomb, lighting a newspaper as a torch, for the place was as black as solid jet.

"You're on your own, monsieur," he said pleasantly. "It is forbidden to enter here. Pieces of stone still fall from the cornices. Look here," and he showed me a bad gash in his scalp where a fragment had fallen on him.

Echternach, in its contrast of tragedy and gaiety, seemed to me a living laboratory of human behavior. Three modern invasions, the last a cyclone of steel and explosives, have left its habits and ways of life unaltered.

Vianden is on the Our River, which forms the Luxembourg-Germany frontier for many miles. But at Vianden a Luxembourg pocket about a mile in depth extends into Germany on the east bank.

Of all towns in the Grand Duchy, Vianden is the most spectacular for beauty of site. Occupying both banks of the Our, it climbs the hills steeply and culminates in the sky-piercing 10th-century castle of Orange-Nassau-Vianden, which looms like a symbol of feudalism high above town and river. From this castle came the present ruling dynasty of the Netherlands.

When I first visited it, between world wars, the castle was impressive and even dispensed a certain aura of gaiety, for I read and took down a very jolly death notice, that of "Madame War," dated November 11, 1918. It concluded with the words:

> The Families Death, Misery, Illness, Devastation
> have the great pleasure of informing you
> of the long awaited loss which they have
> just suffered in the person of
> MADAME WAR

A thousand times alas! The old lady was not dead at all, but merely playing possum. She recovered, returned in 1940, and came again in 1944, utterly wrecking the château on the latter occasion. It is now a labyrinth of scarred and towering walls that reach for heaven. But the castle's verdant terraces still offer the same incomparable view. *That* the bombs and artillery of the Rundstedt Thing could not obliterate.

Victor Hugo was an exile in Vianden in the dark years of 1870 and 1871. His house, on the bank of the Our, was a prewar museum, but it is now a bomb wreck and its contents have been rifled.

Clervaux's Connection with FDR

Clervaux, almost at the "stem" of the pear-shaped Grand Duchy, is proud of its connection with Franklin Delano Roosevelt by way of the Delano component of his ancestry.

A noble family of this village bore the name of De Lannoy. A member of another branch of the family, Philip de Lannoy, or De La Noye, was born in 1602 and sailed from Holland to the New World in 1621 on the ship *Fortune*. He landed at Plymouth, Massachusetts, to join the colony established the previous year. The second generation changed the spelling of the name to Delano. Sara Delano Roosevelt, and hence her son Franklin,

* See "The Grand Duchy of Luxemburg," by Maynard Owen Williams, National Geographic Magazine, November, 1924.

A Roadside Picture Map "Blows Up" Tiny Luxembourg for Touring Visitors

"U. S. Military Cemetery, Hamm" adds its linguistic variation to a signboard map near Steinfort by the Belgian border. In this land of linguists many Luxembourgers speak French, German, and English besides their native patois. In the Middle Ages their country was four times its present size. Various treaties between 1659 and 1839 reduced it to 999 square miles, about four-fifths as large as Rhode Island.

were direct descendants of Philip de Lannoy.

Luxembourg's Clervaux had had a long life and a pleasant one, by and large, until the Nazi scourge of 1940 and the Rundstedt horror of 1944-45 wrought indescribable havoc. The Nazis desecrated Clervaux more grossly than any other Luxembourg village by setting up one of their largest and most arrogantly ordered Hitler schools in the Benedictine abbey that dominates a lofty ridge cleaving Clervaux like a gigantic snowplow (page 801).

For forty years this abbey has seemed to float like a banner of heaven over the village, but religion, venerable tradition, and even a decent reverence for the abbey's architecture were brushed aside callously by the Nazi trainers of youth. The round Romanesque windows were cut square to make it a better factory of brutality. The abbey church was used, and abused, as a gymnasium.

Two Luxembourg gendarmes pedaled up the long, steep slope on bikes and happened to enter the church at the same time I did. I expressed aloud my sense of shock at the awful wreckage of the interior:

"The Allied bombardment, I suppose, did this in driving out Von Rundstedt."

"But no, monsieur," said the gendarmes,

Willing Hands Help Plucky Luxembourg, Survivor of Invasions, to Rise Again

For more than a thousand years the tides of war have swept across the little country. World War II, with its aerial bombardment and hard-hitting mobile forces, dealt the cruelest blows. Without fanfare, industrious Luxembourgers have tackled the formidable task of reconstruction. "From one end to the other," reports the author, "one sees a country at work." This building in battered Ettelbruck has now been completed.

both speaking together. "The Boches did that. Not the bombardment."

"Do you mean," I persisted, "that the Germans did all this damage just in using it as a school?"

"Absolutely, sir. Not one bomb ever touched it. The Nazis did it to show their contempt for religion. And when they were driven out they added damage to damage. It was spite then."

The parish church, halfway down the great ridge, did suffer from artillery bombardment, and the old château at the apex of the "plow" was gutted and completely ruined in the Battle of the Bulge, as was the southern tine of the forked village itself.

On an old monument commemorating events in the War of the Peasants, 1798, during the period when Napoleon swept Luxembourg into his collection of territorial trophies, I read a motto in the Luxembourg language: FIR GOTT A FIR VATERLAND (For God and for Fatherland).

There had once been another word just preceding the word "VATERLAND," and by a bit of Sherlock Holmes deduction I assumed that it had been "DEUTSCHES" (German). There was exactly space enough for that many letters. But the word is expunged for all time.

I should not be surprised if, upon my next visit to Clervaux, I should find both the last word and its preceding void replaced by the name of this freedom-loving land itself, so that the motto would read: FIR GOTT A FIR LETZEBURG,

Cloud Gardens in the Tetons

By Frank and John Craighead

With Illustrations from Photographs by the Authors

FROM wartime service in warm oceans and hot tropical forests, we had returned to Wyoming—to the Jackson Hole valley and canyon roads of snow, to a dazzling whiteness scarcely toned down by forest green, to nightly subfreezing temperatures.* Our wives, Margaret and Esther, had waited for us in a log cabin on the Snake River.

Now we were packing our gear in to snow-buried cabins of the X-X Ranch, owned by "Uncle Jim," a homesteader who had arrived in this part of the country in the midst of a snowstorm, with $17.50 his total capital. The four of us webbed in with a load at a time.

Taking off our packs, we read the sign on the door. "If I'm not at home, I'm off fishing. If I don't come back, see if you can make a living off the place."

Old Jimmy was home, however, and welcomed us with a dinner of elk steak, fried parsnips, potatoes, muffins, coffee, and the remark, "Come and get it."

Wilderness Fun Even in Winter

During the following weeks the spring sun slugged it out with gray snow flurries that roared down the canyons of the Tetons and attempted to spread over the valley.

Although looking forward to spring, we were not anxious to see winter go. There were skiing and ice fishing. There were wonderful light snows for tracking mink and marten, or for reading the story of beavers at work.

The deep snow blanket slowed down the gaunt moose and elk so that we could overtake and photograph them from snowshoes. On one such chase Frank pressed a cow moose and her yearling too close and went up an aspen tree as she turned and charged him.

Days of fly-fishing from snowshoes, when we froze the trout beside us as fast as we pulled them in, passed all too quickly. As if by magic a hot sun burned the snow blanket until the tops of the fences showed, then the tips of the sagebrush.

Warm winds whipped away the evaporating moisture, while the porous glacial soil absorbed the melted snow and slowly released it to the Snake River. Almost overnight spring had come to the valley, and winter slowly receded up the mountains.

Buttercups turned the first bare ground to a glistening gold. Shaggy, ill-tempered moose dragged out of the Snake River willow bottoms, waded into the unfrozen beaver ponds, and daily grew warier as they gained strength and flesh from the slimy green algae.

Grouse drummed in courtship day and night. Seldom glimpsed, Wilson's snipe performed their evening nuptial flights, their directionless, winnowing whistles seeming to come from dead trees in the swamp, from steepled spruce trees, from the dusky sky directly above, or from low in the sedge-lined channels leading to the beaver houses.

A lonesome saw-whet owl calling vainly and monotonously for a mate, the hoots of nesting great horned owls, the ripples left by rising trout, aspens turning green and willows red—all said that winter snows had retreated for another short half year. A move to summer cabins on the STS Ranch, owned by two naturalists, the Murie brothers, placed us within sight and sound of this and much more.

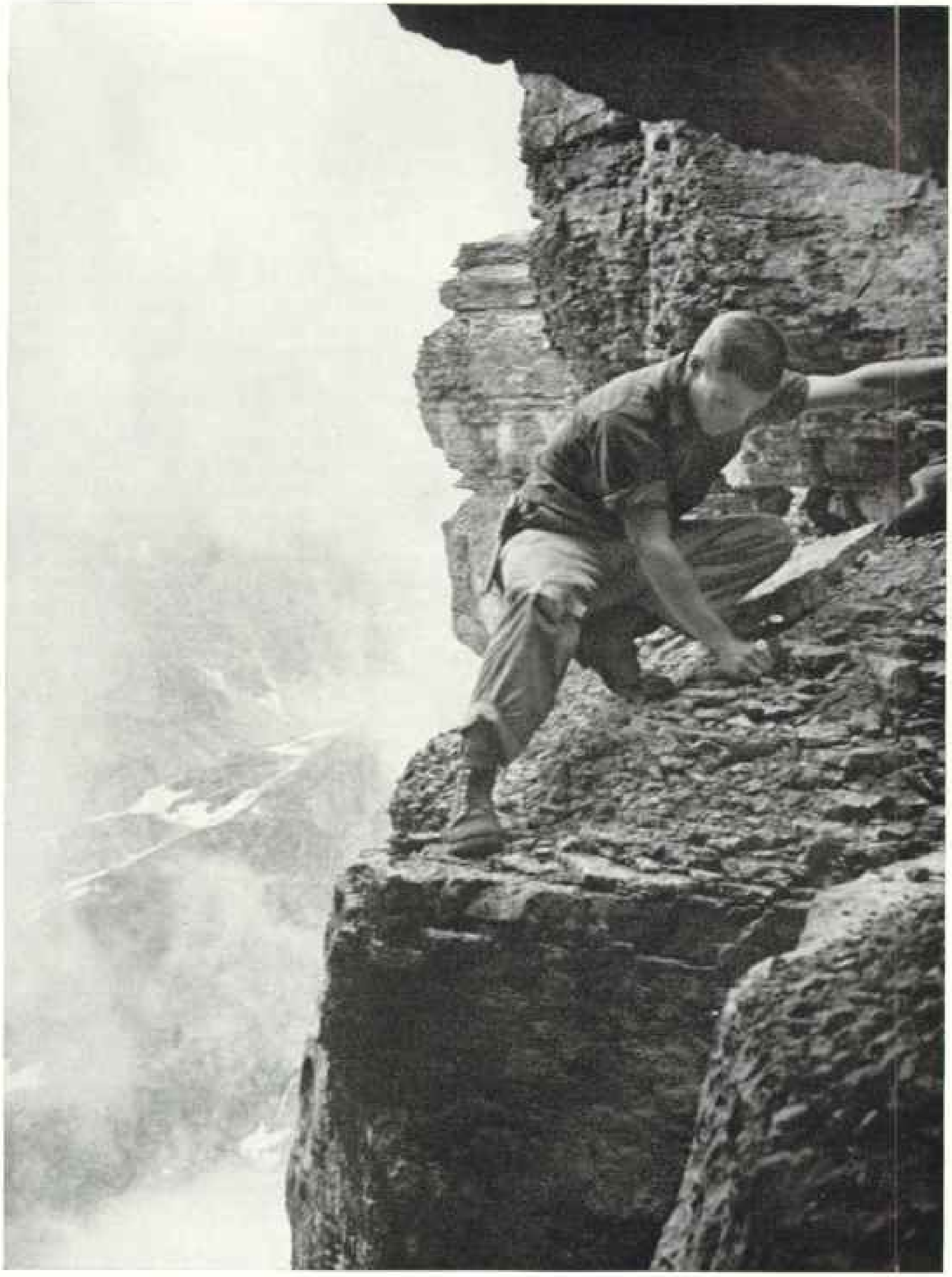
With the appearance of the first buttercups, spring beauties, and yellow fritillaries, we checked our camera equipment, got together flower presses and vasculum, and, with permission from Grand Teton National Park officials, prepared to photograph the alpine flowers (map, page 813).

Snow still lay deep in the mountains, the flowers dormant beneath it. However, we could start photographing mountain-climbing flowers such as the buttercup, glacier lily, and spring beauty that bloom first in the valley, then follow the receding snows up to timber line. There were also valley flowers, the earliest bluebells and larkspurs.

Supplies Must Be Light

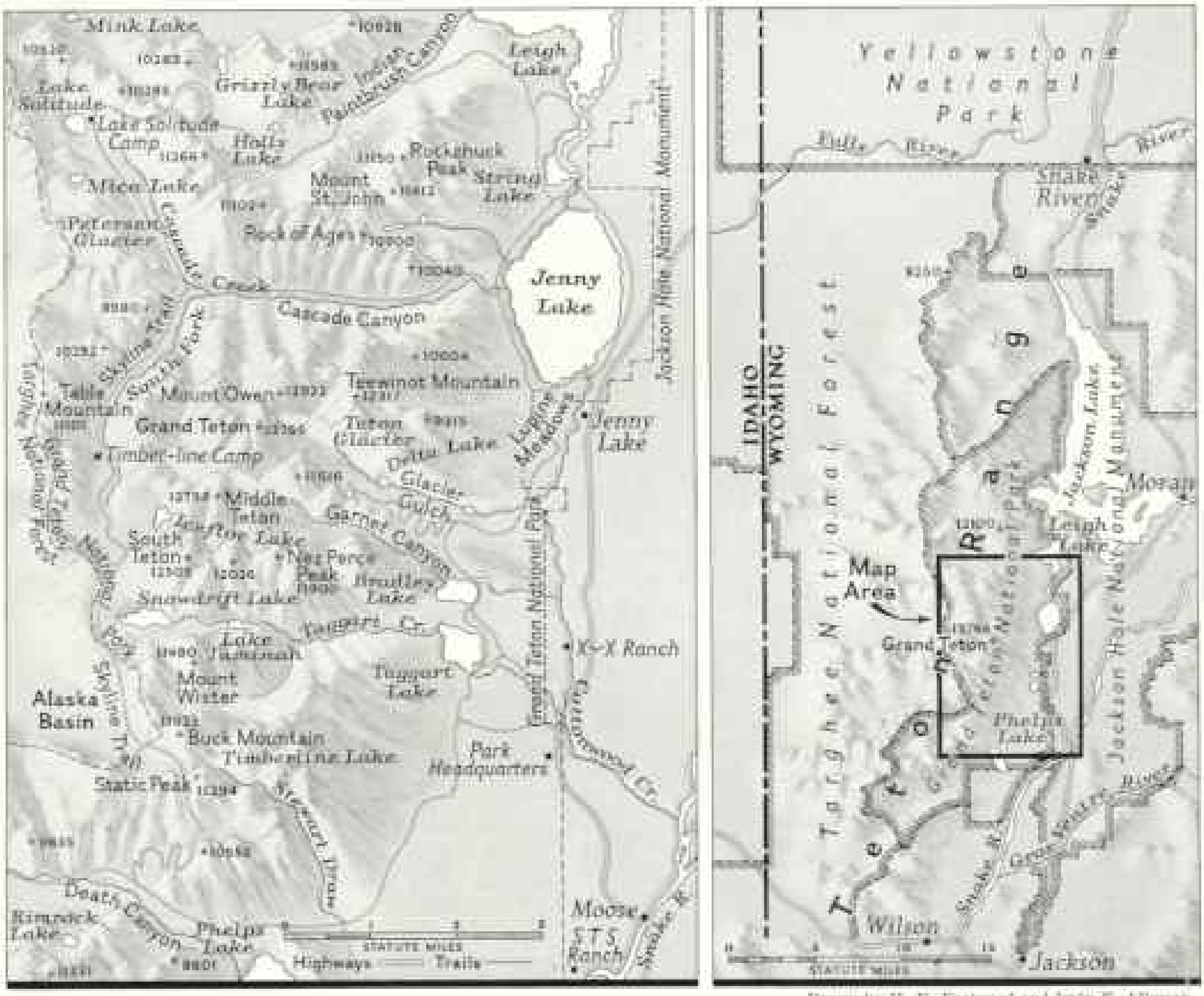
To back-pack up to the alpine regions, we had to select a minimum of equipment, with emphasis on lightness and utility. We started with the food. On a smoke rack open to the sun we placed salted strips of beef. The combined action of sun and aspen smoke

*Frank and John Craighead wrote for the National Geographic Magazine their experiences as young hobbyists hunting and taming wild birds, "Adventures with Birds of Prey," July, 1937, and "In Quest of the Golden Eagle," May, 1940. Through the first story they received an invitation to visit a royal fellow-falconer in India, and the story of their experiences, "Life with an Indian Prince," appeared in the National Geographic Magazine for February, 1942. Their Navy service is recounted in "We Survive on a Pacific Atoll," January, 1945. Graduates of Penn State College, they are at present working on their Ph.D. degrees at the University of Michigan.



Braced on the Edge of Eternity, Frank Craighead Collects a Rare and Lonely Alpine Flower

A misstep would plunge him a thousand feet to the misty valley below. To color-photograph and collect flower specimens from Nature's alpine rock gardens, John and Frank Craighead, their wives, and friends spent four months among skyscraping peaks in western Wyoming's Teton Range.



Drawn by R. E. Eastwood and Irvin E. Allemann

From Lofty Mountain Camps the Craigheads Roamed a Wild, Primeval World

In early spring and summer expeditions they explored the central section of Grand Teton National Park. In its 150 square miles of rugged mountain grandeur, the park includes the highest peaks of the saw-toothed Teton Range. To make this majestic range, elemental forces in recent geologic times heaved and broke a giant earth block. Ice Age glaciers, carving alpine peaks and gouging deep canyons, hewed the continent's most jagged skyline. Headwaters of the Snake River excavated near-by valleys. Dotted lines on the map mark the chief park trails; the expeditions' camps were temporary.

produced jerky, tasty dried meat now greatly reduced in weight and volume (Plate III). Hard and tough as chips of wood, it was stored in cloth bags. Fish were likewise salted and dried to the brittleness of crackers.

Corn and wheat were parched; dried foods such as peas, potatoes, soups, milk, prunes, and raisins were purchased, as well as rice, flour, noodles, and corn meal. Concentrated quick-energy foods like sugar, honey, nuts, chocolate, and peanut butter were added.

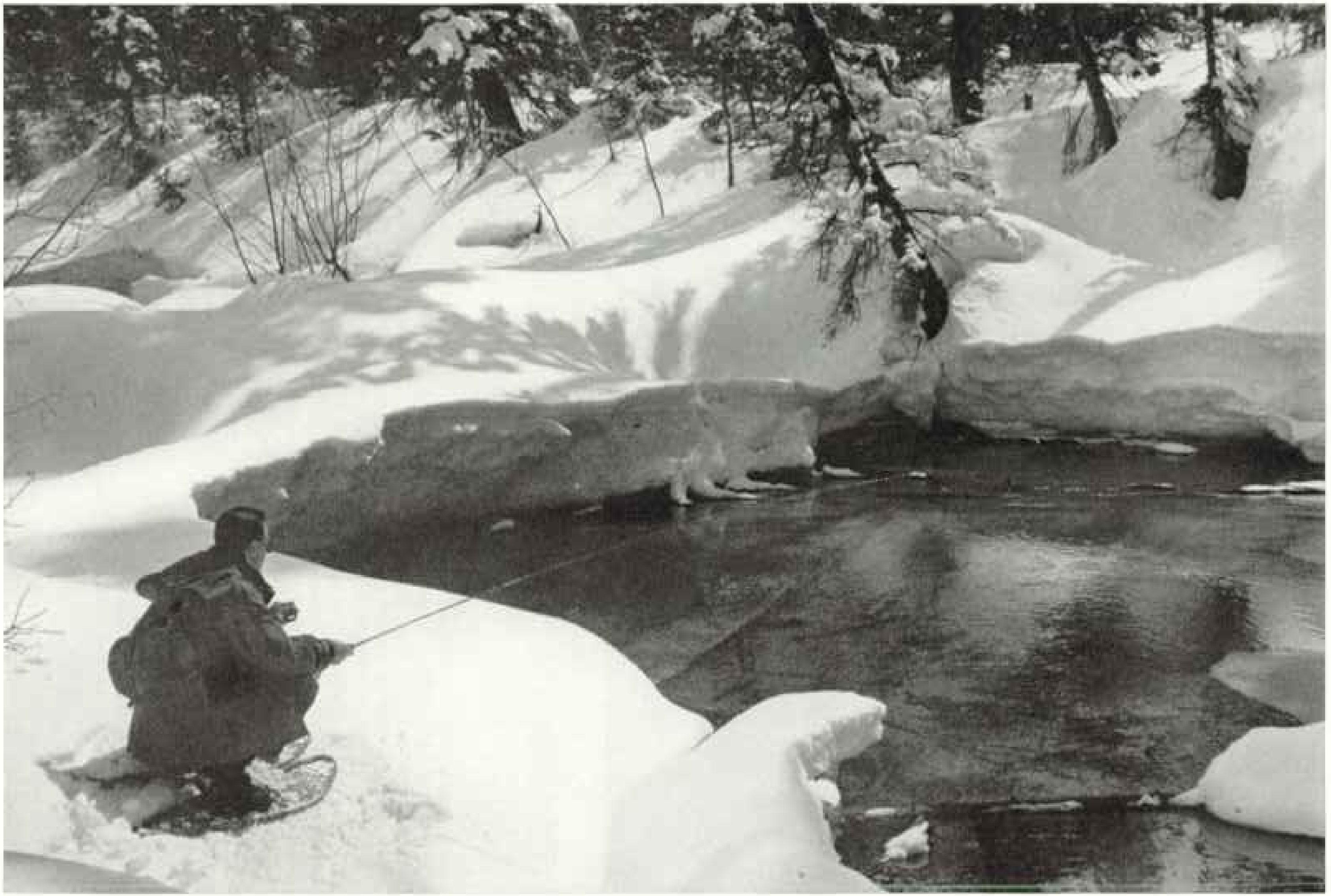
When the bulk and weight of our food could no longer be reduced, we turned to other items. Our tent, a light waterproof nylon tarp, did extra duty as a pack. Rigged with removable chest and shoulder straps as well as tumpline, it functioned as efficiently as a pack board. The nylon rope of the pack rigging would also serve for pitching our tarp tent (page 828).

A machete instead of an ax, a half-size flower press, 35-mm. cameras, light metal tripod, thin aluminum cooking utensils—all lowered the ounces that grew to pounds as, one after another, items of equipment were added or discarded on a basis of weight.

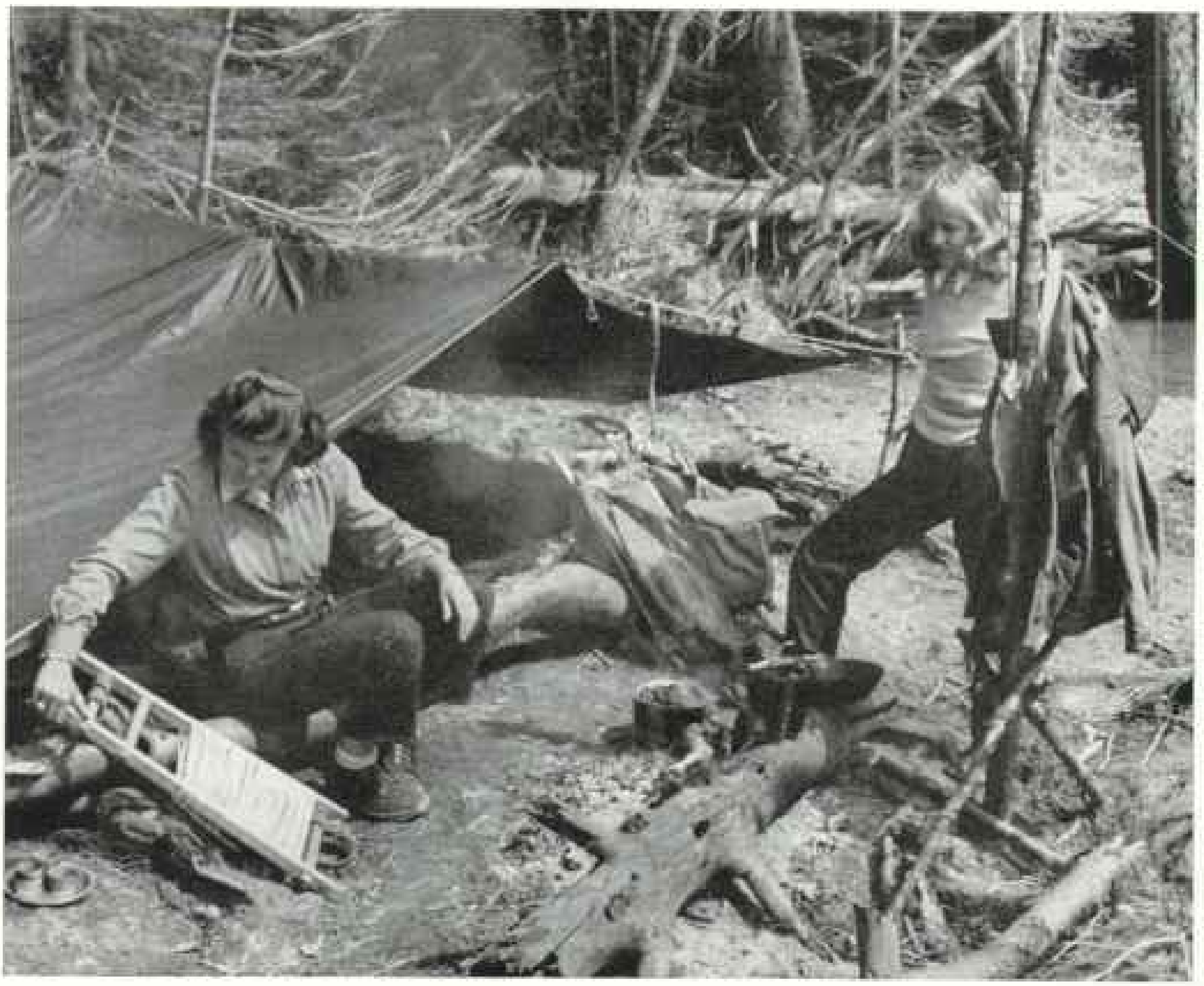
When joined by our friends Dave Spencer and Bob Patterson, and Bob's wife Hazel, we started on our first trip. It is an unwritten law of the mountains that those who venture into them on foot must carry their own gear. Wives are no exceptions. Thus the girls were carrying packs as large as ours but not as heavy, the difference being due to additional food we had offered to carry for them.

From the sagebrush of the valley we followed the trail over glacial moraines cloaked in lodgepole pine, and climbed gradually up Cascade Canyon into the subalpine zone of

Legs and Lungs Attuned to Steep Slopes and Thin Air, They Hunt the Alpine World's First Flowering Signs of Spring



Squatting on Snowshoes, Frank Fly-fishes an Opening in Thawing Taggart Creek for the Season's First Trout



When Camp Life Was Streamlined, Wives Assumed Familiar Chores

They get breakfast while the men prepare for an early start. A hot, dry spell forced the alpine flowers into their short, colorful blooming period early. Camper-ecologists took up the challenge. They specialized their jobs and worked long days to finish while the blossoms lasted. During the summer they took more than 2,000 color photographs, including hundreds which preserve the beauty of 200-odd flower species.

fir and spruce. The lower canyon was colored with pink and white spiraea, with penstemons, purple fringes, red paintbrushes, and a few early-ripening huckleberries.

Higher up the canyon we hit snow, first the packed snow of an avalanche that had plunged down the exposed southern wall and swept across the canyon floor, carrying with it tons of rock as well as the scattered, mangled remains of fir and spruce.

Later we trudged through melting snow and found Lake Solitude still partly locked in ice, the shore line covered by a foot of snow (Plate II).

Beside this glaciated lake at the head of the canyon we made our base camp. We pitched our tents on a small grassy site, free of snow because of its position on the south side of a huge granite boulder. The boulder served as a windbreak and as a reflector for our fire.

Our icebox was a trench in the snow, and our drinking water came from the melted lake edge. A few fir boughs insulated our sleeping bags from the ground dampness. Our firewood was the dead dried branches of spruce and fir—stunted trees that represented years of slow, patient growth.

The Old Question: Who Cooks?

Camp pitched, we were ready to eat. A relay of understanding glances was a signal for the men to investigate the open water where feeder streams entered the lake. It was important, we felt, to stretch our food supply by catching trout—catching them immediately, before we became involved in cooking supper. Outdoor cooking is a man's job, and we intended to do our share—when it didn't interfere with fishing (page 815).

The next day our wives showed us that they, too, intended to fish even if it interfered

A Warm Smile Belies the Icy Coldness of Her Mountain Foot Bath

Margaret Craighead seems a water sprite in dungarees and sweater as she bathes tired feet in a limpid mountain pool. In a cabin in remote Jackson Hole, a valley adjacent to the Teton Range, she and Esther Craighead awaited their twin husbands' return from Navy service in the South Pacific. They kept alive the hope of a prolonged postwar sojourn among the high peaks.

with cooking or with our self-assumed job of getting food. In late afternoon, just when the surface water had warmed sufficiently for the trout to feed, the girls took our only two fly rods and headed for the open inlet. Just too late, we returned from photographing with the same purpose in mind. The tables turned, we started preparing supper.

Campers who don't cook their own meals must eat the concoctions of companions. Every camper seems to have a favorite goulash that is like ambrosia to his whetted appetite, but tastes just as it looks to everyone else. Bob's was so-called rice pudding: sticky undrained rice, raisins, and prunes.

At the first helping the girls regretted having left the cooking to us. To prove the mess was edible, we continued to consume one cupful after another long after the girls had called quits. In the morning there was no argument when we picked up the rods.

For breakfast we had the sweet pink meat of trout that had passed more than half their lives beneath a thick layer of ice and snow.

Between sunrise and 8 o'clock there was usually a period of calm. No wind battered the white, woolly heads of the long, thin-stemmed bistorts. The fringed grass-of-Parnassus stood upright and motionless.

The light was bright, the shadows soft. It was the time of day when we set up our cameras, took a picture, and moved from one flower to another. Along with the heat of the day came the winds, persistent breezes that would slow down, cease for an instant, then tantalizingly start up stronger than before, making photography difficult.

Nevertheless, our list of photographed flowers grew—globeflower, glacier lily (or adder's-tongue—Plate V), marsh marigold, Smelowskia, Potentilla, white mountain heather (not a real heather, despite its name),

shooting star, phlox, Polemonium, and erigerons. Our flower press expanded so that none of us wanted to pack it down the mountain (page 828).

Each day took us over miles of mountain meadows, up the peaks to the farthest penetration of seed plant growth, and often on to the summit for the fun of it. Sometimes together, at other times widely separated, we crossed the talus slopes, climbed the snow fields and glissaded down them, explored cliffs, ledges, and chimneys for new flowers to collect and to photograph.

Our legs no longer complained of the day's exertion; our lungs adjusted to the rarer atmosphere. We felt like staying forever up in the clouds, in the invigorating air, in the rock gardens above the valley.

As our appetites increased, our food supply dwindled. We supplemented it with fish, mountain sorrel greens, and the green pods of glacier lilies, but the inevitable faced us. We must temporarily leave the cloud gardens and descend to the valley for more food, more film, and a fresh start.

Back to the Peaks in August

In August we were again in the mountains, camped this time near the head of the South Fork of Cascade Canyon, where two streams originating in snow fields above us formed a V on joining.

We were at timber line, and above us towered a tremendous limestone wall the stratified structure of which contrasted with the Pre-Cambrian granite of the Teton peaks. Beyond it lay picturesque Alaska Basin, tucked away in the Targhee National Forest. This calcareous soil would support flowers we had not yet found and photographed.

Above the cliffs and peaks, birds of prey soared and wheeled on rising air currents while hunting the treeless flower meadows below. Swainson's hawks, ferruginous rough-legs, sparrow hawks, and prairie falcons maneuvered apparently unhampered in the rarer air at 11,000 feet, while the golden eagle soared to 13,000 and above to look down on the peaks of the entire range.

Cliff swallows and rosy finches nested on cliff faces and in crevices above timber line. Lower down, pipits and white-crowned sparrows were hatching their young in the sprawling, matted fir growth. In the rock slides conies, or pikas, were harvesting flowers, piling and curing them in colorful scented "haystacks."

A hot, dry spell had brought the alpine flowers to the height of their blooming season several weeks early. The dryness was likewise rushing to a close their already short lives. Fields of golden mountain sunflowers, lavender erigerons, yellow, pink, and scarlet paintbrushes, dark-blue lupines, sweet vetches, mountain roses, stonecrops, various colored mustards and anemones seemed to be racing frantically to flower and produce seeds.

This rush and hurry proved contagious. We were forced to fall into the swing in order to photograph the numerous flower species while their brief glory lasted.

As we took up the challenge and entered the race, camp life was streamlined. Dave would perhaps start a fire, the girls would cook breakfast and portion out food for lunches (page 816).

John would take advantage of the early-morning sun to photograph a flower. Bob would secure the tents and protect our gear from possible storms. We'd then eat a breakfast built around cupfuls of oatmeal or cornmeal mush and be off, sometimes to locate new flowers, sometimes to hurry to a previously located flower, timing our arrival to coincide with the best light conditions.

In the evenings we would drop down from the peaks, the ridges, and the high saddles to our timber-line home. Sometimes we would schuss the snow fields on our feet or angle down the steep, rocky talus slopes in long bounds. All of us returned hungry and tired.

While supper was cooking, we pressed our flowers and keyed out strange or doubtful species in our books. Sometimes we finished writing notes by firelight. Each evening we would add to our list the new plants photographed. On days when weather conditions were poor, we would chalk up only two or three; on our most successful day John and Margaret photographed 30 different species.

Thrilling Quest of Purple Saxifrage

While Dave and Frank keyed plants and wrote notes at camp, John, Margaret, and Bob started off for Alaska Basin, photographing each new plant they encountered. They hoped to find on the high, rocky ridge the small purple saxifrage, *Saxifraga oppositifolia*. The day before Dave and Frank had covered 20 miles of high ridges and slopes, looking for it with no success.

This tiny alpine flower was of special interest, because it not only perches high on the mountain slopes of the Rockies but is found in similar habitats in the Alps and the mountains of northern Europe and Asia. As an old friend, this hardy adventurer greets the mountain lover on the Grand Teton and on the Matterhorn.

John, Bob, and Margaret dropped down

I **Billowing Clouds over the Tetons Herald a Storm's Approach**

Frank Craighead prepares to photograph scenic wonders from atop 11,412-foot Mount St. John, in Grand Teton National Park, Wyoming. To such heights the authors and their wives climbed in search of alpine flowers. Water from Jackson Lake (background) irrigates farms along the Snake River in Idaho.

Kodachromes by Frank and John Craighead

Brilliant Paintbrush and Beaming Erigerons Invite a Climber to Rest

On her way to gardens high above timber line, Margaret Craighead pauses for a breather.

Kodachrome by Frank and John Craighead

Glacier Lilies, First to Hail Spring, Nod Demurely Beside Lake Solitude

As ice goes out and melting snow trickles down from the Teton crags (background), mountain flowers spring up and hungry trout start feeding on the surface. Here Esther Craighead admires a patch of newcomers.

111 **Sun and Aspen Smoke Turn Beef into Easy-to-pack Jerky**

Forced to carry two-week supplies of food and equipment on their backs, the Craigheads dried meat on a rack over a slow fire. The resulting product, tough as wood, was greatly reduced in weight and volume.

Kodachromes by Frank and Joan Craighead

Poor Fish! Adroit Work with Bare Hand Proves a Sucker's Undoing

Frank Craighead here demonstrates the art of "guddling." Cautiously the guddler gropes under a log or rock until he feels his quarry. Then he eases his hand forward and clasps the fish near the gills.

IV **Gay Colors from Nature's Palette Brighten a Harsh Environment**

Left, sky pilot or skunk flower *(Polemonium viscosum)* grows among rocks from 10,500 to 12,100 feet. The crushed plant emits a skunklike odor. Center, mountain heath *(Phyllodoce empetriformis)* forms pink patches up to 11,000 feet. Its in-rolled leaf margins hold moisture at heights where water is often scarce and evaporation high. Right, paintbrush *(Castilleja rhexifolia)*, Wyoming State flower, carpets large areas from valley floors to mountain peaks.

 Kodachromes and Aiseo Color by Frank and John Craighead

Like Clown Faces, Red Monkey Flowers Grin Beside a Canyon Stream

This species of the snapdragon family, *Mimulus lewisii*, was named for Meriwether Lewis. Its genus name derives from the Greek word for ape. The perennials prefer moist places but are also found in alpine meadows. Here they share a patch of ground with mountain bluebells *(Mertensia sibirica)* and golden ragwort *(Senecio triangularis)*.

V

Hardy Flowers of the Tetons Grow and Bloom Quickly

Nature equips all to make a brave show despite long winters and short summers. Left, dogtooth violet (*Erythronium grandiflorum*), also known as glacier lily (Plate II). Indians eat its bulbs, seed pods, and leaves. Center, columbine (*Aquilegia coerulea*), State flower of Colorado, ornaments canyons and climbs to timber line. Right, alpine buttercup (*Ranunculus adonens*) is related to larkspur, anemone, monkshood, baneberry, clematis, and meadow rue.

 Kodachromes by Frank and John Craighead

Alpine Sunflowers Turn Their Backs on Mountain Grandeur

These specimens of *Rydbergia grandiflora* face east; behind them lie Alaska Basin, in the western watershed of the Tetons, and distant Idaho. Near this spot passes Skyline Trail, part of a 90-mile network penetrating areas of Grand Teton National Park, which only a few years ago was an unbroken wilderness.

Knee-deep in Arnica, a Flower Hunter Gazes at the Grand Teton, Flanked by Mount Owen and Middle Teton (Extreme Right)

Pass the Raisins, Please! Light Rations and Equipment Are the Rule for Teton Mountaineers

Frank (left) and Margaret Craighead and Bob Patterson relax at their camp in Cascade Canyon. Nylon tarpaulins (background) served as both shelters and packs.

Kodachrome by Frank and John Craighead

Kodachrome by Frank and John Craighead

Down He Goes! Frank Craighead's Life Hangs by a Slender Rope

He descends Mount St. John (Plate I) by rappelling, with the rope passing over his shoulder and around his left leg. Below him lie Leigh Lake in the foreground and Jackson Lake in the distance.

below timber line on the slopes that carried the mountain rain and melting snows out to the plains of Idaho. *Oppositifolia* had eluded them all morning, and at noon they decided to climb back to the divide, then follow it south in their search.

A half hour of upward plodding, and they stopped to debate. A storm was rolling in from the southwest, and thunderstorms mixed with mountain peaks and ridges produce trouble. Should they risk entanglement in such a brawl?

The storm, they argued, might be deflected by a peak or pass through a canyon, missing them completely. Once on top, they could perhaps drop down the far side to shelter and be well on their way to camp. They decided to go on climbing.

The onetime distant thunder was soon breaking directly overhead. Clouds rapidly dwarfed the view. Almost at the top they turned back. The air was charged, crackling. Electricity stood their hair on end, made their skin tingle. The wind came in violent gusts. Lightning struck close by, leaving a strong ozone smell in its wake. They raced for timber line.

A band of elk crossed their path, likewise headed down. Again the lightning struck. John thought of temporarily abandoning his metal tripod and camera as a tingling played up his arm, but he could find no protection for it. Rain and hail flailed them as they crawled into timber-line lean-tos, natural shelters beneath the thick matted roofing of stunted firs.

It is in such places that mountain sheep and elk bed down. Gnarled, ageless, dwarfed trunks support a thick mat of foliage flattened and contoured to the mountain by prevailing winds and heavy snows. Streamlined to meet the blasts of a century of storms, they took this one as they had all others. Rain and hail, their force spent on the cushion of needles, trickled down to the dry soil below.

Thundering and mumbling, the storm moved quickly on, tagged by the sun reflected in a million water crystals adhering to the flowers. The scattered hail soon disappeared.

Elusive Flower at Crest of Ridge

Climbing again, the plant hunters made the ridge. On top they stopped to photograph a beautiful tiny member of the Mustard family, *Draba*. Its yellow blooms were still sparkling from the rain.

On the highest rise on the ridge, the top of the limestone wall, they saw, at last, the light-purple flowers of a single clump of *oppositifolia*. The search was over.

John set up his camera, moved it as close as he could to the diminutive flowers, and took a picture. Margaret curled around the plants to shut off the wind.

Evening was at hand and camp was a long trek away, unless they could take a straight course, a short cut. The wall in front of them dropped 1,000 feet to the canyon floor. A long detour would take them down there, with yet another high saddle to climb before dropping into Cascade Canyon and camp.

But from a break in the precipice they could reach a wide, sloping, snow-covered ledge running horizontally across the lower cliff face. If they could follow this over to the saddle, they would hit a long, steep snow slide and could glissade almost into camp. It was worth a look.

They climbed down to the ledge, following tracks of elk caught in the storm. At the ledge the elk had stopped, backtracked, and sought another route of descent.

Short Cut Proves Perilous

John, Margaret, and Bob hesitated. The ledge had a 50-degree snow slope. Without ropes and an ice ax it was dangerous. It was also shorter. One slip, a short slide, and they would drop over a cliff varying from 40 to 100 feet and land on a nearly perpendicular snow slope that ended in a mass of huge boulders.

John thought they could make it. Margaret and Bob were not sure. Another storm struck, sweeping over the wall from the west. They waited it out, huddled against the precipice for protection. When it passed, the canyons were in shadow. Only the peaks reflected the sun.

They decided to try the short cut—cross the ledge. John handed Margaret the tripod to use as an emergency ice ax. They moved slowly, kicking each foothold in the crusted snow slope.

The ledge was cut by deep crevices formed by water constantly freezing and expanding in confined cracks. Tremendous sections of it were false fronts of millions of tons of limestone rock pried loose from the mountain proper and getting ready to fall. They might cling another 50 years or fall tomorrow—tonight!

Margaret slipped, fell, dug the tripod in, and stopped. That was enough. John took chances, but he didn't like Margaret taking them—not when he had to watch.

They retreated, following their ice steps back, and descended a chimney to the snow field. Then they took off in a glissade that shot them downward, three blurred figures barely discernible amid sprays of snow.

Their eyes watered; their feet barely

Evening Brings the Job of Classifying and Pressing the Day's Flower Take

The Craigheads combined vacation with work on their doctorates in ecology, which deals with effects of environment on wild animals and plants. Mountain plants evolve strange adaptations to preserve life-giving moisture and produce seeds rapidly. Because the season is short, many bloom as soon as the snow melts off. Flowers are large in proportion to the plant and exceedingly colorful, insuring quick cross-pollination by insects.

Nylon Tarp and Fresh-cut Fir Boughs Keep Sleepers Dry, Top and Bottom

Since man and woman power carried food and equipment to timber line, supplies had to be light. The tarpaulin doubled as tent and pack; nylon pack ropes pitched the tent; a machete served as an ax.

touched the snow. An icy lump would lift them off the surface for 20 feet. A shift of weight to their heels made the snow fly more thickly, strained leg muscles, but served as a brake. A turn of the toes started them on a traverse or guided them to either side of an icy rib.

A second on the snow saved minutes climbing over rock. They were off the cliff, they were safe on the canyon floor, but it was not the camp canyon. A tiring climb up and over the saddle, a long hike down in the dusk, and they reached the camp, tired, hungry, but happy. *Oppositifolia* had been added to the list.

A Sure Cure for War-taut Nerves

The campers were ready for them with a huge kettle of pea soup, cooked with jerky, and a batch of fluffy biscuits baked in a rock pit oven.

Dave boiled some dried potatoes and whipped them with dried milk. Esther cooked the soaked prunes we were saving for breakfast and put out honey and peanut butter for the biscuits. Fragrance of coffee permeated the air. John, Margaret, and Bob dug into the meal, and the others kept pace with them.

Ice Ax and Bare Hands Help Climb a Snowfield's Steep Ascent

High in Cascade Canyon on the spring expedition, John and Margaret Craighead hit snow—first the hard-packed remains of an avalanche, later the melting whiteness of retreating winter. From the base camp on still-icy Lake Solitude they scaled snowfields to reach early mountain-climbing flowers. At day's end they glissaded "home."

The kettles emptied and our hunger satisfied, we sprawled contentedly about the campfire, leisurely sipping coffee. Bob broke the ensuing silence: "How could this be better?"

John answered, "It couldn't."

Dave was silent, but his eyes agreed.

They meant all that made up this way of living—this fulfillment of long-cherished hopes. They were thankful for the freedom and quiet, for the surroundings that had been preserved for us and for all Americans who choose to enjoy them.

Could the farsighted men responsible for our public land system of parks and forests have looked across our campfire and seen how a summer in this environment had erased the war lines in Bob's face, the tired look in his eyes, they would have felt repaid. More than four years' duty on a destroyer from Pearl Harbor to the Philippine Sea were being forgotten. Dave's gaunt face was filling in. The strain of flying was gone. He was again almost as we had remembered him.

Lightning was playing among the peaks; the storms that had been milling around all day

A Dwindling Glacier Hints at the Bulldozing Power That Carved the Tetons

The retreating glacier leaves walls of crushed rock debris which it pushed forward in its prime. During earth's Ice Age mammoth glaciers sculptured the rugged outlines of the Teton Range. Much of the range is above timber line, and the high peaks lie in the realm of perpetual snow. Vestiges of these mountain-shaping rivers of ice remain in the upper reaches of Grand Teton National Park.

seemed to have fused at last in one rumbling mass of clouds and searing flashes. A brief stillness settled around camp, the whitebark pines stopped whispering, and we could hear the trickling of the stream.

In full accord we rose simultaneously, checked tent ropes, threw a handful of dry kindling under a tent, piled rocks on cooking utensils, placed cameras and film in waterproof bags, and crawled into our shelters just as the wind zoomed over the wall with a roar and dashed down into the canyon, driving the rain with it.

We were in a huge rock bowl with the wind as a mixer. It seemed to take the rain, lightning, thunder, rocks, trees, the tents, and ourselves, mix them thoroughly, and whirl the contents off into a darkness vibrating with thousands of discordant, deafening sounds.

The storm's fury was so awe-inspiring that we lost track of time, place, and direction and were surprised, as the onslaught slackened, to see that we were still under a tent, soaked, chilly, but with our rolled-up beds and equipment relatively dry.

The next morning light snow covered the peaks and clouds filled the canyons. They drifted low over the alpine gardens. They let the sun through here and there, but never for long. The mood of the mountains had changed. Water was in the soil, moisture in the air. The plants responded. Their flowering season had been lengthened. For a few days more they would color the landscape.

But the snow had started down the mountain. It would descend to the valley, bringing winter just as inexorably as it had climbed, leaving spring behind. The beauty of the alpine flowers would lie dormant for nine long months, awaiting the time when they could again enrich the mountains with their color and life.

Mapping the Nation's Breadbasket

By Frederick Simpich

IT WAS June. Flying west over Lake Michigan, steering our plane for Illinois skies, we saw Chicago's towers suddenly poke up from the blue water. It was as if from *Queen Mary's* rail, on some Atlantic crossing, you might behold a glistening city lift itself from ocean's depths.

Seconds later we looked down on the elevated railroad circling the Loop, pounding heart of this monster city.

There was the 43-story Board of Trade Building—topped by the figure of Ceres, goddess of grain—where at 9:30 every morning a bell clangs to open the big grain market, shouting brokers buy and sell, and tickers flash to distant farmers news of changing prices (page 833).

In another minute we were over spreading Union Stock Yards, host last year to 6,650,000 cattle, horses, hogs, and sheep. To this world's greatest sales pen trains roll in from all over the Midwest, helping make Chicago the busiest railroad center ever known. In and out of it passenger trains run at the rate of one a minute, and every day some 45,000 freight cars hit its busy switches.

One of Earth's Great Producing Areas

On a map of the North Central United States, published with this issue of the National Geographic,* you can see how rails, highways, rivers, and canals link Chicago with such other busy Midwest cities as Cleveland, Indianapolis, Milwaukee, Minneapolis, St. Louis, Kansas City, Topeka, Lincoln, Omaha, Sioux Falls, and Des Moines (page 850).†

The map shows how, by the Mississippi River and connected inland waterways, cargoes of wheat ride from Minnesota down to the South, and southern oil or sugar goes upstream to Omaha or Minneapolis. In waterborne commerce with ports as far away as Houston, Texas, the Chicago Harbor District, using the canal that connects Lake Michigan with the Illinois River, moves about as much freight as passes through the Panama Canal.

As for air mail and air travel, there's hardly a sizable town from Ohio out to North Dakota or from Wisconsin down to the Missouri Ozarks but has its airport or is in easy reach of one.

It takes these many trains, planes, trucks, and barges to handle Midwest commerce because, mile for mile, State for State, no equal area on our planet yields such farm wealth. Its industrial wealth is also enormous.

Consider our Corn Belt alone (page 839). It reaches west from central Ohio, takes in most of Indiana and Illinois, parts of Missouri, nearly all of Iowa, and parts of Kansas, Nebraska, South Dakota, and Minnesota. This almost level area is more intensively cultivated than any other of its size in the entire Nation.

Where Tall Corn Turns to Meat

Nature made Iowa one big cornfield. Climate, depth and richness of porous soil, and quality of seed bring average yields of 50 or more bushels per acre, and record crops up to 150 bushels. This corn is mostly fed to stock and sold as meat.‡

With 93-percent literacy, Iowa is famed for excellence of schools, its experiments in finding new uses for farm products, and, notably, for the work of its State College at Ames in producing better pigs. It leads all States in corn, oats, hogs, and eggs.

In value of farm products, Iowa runs nip and tuck with California; first one's ahead, then the other. Texas *raises* more cattle, but more are fattened in Iowa than in any other State.

But you have only to look at costly farm machinery, fat, sleek stock, well-painted houses and barns, fine roads, and all the shiny automobiles to see what good country life this Corn Belt puts in reach of farmers who mix brains with sweat.

Nor does Iowa, or any other Midwest State, think only of plows, cows, pigs, hens, and manure. Des Moines, for example, sometimes called America's farm capital, is noted for its farm papers, for J. N. ("Ding") Darling's protect-our-wildlife cartoons in the *Register*, and for its share in making or selling some of the washing machines, fountain pens, cosmetics, farm implements, lawn mowers, vending machines, and railway equipment which Iowa produces.

* Members may obtain additional copies of the new map of the North Central United States (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ each, on paper; $1 on linen; Index, 25¢. Outside United States and Possessions, 75¢ on paper; $1.25 on linen; Index, 50¢. All remittances payable in U. S. funds. Postage prepaid.

† See "Illinois, Crossroads of the Continent," by Junius B. Wood, National Geographic Magazine, May, 1931.

‡ See "Iowa, Abiding Place of Plenty," by Leo A. Borah, National Geographic Magazine, August, 1939.

Al Moore from Chicago Sun

One Kind of "New Look" on Chicago's Wind-swept Michigan Avenue

Papa holds his hat, his groceries; chill winds balloon his breeches. Giggling, the girls face the blast. Always the Windy City wishes Nature would spread her weather out a bit and save some of her cool breath for those scorching summer days when all Chicago swelters.

Iowa-written novels, such as Phil Stong's *State Fair*, are graphic studies of Midwest rural life. The same scenes could as well have been laid in Missouri or at an Indiana fair.

Recognized today as foremost painters of Midwest America are the late Grant Wood and Thomas Hart Benton. Wood, an Iowan, took his painter's text from farm life, as one sees in his "Spring in the Country," "Popcorn for Grandpa," or that now famous picture of what he called "good and solid people," his "American Gothic." For it Wood's sister and a Cedar Rapids dentist posed.

Benton's Jesse James study and other murals in Missouri's capitol at Jefferson City lure thousands of sight-seers every year, though over them two schools of Missouri thought forever argue.

Omaha, Nebraska, is only 125 miles west of Des Moines; but trees get scarcer, hills rougher, and houses farther apart as you near the Missouri River, beyond which begin the Great Plains.*

Metropolis of the Nebraska Plains

This Nebraska metropolis is much like Chicago, especially in its stockyard's chorus of bleats and bawls, its eager interest in daily quotations on grain and livestock prices, and its big flour mills. If you don't care for the scent that hints at meat-packing plants, there's an olfactory antidote in the appetizing fragrance of fresh bread, cookies, and doughnuts from many bakeshops.

Train riders gasp at the architectural beauty of Omaha's sumptuous Union Station. Transients go for big thick steaks at the Paxton or Fontenelle Hotels, struggle for elbowroom on crowded dance floors, listen to cowboy guitar players strum "A Home on the Range," or applaud a pint-sized brunette dressed

* See "Nebraska, the Cornhusker State," by Leo A. Borah, NATIONAL GEOGRAPHIC MAGAZINE, May, 1945.

Staff Photographer J. Baylor Roberts

Brokers Shout and Gesticulate in Chicago's Howling, Uproarious Wheat Pit

With hands outstretched, members of the Board of Trade offer to buy or sell. Palm in or out, with one or more fingers extended, shows whether a broker is buying or selling and indicates the price in fractions of a cent. From a balcony visitors may look down on the pandemonium of big days when prices soar or break. Grain prices here are flashed throughout the world (page 847).

Indian girl style who gets up to hum "My Little Mohee."

Once a year everybody gets all steamed up over spectacular carnival frolics of the Knights of Ak-Sar-Ben, a word coined by spelling Nebraska backwards.

From Omaha you can hop a Mid-Continent plane for Minneapolis. Take a side trip west from Huron, South Dakota, by all means: it's worth it, to see the great stone faces carved on Mount Rushmore, near Rapid City, or to ride through the amazing Badlands.*

Land of Lakes, Bread, Butter, Iron

The 2,700-mile-long Missouri winds its muddy way through both North and South Dakota, States famous for spring and durum wheat. There's corn, too; and vast potato patches, oats, rye, barley, flax—and, as always on the grassy plains, wind-swept cow ranches.

Minnesota, "Land of 10,000 Lakes," is a summer playground for vacationists from all over the Midwest. Even before the Civil War, southern planters, bringing their families and their slaves, used to come up the Mississippi by steamer to summer around St. Paul. Three great river systems, the Mississippi, the Red River of the North, and the now much-discussed St. Lawrence, all rise in Minnesota.†

Here, too, is still more food for that big "Breadbasket"—corn, wheat, rye, barley, potatoes, and meat from packing plants. Remarkable, too, is the growth of Minnesota dairy-farm cooperative marketing.

The Twin Cities, St. Paul and Minneapolis, stand at the head of Mississippi River navi-

* See "South Dakota Keeps Its West Wild," by Frederick Simpich, National Geographic Magazine, May, 1947.

† See "Minnesota, Mother of Lakes and Rivers," by Glanville Smith, National Geographic Magazine, March, 1935.

Carnegie-Illinois Steel Mill and Youngstown Sheet and Tube Works on Calumet Harbor

Morris Aerial Survey

Ore Boats from Lake Superior Unload in Calumet River, Part of the Illinois Waterway

Staff Photographer J. Baylor Roberts

Everything from Furniture to Frocks Is Displayed in Chicago's Merchandise Mart

Here a buyer from Texas, on one of the 400,000 buying visits made annually to the Mart from all over the United States, is fingering a temptingly modeled frock. More than 450 different lines of apparel and accessories for women, children, and infants are on permanent display. But articles ranging from hammocks to home freezers, ties to toys, may be found in this huge institution, which has a "population" of 25,000 people and in size is equal to eighteen 20-story buildings all under one roof.

gation, 1,830 miles from the Gulf and near the geographic center of North America.

Though once miles apart, the Twins have spread out so much that now it's not easy for a visiting stranger to be quite sure which town he's in.

Today the narrow Mississippi winds happily through downtown Minneapolis and past elevators, flour mills, and the University of Minnesota.

To a singular degree, development of the Northwest's mines, lumber mills, wheat fields, and transport has spread from the Twin Cities. From here James J. Hill built his Great Northern Railway out to the Pacific coast, whence his great steamers also once plied to the Orient. Opening of new fruit and wheatlands all across the Northwest followed the building of this long line.

Hill was to Northwest rails what the Weyerhaeuser family was and is to lumber, and what the Washburns, the Crosbys, the Pillsburys, and the Harry Bullises are to Minnesota flour milling; General Mills, Inc., of Minneapolis, is now the world's largest grinder of wheat.

Duluth, at the most westerly tip of Lake

Superior, stands near the point where John Jacob Astor built a fur-trade post in 1817.*

Though far off beaten tracks of cross-continent trippers, Duluth-Superior Harbor ranks second among United States ports in total domestic and foreign water-borne commerce, being surpassed only by New York. About 7,000 vessels of all kinds arrive and depart each season.

Hills of Rust-red Ore

More than 60 percent of the iron ore mined in the United States comes from the Mesabi, Cuyuna, and Vermilion Ranges of Minnesota and goes by ore boat to steel mills about Chicago and elsewhere.† In one busy year the Lake Superior district shipped more than 92,000,000 tons!

Wheat, too, leaves this harbor in oceanic volume; 25 grain elevators can hold 50,000,000 bushels. At 20 bushels an acre, that's the crop from a field of some 2,500,000 acres!

What may happen to foreign trade from "the head of the Lakes" to Buffalo if and when the St. Lawrence Seaway Project is completed is a subject now of much debate in all these Lakes cities.

Just now, it's interesting to imagine ships docking here from South America, or even from China, and passengers for Antwerp or Capetown waving farewell from a liner's rail as she edges away from a wharf, say, in Milwaukee or in Port Arthur, Ontario!

Though even few people in Chicago seem to know it, several small ocean-going freighters of Swedish-American and three other lines already use the St. Lawrence between the Windy City and North Sea ports. They bring us wood pulp, canned fish, herring, cod-liver oil, and tulip bulbs, and take back meal, flour, and farm implements.

Many Blonds and Scandinavian Names

All this Minnesota and Dakota country suggests Scandinavia; look at all the blonds, and the Danish, Norwegian, and Swedish names in telephone books!

Likewise in Wisconsin, as in St. Louis, Cincinnati, and other Midwest "racial islands," German names abound. Many early orchestras, athletic and glee clubs, learned societies, and newspapers were founded by German immigrants. But it was the French who came earliest.

Father Marquette and Jolliet were the first whites to land at what now is Chicago. For years St. Louis was strictly a French settlement; the French left other place names, such as De Pere, Eau Claire, Ste. Genevieve, but they faded from the Midwest as permanent settlers. What might be filling this Breadbasket today had pioneer French remained to rule the Mississippi Valley?

After the French and Indian War, the Revolution, and the War of 1812, migrant American tides rose and flowed through Cumberland Gap, down the Ohio, up the Wabash, the Illinois, the Missouri, as in the days of Daniel Boone, Simon Kenton, and the fur trappers. So many from Virginia settled in southern Indiana and parts of Missouri that to this day these sections have a distinct flavor of southern speech, culture, and social behavior.

Poles, Irish, Italians, Greeks—by hundreds of thousands they too now flavor the Midwest melting pot. But few take to the land; the mines and the great industrial centers chiefly absorb them. Even the oil fields of Indiana, Illinois, and Kansas are worked mostly by Americans of Anglo-Saxon origin.

The Yield of Wisconsin

What a pile of good things to eat Wisconsin dumps into our Breadbasket!‡ Besides grain, it adds butter, cheese, milk, potatoes, sugar beets, peas, maple syrup, cherries, cranberries, apples, and plums. It ranks high in growing dairy cattle and yields hemp and cigar-wrapper tobacco.

Tractors, farm machinery, footwear, textiles, sawmills, motor-vehicle parts—Wisconsin makes them all.

Big paper mills abound. In the State are such factory centers as Milwaukee, with the great Allis-Chalmers plant; also Racine, Kenosha, Janesville, Beloit, and Madison with its famous laboratory for the study of wood and wood products.

With 85,000 miles of highways and 7,000 miles of railway, Wisconsin's scenic regions, similar to Minnesota's, are reached by hordes of summer guests.

At railway terminals in all these bigger Midwest cities you see sleek, swanky new Diesel-electric locomotives lined up side by side, painted like circus wagons. There they stand, as passengers climb aboard the streamlined aluminum-and-steel coaches, ready to whiz across the Breadbasket or race on to New York, New Orleans, or the Pacific coast.

* See "The Romance of American Furs," by Wanda Burnett, NATIONAL GEOGRAPHIC MAGAZINE, March, 1948.

† See "Steel: Master of Them All," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, April, 1947.

‡ See "On Goes Wisconsin," by Glanville Smith, NATIONAL GEOGRAPHIC MAGAZINE, July, 1937, and "Deep in the Heart of 'Swissconsin,'" by William H. Nicholas, June, 1947.

Chicago Tribune

Big Day for Big Boy and His Master, Claude Millwee, of Fort Cobb, Oklahoma

Big Boy, the steer in front of the lad proudly holding his trophy cup, is his prize-winning grand champion, exhibited in 1947 at Chicago's International Livestock Exposition. That fat bovine sold at auction for $8 a pound, bringing young Millwee, a member of the Future Farmers of America, the snug sum of $8,860 (page 843).

Staff Photographer J. Baylor Roberts

From Textbooks to Tassels! Schoolgirls Take to the Cornfields and Help Pollinize Hybrid Seed Corn near Yankton, South Dakota

"It's hot, but it's healthy." Cornfield vacations bring these schoolgirls tan and spending money in return for pulling tassels from rows of one kind of corn and causing its ears to be pollinated by tassels of another type in two adjacent rows. This hybrid-seed cornfield belongs to Gurney Seed & Nursery Company.

Arms

Vigorous, Squirming Boys and Girls Hold Still to Paint a Cowboy or a Princess

In Winnetka, Illinois, schools the child is free to set his own pace in learning. Creative art work as shown above is encouraged by field trips into the woods during which youngsters may stop to sketch. Building self-reliance is basic training in this type of progressive teaching.

What fancy names! The Zephyrs, Rockets, Hiawathas, Four Hundreds, Humming Bird, Super Chief, Capitol Limited, City of San Francisco, Empire Builder, Twentieth Century Limited, Broadway Limited, Panama Limited.*

Like long red-and-yellow centipedes they race across the Great Plains and storm the mountain passes. Cowboys tell us that on still nights they can hear a streamliner's hoarse horn 10 miles away.

Many such new-type locomotives are built by General Motors at its plant in La Grange, Illinois, near Chicago. I saw some "launched."

No man-made land animal has such power. One freight Diesel-electric easily hauls 140 loaded cars; it could haul more, were it not that couplings would break and the train pull in two. More than 5,000 of these giants are now in use.

Every day the La Grange plant turns out an average of five units; a "unit" is a single car. A typical locomotive is four such units coupled together; it is 200 feet long and has 32 driver wheels.

A 6,000-horsepower freight locomotive costs about $550,000. "And nobody knows how long one will last," said a GM engineer. "Many have run more than 1,000,000 miles without major repairs. One passenger locomotive, on the Denver Zephyr, has run 3,750,000 miles—which makes it the world's most traveled land animal."

That "Train of Tomorrow," shown all over America, was built here and at the Pullman shops. Its "astra dome" sight-seeing section, set up on each car's roof, is reminiscent of the blister on a bomber where the top turret gunner sits.

Most Pullman cars used in America—and thousands of freight cars—are built at Pull-

* See "Trains of Today—and Tomorrow," by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, November, 1936.

Staff Photographer J. Baylor Roberts

Color and Design Artists Turn a New Dining Car into an Art Gallery

Most of the sleepers, club, and dining cars used in America are built in Chicago by Pullman-Standard Car Manufacturing Company, which also builds thousands of freight cars and hundreds of streetcars and trolley coaches. Ralph Haman, seated, is the company's engineer of color and design. He and Everett Lee, assistant foreman, are discussing murals and decorations for 48 new cars ordered jointly by the St. Louis-San Francisco Railway and the Missouri-Kansas-Texas Lines. This diner, one of them, is for use in a crack train, the Texas Special.

man, Illinois, within the city limits of Chicago. The first "palace" car ever built, the Pioneer, was used after Lincoln was slain to bring his body from Chicago to Springfield. Some of the first sleepers and dining cars used in regular service on railways in Great Britain were built by Pullman and shipped abroad.

Factories Flourish in Illinois Cities

Nearly every Illinois city, even the smaller ones, has some kind of industry.

Decentralization slows down the tide of boys who used to head for Chicago or St. Louis. Elgin makes watches; Rock Island and Moline make farm implements; Decatur has soybean mills; Peoria makes whisky and tractors; Joliet has its wallpaper mills; and Kewanee makes boilers. So it goes.

Springfield, State capital, has its memories of Lincoln, and its memorials to him. Of this home town of his, he said, when leaving for the White House: "To this place, and the kindness of this people, I owe everything."

Since mound-builder days Illinois has been a good farming country. Pioneer whites sent river flatboats to market loaded with hams, wheat, whisky, salt beef, beans, and tobacco.

Men early found this sticky prairie sod hard to till; that hastened the invention of steel plows and other farm machinery. Today light tractors are displacing horses and mules, and mechanical corn pickers save wear and tear on farm hands.

Since whites got their first seed from Indians, corn here has been the main crop. As in Iowa, it is nearly all the hybrid type.

The soybean crop in Illinois is twice that

Fred G. Kerch

"No Left Turn," "No Parking at Any Time," No Elbowroom at Rush Hour in the Loop

Chicago's busiest intersection is the corner of State and Madison Streets. At times the jam is terrific, especially when children swarm to watch a pet elephant, with a rubber stamp in his trunk, "autographing" an animal book at Marshall Field's seething bazaar. Like some other U. S. cities, Chicago, with nearly 5,000,000 people, has a puzzling downtown transportation problem. The new subway being built will help some.

in any other State. Milk, cheese, livestock, and enormous stacks of breakfast food, flour, starch, and corn products help fill the Basket.

McCormick and His Reapers

More than any other State, Illinois has helped develop farm machinery.

When Cyrus Hall McCormick couldn't sell his newly invented reapers in Virginia, he came west.

Here in Illinois he found men, women, and children wearily cradling wheat even by moonlight, to save a crop that ripens so quickly. He sensed that from Ohio westward must rise the granary of the Nation. So he built a reaper factory in Chicago.

As the wheat crop spread west, McCormick built assembly plants in other Midwest cities. He gave credit, or reaper agents took grain for pay. An annual "field day" grew up, with grain-cutting contests; farmers chained two reapers together and pulled in opposite directions to see whose machine would break apart first.

In foolish pioneer feats of wild exhibitionism, they even tried to mow down patches of saplings!

By 1884 McCormick had sold nearly 55,000 reapers—the dawn of farm-machinery mass production. Slowly competition reduced the number of rival companies.

Five of those still in existence in 1902 organized as a single unit and took the name of International Harvester Company. Besides modern combine harvesters, they make plows, cultivators, binder twine, planters, hay balers,

motor trucks, corn and cotton pickers, road machinery—dozens of labor-savers to handle food crops faster.

From the Midwest's old-time country fairs, with trotting races and displays of fat pigs, big bulls, and prize-winning hens in "cackle berry" contests, came such now-famous shows as Kansas City's "Royal" and the International Livestock Exposition at Chicago.

I saw the latter in 1947, when 12,500 fine animals took part. For them it is like an Atlantic City beauty parade (page 838).

With ribbons in their tails, high-stepping horses proudly pull shiny buggies driven by haughty women in mink coats. Jumpers go gracefully over the bars or nick one with a careless hoof. Sheepshearers work like sculptors hewing marble; they clip away natural curves, leaving little baa-baa squared off into a cube of snowy wool.

Dead-pan judges tie blue badges on broad-beamed bulls admired even by kilted cattle fanciers from Scotland. Prizes go to hogs too fat to stand.

From boxes, owners and guests clap and cheer a shapely heifer while the band plays on. Chicago, too, exalts the golden calf.

I met exhibitors here, old friends, from as far west as Cheyenne. Iowa, Missouri, Illinois, Texas, Indiana, all were here, including crowds of 4-H Club boys and girls.

I helped entertain a Hoosier delegation—maybe I feel close to them because my mother's Scottish parents settled early in Indiana. One of her girlhood memories was of the Chicago Fire of 1871, when smoke and the smell of burnt wood drifted as far south as Terre Haute and beyond.

Versatility of the Hoosiers

Hoosiers not only write poems and novels, play fiddles, and race cars on the Indianapolis Motor Speedway; they make some of the world's finest fishing tackle and brass band instruments.*

Despite that Bible warning, they also built a great city on the sands. That's Gary; with giant steel mills, it has been called "America's most powerful concentration of industry."

Here beside Lake Michigan, on swampy sands and dunes, Hoosiers pumped enough silt from the lake's bottom to lay a 15-foot blanket over many thousands of acres; then, on additional acres, they hauled in trainloads of black soil, set out shrubs, trees, gardens, and built homes, schools, churches.

Though Indiana has no active iron mines, she imports so much ore that steelmaking is her biggest industry. Here at Gary rise the tall smokestacks of U. S. Steel, Republic Steel, and many allied groups making sheets, rails, bolts, springs, tin plate, etc. The Carnegie-Illinois mill alone covers 1,400 acres.

As more and more iron ore came south by lake boat from Michigan and Minnesota, more steel mills rose in this area, spreading west to Whiting, East Chicago, and Hammond, known now as the "Cities of the Calumet." This area ranks second only to the Pittsburgh-Youngstown district in production of ingots. You see here how our industrial power tends to move westward (pages 834–5).

But the moon still shines bright along the Wabash; there's still that scent of new-mown hay. Hog and hominy is still good Hoosier fare, and if you'll go down to the Indianapolis stockyards some summer morning about 4 o'clock you'll see trucks rolling in from every direction, bringing fat hogs and beeves. Some of earth's most succulent hams and bacon are cured right here (page 849).

Indianapolis, Hub of Hoosierland

As our map shows, railroads and highways run out from Indianapolis like the spokes of a wheel. This is the largest American city not built on navigable water. It proves how highly industrialized the Midwest has become.

Among the Nation's larger manufacturing corporations which have plants here are General Motors, Swift, Armour, U. S. Rubber, Western Electric, American Can, RCA, Borden, Coca-Cola, and International Harvester.

Factory output of insulin, animal serums, saws, chains, and inner tubes is enormous.

Some of James Whitcomb Riley's lines make Hoosiers sound like indolent, carefree folk, like "Hoosier Hot Shots" on the radio.

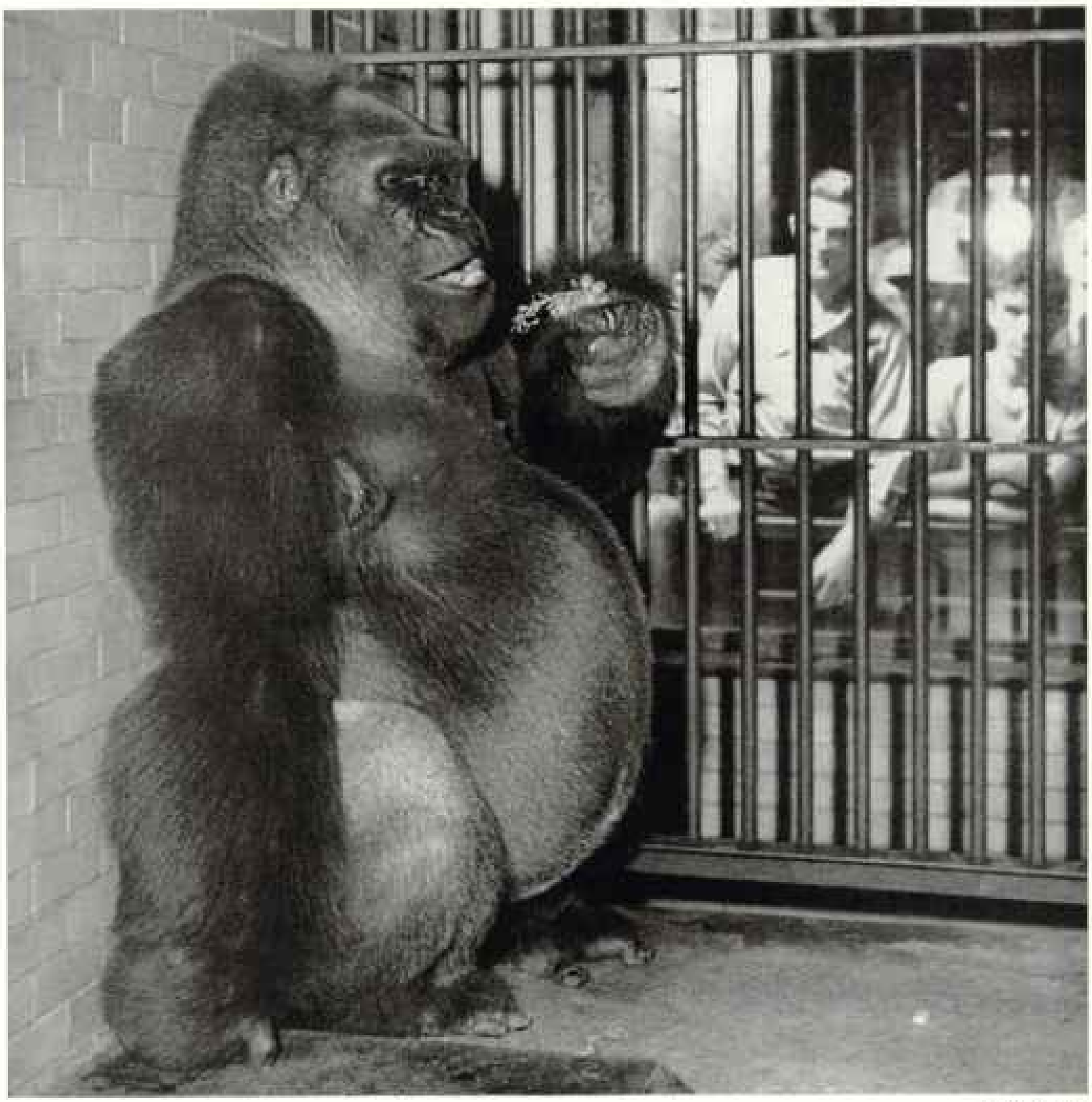
Don't be misled! Housewives who make jam know about those glass fruit jars made in Muncie. The Studebakers were making wagons for our Army and for British use in the Boer War long before they built motorcars.

Interesting people may be the chief product. I don't mean just that "Irish" football team at Notre Dame. General Lew Wallace, Theodore Dreiser, Ernie Pyle, Booth Tarkington, George Ade, Meredith Nicholson—they were Hoosiers. So are Kent Cooper, George Jean Nathan, Byron Price, Elmer Davis.

In the Brown County hills in "Abe Martin" country, painters are thick as pawpaws in September.

Vincennes, on the Wabash, is the oldest Hoosier city. Catholic priests in its historic church showed me documents dating from French times. Great Britain got Vincennes

*See "Indiana Journey," by Frederick Simpich, National Geographic Magazine, September, 1936.



Fred G. Kuth

In Chicago's Lincoln Park Zoo, Bushman, 550-pound Gorilla, Munches Grapes

Born in the French Cameroons, Bushman is now 20 years old. He eats 22 pounds of food a day: fresh vegetables, melons, fruit, bread, and malt extracts—no meat. He gets a shower bath every other day. Largest of manlike apes, 13 of these monsters are in captivity today in the United States.

from France after the French and Indian War. Later came that tug of war between Virginia and the British. To stop the latter from keeping a toe hold in this West, Virginia sent George Rogers Clark with 350 lanky, squirrel-gun Virginians, who after two trials took the old fort.

Vincennes in 1800 was the first capital of Indiana Territory. Here now is the imposing George Rogers Clark Memorial, which looks a bit like the new Jefferson Memorial at Washington. Also, here's one of the most graphic monuments ever erected to Lincoln: it's a plaque at the end of the Lincoln Memorial Bridge over the Wabash and shows him walking bareheaded, carrying a stick, on his journey through Vincennes in 1839.

Paper—100 Carloads a Week

Bobbs-Merrill, the publishers, have their head offices at Indianapolis.

At a huge plant in Crawfordsville the *Encyclopædia Britannica* is printed, in a branch of R. R. Donnelley & Sons Company.

Donnelley's Lakeside Press in Chicago runs day and night. More than 100 presses, including giant color machines as crowded with moving parts, lights, and wires as a Navy

Staff Photographer J. Baylor Roberts

A Mirror Doubles the Eye Appeal of Appetizing Food

There's cold ham, roast beef, meat loaf, liver sausage, salami, and liver cheese. This is a mouth-watering scene in a home demonstration kitchen of Swift & Company's great Chicago plant. Guests seated in the auditorium may look up into the overhead mirror and see just how the young woman is fixing the platter.

destroyer, gobble up paper at the rate of more than 100 carloads a week.

Jobs include more than 50,000,000 catalogues a year for mail-order houses; telephone directories for Chicago and many other Midwest cities, and some 40,000,000 copies a month of national weeklies and monthlies. Lakeside also prints tons of Bibles, schoolbooks, and other editions.

Printing Mail-order Catalogues

America's catalogue-printing business beggars belief. Montgomery Ward's catalogues use up 222 carloads of ink a year. Its largest catalogue alone for one year, not counting smaller ones, would make a stack 256 miles high!

At Ensenada, on Mexico's west coast, the postmaster once told me he spent most of his time helping buyers write out money orders on Chicago and sorting out parcel-post bundles when the goods arrived.

Sears is the biggest mail-order house, though it really sells much more through its retail stores, some of which it has built in Latin America.

But Ward's is the older. I looked at its first catalogue, printed in 1872. Hollywood,

Kent Rochester from Black Star

Here Customers Study Changing Tides of Market-bound Hogs, Cattle, and Sheep

This big board in Kansas City's Livestock Exchange Building is about 20 feet long by 10 feet high. Chalked up as reports come in are receipts of all classes of meat-bearing animals at the Nation's principal livestock markets, and up-to-the-minute reports on developments at these great on-the-hoof meat markets. The information is posted by employees of Production and Marketing, Livestock Branch, U. S. Department of Agriculture.

and artists across America, prize these old catalogues, from which to copy early styles in clothing, vehicles, etc.

In 1875 a man could order a 6-cent shaving brush, or an all-wool overcoat for $4.50! A girl could get a "bustle with 3 springs" for 15 cents, or a good sidesaddle for $4.85. From the 1948 catalogue a modern miss may choose a $7,000 diamond ring.

Beautiful girls who model dresses for Ward's catalogue pictures bring floods of fan mail asking names and addresses. One enamored soldier wrote, "I'm sure that's my long-lost sister on page —. Where can I write her?"

Every one of these larger Midwest cities is a distributing point.

Kansas City and St. Louis are both the homes of jobbers who ship "package cars" of goods as far away as Texas. Lighter goods go by air express to the Pacific coast.

Mighty Mart of the Midwest

Chicago's famed Merchandise Mart seems a cross between a Damascus bazaar and that once-busy sample fair at Leipzig. It has 93 acres of floor space, all under one roof; it could hold everybody in Chicago! You can window-shop through 7½ miles of air-conditioned streetlike corridors. It rents space to exhibitors.

Nothing is for sale. You order from samples. Delivery may be from any factory between Boston and Los Angeles.

Here a buyer from Buenos Aires or Baltimore—or Blue Eye, Missouri—can usually find what he wants without running all over America hunting it (page 836).

To haul all samples shown here would take a train 17 miles long. It would be loaded with infinite goods, from lamps, carpets, furniture, clothing, china, glass, and curtains to pottery and toys.

In 1947 this, our second largest city, held 946 conventions. They make hotel rooms hard to find. When machine-tool makers held a show, 175,827 buyers registered from 34 different countries!

Political parties like to hold their national conventions here. Since Lincoln was nominated, Chicago conventions have named a long list of Presidential candidates.

One of earth's three chief financial centers, Chicago has 68 banks with total deposits of more than eight billion dollars. Two of these, the First National Bank of Chicago and the Continental Illinois National Bank and Trust Company, are among the seven largest in the United States.

Our Daily Bread—and Food for Europe

To many American farmers, the Chicago Board of Trade's wheat pit is the most significant spot in the whole Midwest. It interests you and me, too, because of the effect of prices here upon what we pay for a sack of flour. The Board itself doesn't buy or sell; the members do that.

Pioneer farmers hauled corn and wheat to town and sold for what they could get; 250 miles away, prices might be higher or lower, depending on nearness to a flour mill, drought, floods, or other factors.

Wagon trains of grain rumbled into early Chicago.

One day in 1848 swearing bullwhackers cracked their black-snake whips over grunting oxen yoked to heavy wagons that bogged down in Chicago's muddy lanes. They halted, finally, before a rough wooden building at the corner of Clark and Water Streets—Chicago's first Board of Trade.

Now, 100 years later, figurative mountains of wheat and corn tumble through this most gigantic of all grain exchanges. Here Uncle Sam buys hundreds of shiploads of wheat for European relief; private dealers sell to ports as far away as Singapore.

If you run a flour mill, starch or breakfast food factory, or corn syrup works, or export wheat, you can buy here for "cash" and get quick delivery from cars already on Chicago sidings.

To deal in futures or to hedge, members go down to one of the five pits on the main floor of the Exchange and join other yelling, gesticulating brokers.

To gallery spectators it all looks mad. But every hand held up, palm in, palm out, one finger up, two, three, is a signal for a bid to buy or an offer to sell, and indicates at what price. You soon catch on (page 833).

Home-town Papers Mirror Midwest Life

But more than thoughts of wheat prices and farm and factory problems engages the Midwest mind. Its people are interested in each other, especially folks in towns and smaller cities. Nearly every family takes at least one big-city daily; but it's the home-town paper they read first, and most closely. They want to see what the other fellow is doing.

Country weeklies and biweeklies flourish by the hundreds. Minnesota alone has between 400 and 500.

Many rural editors gain State-wide fame. I know several whose amusing paragraphs are steadily picked up by big dailies.

Ed Howe, "Sage of Potato Hill," who long edited the Atchison, Kansas, *Globe*, was known across America. In the same column he'd mix want ads, jokes, gossip, and personals. To hold readers, he once told me, "You have to make 'em laugh, make 'em cry."

In His Steps, by that prolific writer Charles M. Sheldon, gained a circulation in the U. S. larger than that of any other book except the Bible. In his Topeka home the Reverend Mr. Sheldon once showed me a whole shelf of these books—I think it was more than 30!—each translated into some foreign language.

Sheldon didn't know how many copies his book had sold; he thought about 18,000,000, here and abroad. Other estimators say about 25,000,000.*

William Allen White walked with kings. His *Emporia Gazette*, printed in a little Kansas town, was his great love. Though national magazines bid for his articles and great eastern dailies tried to hire him at many times what he might earn on his small Kansas daily, he preferred that life.

White could and did "take the hide off" Kansas when he had a crow to pick. Usually the Jayhawkers chuckled; always they started thinking.

Once White took me to a Rotary luncheon in Emporia; with us went a preacher, a photographer, and a drygoods salesman. A bit later I saw my Kansas friend in Washington,

* See "Speaking of Kansas," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, August, 1937.

Paul Dorsey from Ford Motor Co.

What Myriad Trees We've Cut since Pilgrim Fathers Built Their Houses!

Once much of the Midwest was woods. Sawmills and paper mills still hum in Wisconsin and Minnesota, but vast forests the pioneers knew have vanished; Chicago alone consumed many. Hundreds of early towns were nearly all built of wood. Farmhouses, telephone poles, railroad ties, bridges, block pavements, fuel, all took toll and left desolate leagues of stumpage. Now trees are better husbanded, as on this timber property of Ford Motor Company in Michigan's Upper Peninsula.

on his way to the White House because the President had sent for him.

Such men, perhaps more than editors of big dailies, reflect the intimate home life of this Midwest.

Mid-America on the Move

Relations between States in the Midwest group, close because of good roads and easy riding, are brought closer too by football games, hunting trips, horse shows, field trials for bird dogs—and the endless conventions.

In Europe a car might be stopped by border guards two or three times in the distance it takes a Kansas family to drive to a football game.

It's always a big noise when the Tigers of MU—Missouri University—battle over the cleat-torn turf with their friendly enemies, the Kansas Jayhawkers, or when Nebraska bucks the Minnesota line, or the Green Bay Packers meet Chicago at Wrigley Field.

Glee club singers, basketball teams, and intercollegiate debaters all warm up this kaleidoscopic picture of restless life in the Breadbasket.

If an Illinois plow salesman goes peddling in Kansas, he may marry some wheat farmer's daughter, just as a Kansas City clerk courts in Omaha or Joplin Jane finds a mate in Minnesota.

When Chicago was burning, St. Louis sent a special train carrying firemen and their engines. In Missouri country schools, at our Friday "declamations," we used to recite a poem about that.

Between St. Louis and Chicago, business ties have long been close. Yet St. Louis is so different! It resembles Baltimore in its social aloofness, its indifference to booms, its distinctive culture.

St. Louis, Mellow and Leisurely

Elderly, leisurely St. Louis had its philosophical societies, its clubs, and its excellent concerts when Chicago was yet a brawling pioneer maelstrom of mud, pine shacks, and get-rich-quick land gamblers.

I was reared in Missouri.* I have slept in many an old home built by slave labor; I

* See "These Missourians," by Frederick Simpich, National Geographic Magazine, March, 1946.

J. C. Allen and Son

Mamma Sow Smiles as Her Brood Make Hogs of Themselves

It looks as if "plates were laid for eight," but the Berkshire children are so mixed up it's hard to count them exactly. Under the third from left protrudes the stern of a ninth one. Anyway, this happy pig picture shows no sign of "child spacing" or "planned parenthood" in Hoosier hog circles. Somewhere in Indiana.

have hunted coons, played ball in many towns, lived on the old "plank" stage road across Howard County, heard old-timers defend Jesse James or tell how Quantrill's "border ruffians" raided and burned Lawrence, Kansas.

For a few dizzy weeks I worked as advance agent for a road show that played many Midwest cities. *All* are good ways to learn human geography in any land!

So I know it's wrong to say, as hurried visitors may, that "all these Midwest towns look alike." What kin, for example, is Appleton, Wisconsin, with its paper mills, to Hutchinson, Kansas, with its salt mines and seas of wheat?

Or how does Columbia, Missouri, with its shady streets and classic University buildings, its Stephens and Christian Colleges for women, its fraternity and sorority halls, look like that restless zinc-mining and money-making city of Joplin, only a few hours to the south?

Sure, they all have the same gas stations, chain stores, chain movies, and maybe chain hotels; they read the same comics and columnists and are amused or bored by the same singing commercials. But how utterly different are such cities as St. Louis and Kansas City!

St. Louis makes mountains of shoes, miles of streetcars, enough aspirin to relieve a nation's headaches.

But at dinner, unless you bring up business themes, likely as not talk turns to the Missouri Historical Society, somebody's trip to Argentina, or what Washington may learn from Daniel R. Fitzpatrick's latest cartoon in the *St. Louis Post-Dispatch*.

Kansas City's Growing Pains

Kansas City, younger, still feeling its growing pains, stands on the western edge of the State. It belongs as much, or more, to Kansas wheat, oil, jobbers' trade, or to the cow ranches of Oklahoma and Texas as it does to Missouri (page 846).

It has its research laboratories, seats of higher learning, art school, and William Rockhill Nelson Gallery of Art; but, being young, restless, eager to test new ideas, it *runs* to work, eats and plays golf faster. It can't wait for tomorrow. Yet, like more sedate St. Louis, in its own vital, vigorous way it also helps fill our Breadbasket in this ever-changing Midwest.

The Society's New Map of the North Central United States

THE NEW map of the North Central United States, which reaches the 1,800,000 member-families of the National Geographic Society as a supplement to this issue of their Magazine, is the sixth and last in The Society's series of large sectional maps of the United States.

This series furnishes a full-color reference map of the country equivalent in size to a single sheet more than seven feet by four feet.

Five maps previously published were: Southwestern United States, June, 1940; Northwestern United States, June, 1941; Northeastern United States, September, 1945; Southeastern United States, February, 1947; and South Central United States, December, 1947.*

Five of the six sectional maps are made on the uniform scale of 1:2,500,000, or 39.5 miles to the inch. The densely populated northeastern section required an even larger scale—1:1,750,000, or 27.6 miles to the inch.

Map Shows Nine Midwest States

Within the decorative borders of the new North Central United States map, 28 by 26½ inches, are presented the nine States between the Great Lakes and the Rockies—North and South Dakota, Minnesota, Wisconsin, Nebraska, Iowa, Illinois, Kansas, and Missouri—as well as parts of adjacent States and Canadian Provinces.

Main highways are clearly marked and numbered, elevations indicated, national parks and monuments and principal railways and canals shown.

Lakes Superior and Michigan dominate the northeastern quarter of the map, Fort Peck Dam and Colorado Springs lie along the western border, and Nashville, Tennessee, shows in the southeast corner.

The geographical center of the United States falls within the area of this map—in north-central Kansas, near Smith Center. Almost 600 miles northward is the geographical center of the whole North American Continent—a few miles west of Devils Lake, North Dakota.

Up on Lake of the Woods appears the northernmost point in the United States—the stray peninsula, known as the Northwest Angle, which forms a part of Minnesota, although it is connected to Canada by land and separated from United States soil by water.

Shawneetown, "newest and oldest town in Illinois," is shown in its new location some three miles back from the often-flooded banks of the Ohio River.†

Near Lake Itasca, Minnesota, source of the great Mississippi, visitors can walk across the infant river on steppingstones.

An important base for heavy bombers is now located near Rapid City, South Dakota. Near here, in November, 1935, the intrepid two-man crew of the National Geographic Society-U. S. Army Air Corps stratosphere balloon *Explorer II* took off on its record-breaking flight to an altitude of 72,395 feet.‡

Now from Camp Ripley, 100 miles north of Minneapolis, new plastic balloons called "skyhooks," similar in design to *Explorer II*, carry instruments 20 miles up and float through the skies of the Midwest, gathering data for the Office of Naval Research.

But still the record set 13 years ago stands as the greatest height yet reached by man.

Just east of Kansas City is Independence, Missouri, home town of President Harry S. Truman. In southeastern Missouri the map shows Big Spring State Park, a favorite spot of the President. An enlarged picture taken in Big Spring Park was used in the front panel of the map case presented the President by the National Geographic Society.

Romance of Place Names

Among the 8,927 place names on this map are many familiar surnames. Accordingly, hundreds of American families will find their own name somewhere on the map.

A cheerful note is struck by such place names as Joy, Good Hope, What Cheer, and Fair Play. Hazard and Gravity strike a more somber chord. Many names are picturesque, such as Sleepy Eye, Concrete, Crocus, Young America, and Potato Creek. Eloquent of the Indians are such names as Broken Bow, Spotted Horse, Wounded Knee, Lost Nation, and Badnation.

* Members may obtain additional copies of these sectional maps and the Map of the United States by writing to the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ each, on paper; $1 on linen; Index, 25¢. Outside United States and Possessions, 75¢ on paper; $1.25 on linen; Index, 50¢. All remittances payable in U. S. funds. Postage prepaid. Also available is an enlarged map of the U. S., 67" x 43½", on heavy chart paper, for $2 in U. S. and Possessions; Index, 25¢. Elsewhere, $2.25; Index, 50¢. Postpaid. Mailed rolled to U. S. and Possessions; postal regulations necessitate folding them for mailing to all other places.

† See "Men, Moose, and Mink of Northwest Angle" and "Shawneetown Forsakes the Ohio," both by William H. Nicholas, in the August, 1947, and February, 1948, issues of the NATIONAL GEOGRAPHIC MAGAZINE.

‡ See "Man's Farthest Aloft," by Capt. Albert W. Stevens, in the January, 1936, NATIONAL GEOGRAPHIC MAGAZINE.

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To carry out the purposes for which it was founded sixty 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 The Magazine uses, 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 solved secrets that had 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, 321 B. C. (Spinden Correlation). 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. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse 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.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.

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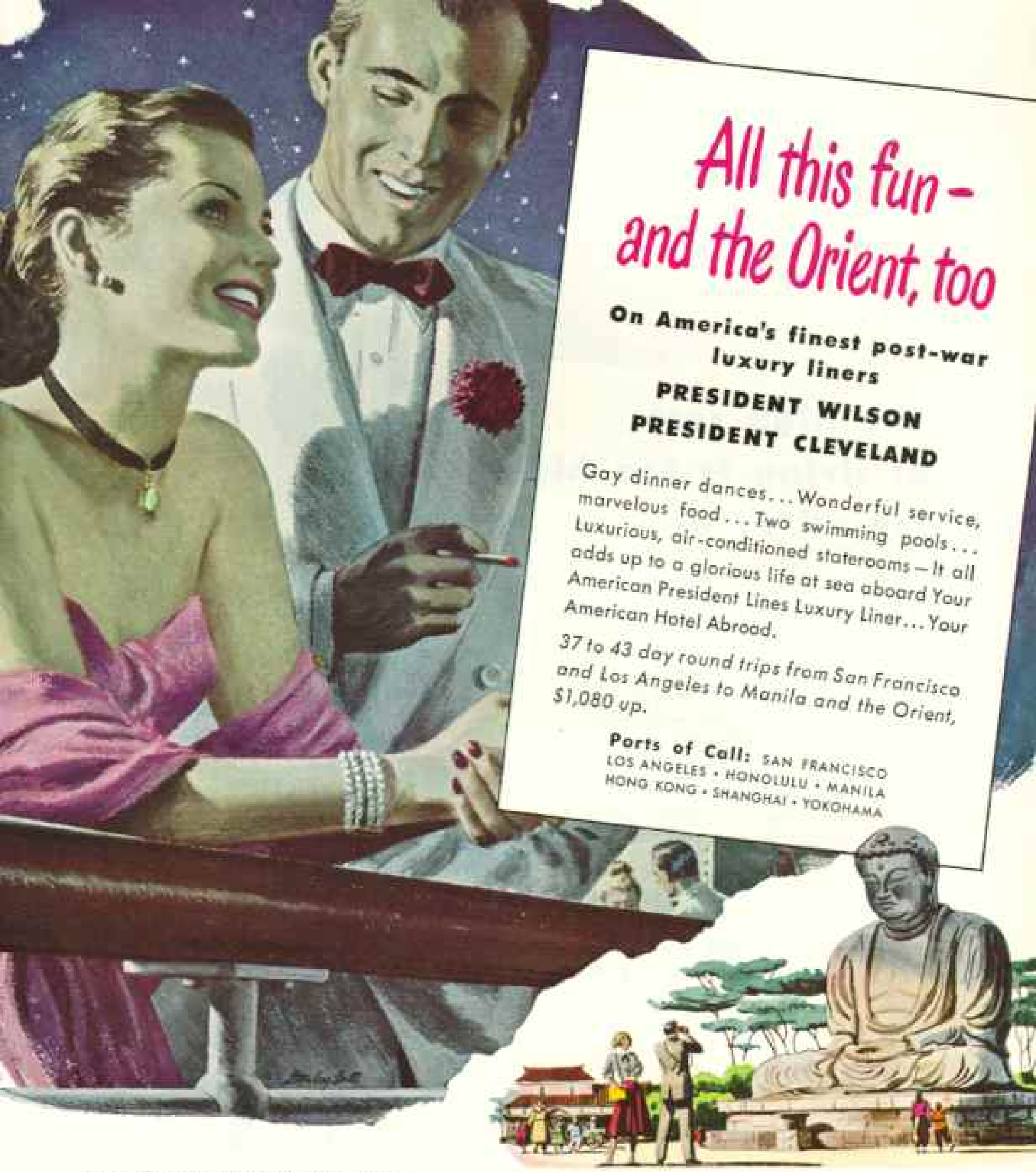

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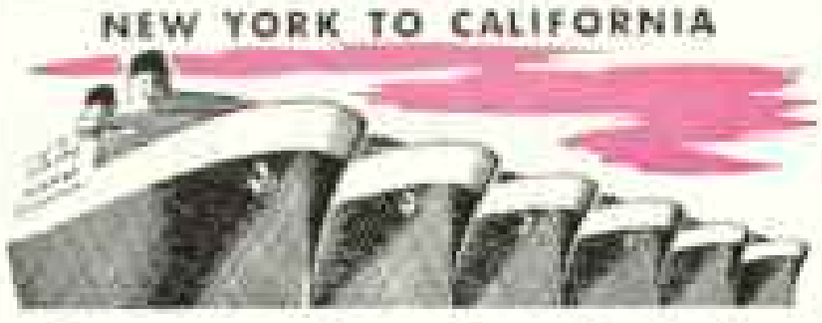

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We worry about the high cost of living as much as you do. When prices are high, fewer people can afford to buy. That's not good for our business—or *any* business.

So we are doing everything in our power to keep prices *down* and quality *up*. The ablest men from all our companies meet at a round table once each month to plan new and better *methods* as well as better *products*. National Dairy research works with them, always seeking *top quality at lowest possible price*.

Here are some figures which show how milk prices compare with food prices, from 1939 to 1947:

Increase in cost of food . . . 106%

Increase in cost of fluid milk . 63%

Notice that milk has not increased nearly so much as the average of other foods. Our profit from all of our milk divisions averaged less than ½ cent per quart of milk sold in 1947—far less than the public thinks business makes—and much less than the average profit in the food industry.

When you're watching your food purchases, remember that milk—nature's most nearly perfect food—gives you more for your money than anything else you can eat. We see to it that milk, cheese, butter, ice cream, and other products made from milk are fine and pure. *Then we make them available at the lowest possible prices to the greatest number of people.*

An impartial national survey shows that most Americans consider 10%-15% on sales a fair profit for business. Compared to this, the average profit in the food industry is less than 5%. And National Dairy's profit in its milk divisions in 1947 was less than 2%.

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To the grandeur of the Canadian Rockies . . . to America's inspiring National Parks, well-timed connections.

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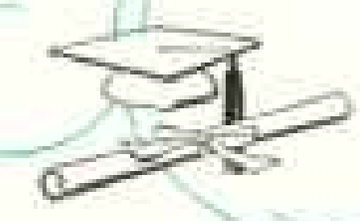

Eliminates 99% of watch repairs due to steel mainspring failures!

You show how *very* proud you are of your graduate's achievement when your gift is a beautiful Elgin Watch

Elgin's leadership as the watch most wanted is now even more pronounced. For Elgin has achieved a remarkable improvement in the part that makes a watch go . . . the mainspring. Only an Elgin has the DuraPower Mainspring . . . and at no extra cost.

This miracle mainspring retains its "springiness" indefinitely for greater accuracy through the years. It completely overcomes rust . . . and rust is the commonest cause of mainspring breakage. *Actually eliminates 99% of watch repairs due to steel mainspring failures!*

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Now to Elgin's famous star-timed accuracy the DuraPower Mainspring adds a permanency of timekeeping performance never before possible in any watch. Elgin observatory time is the official time of United Air Lines.

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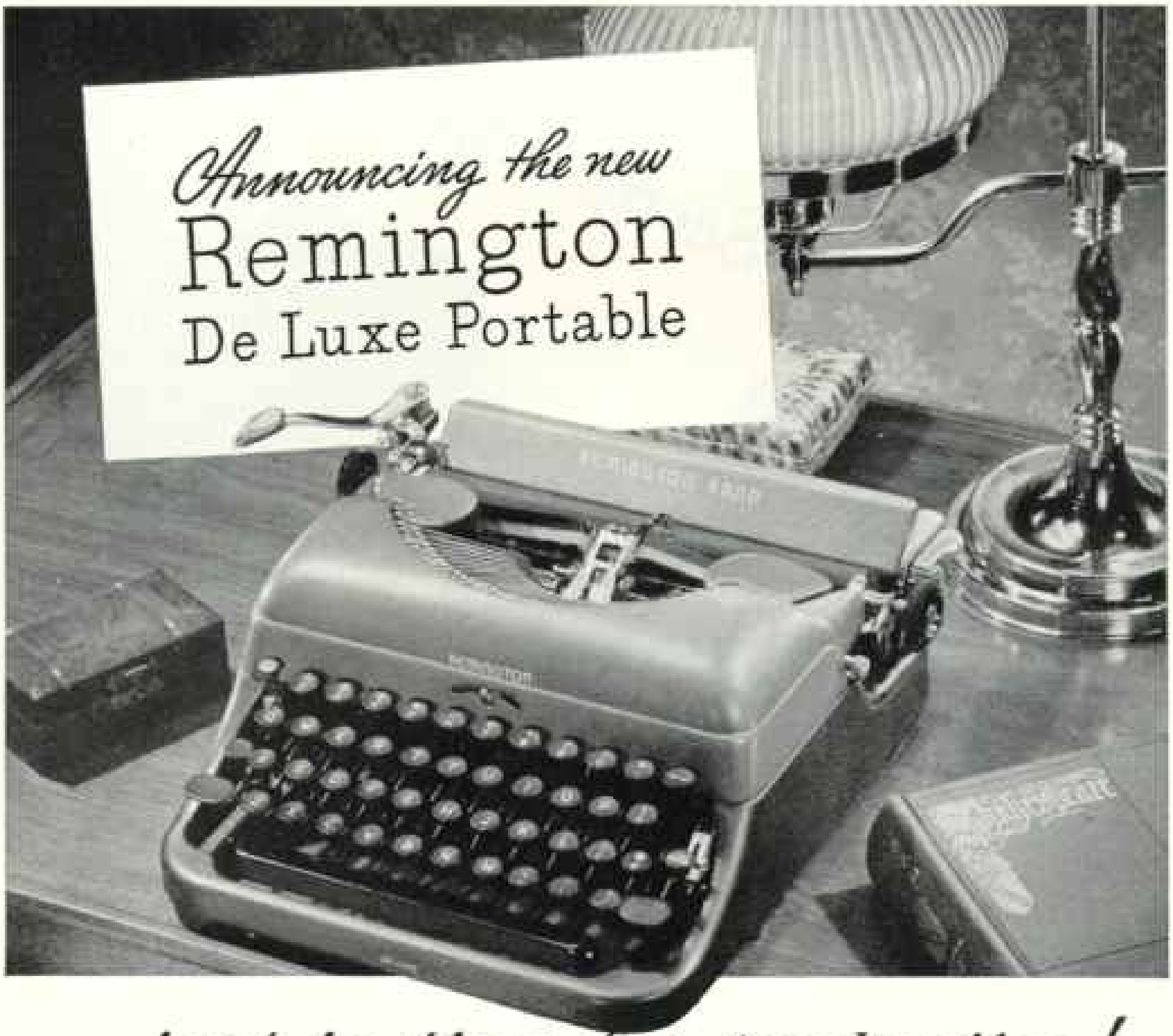

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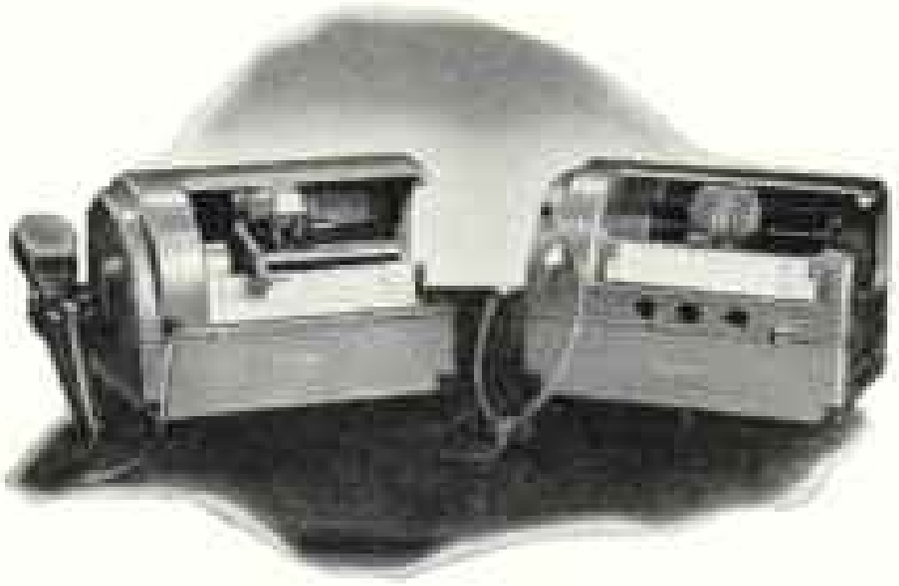

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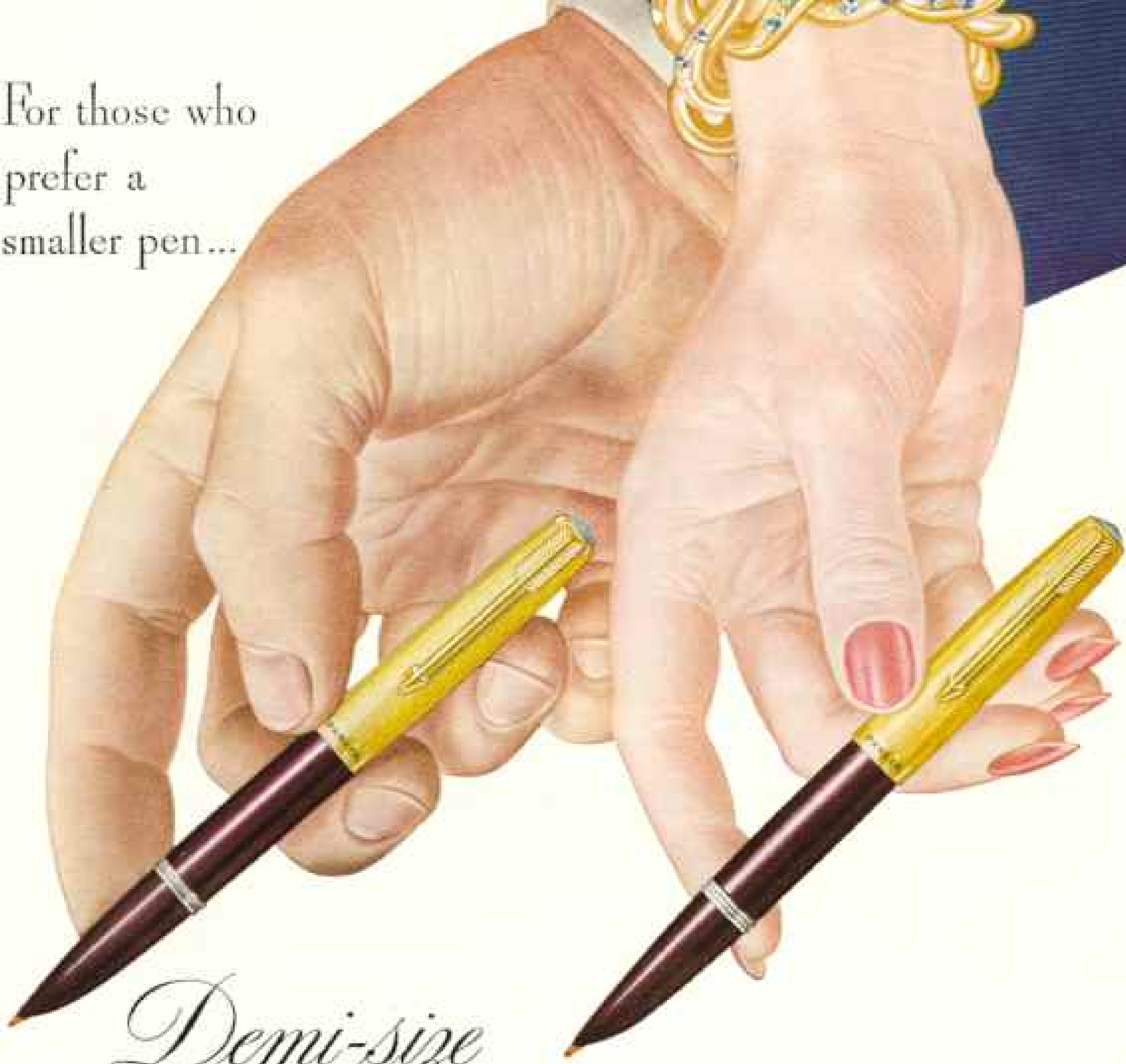

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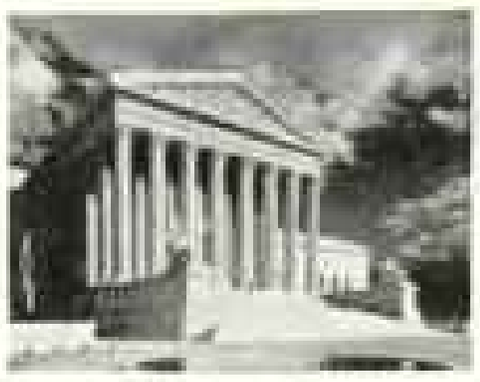

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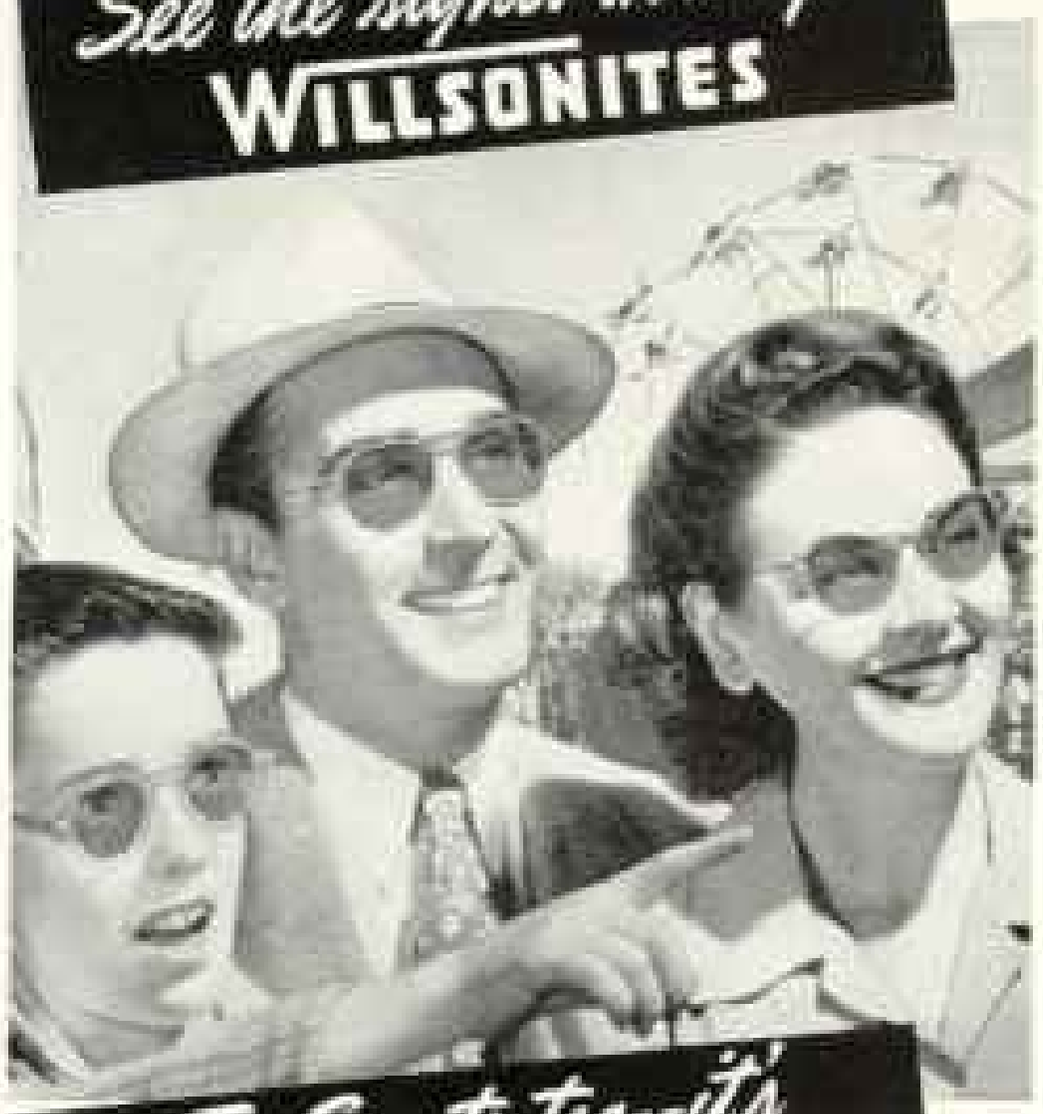

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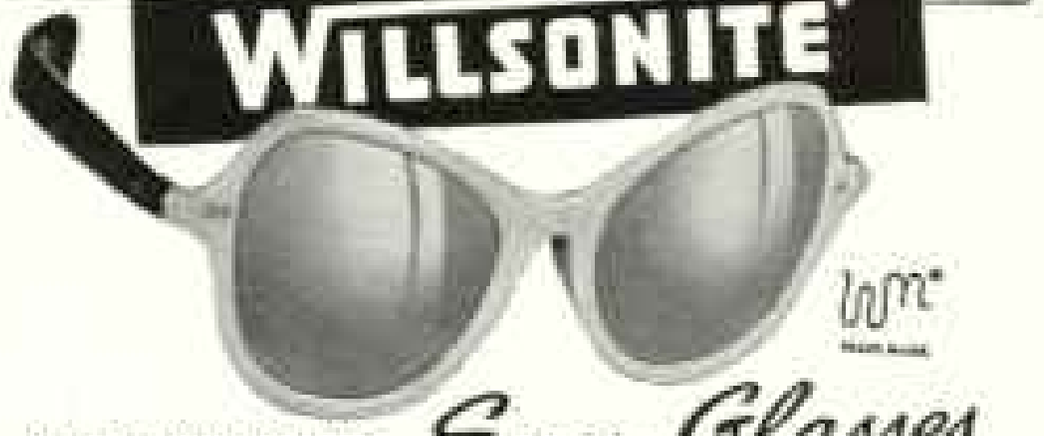

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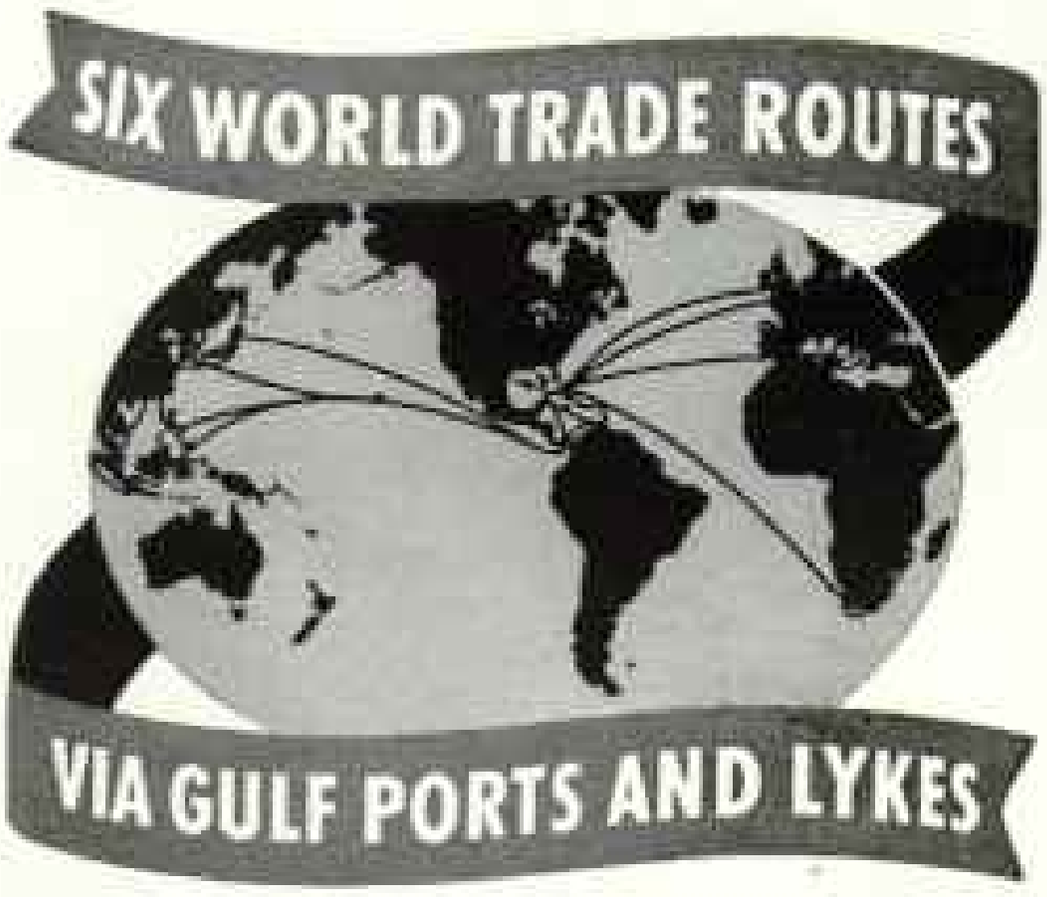

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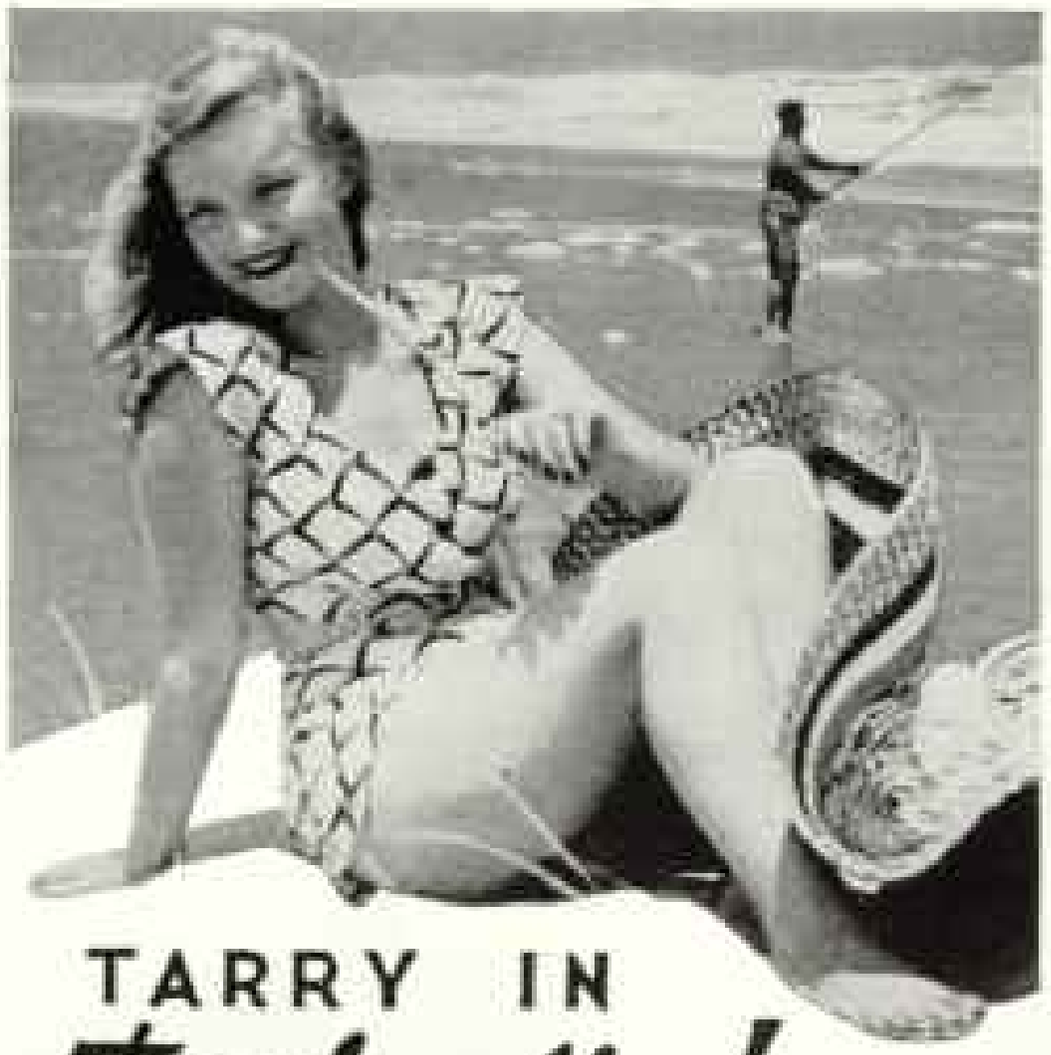

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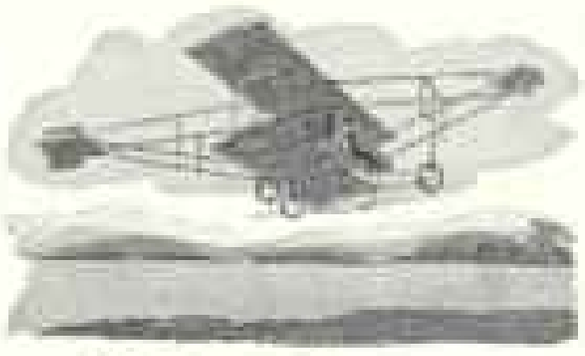

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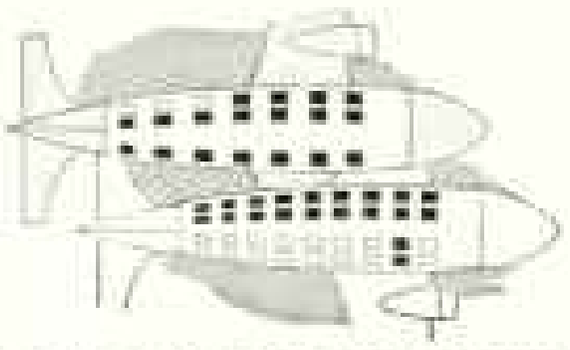

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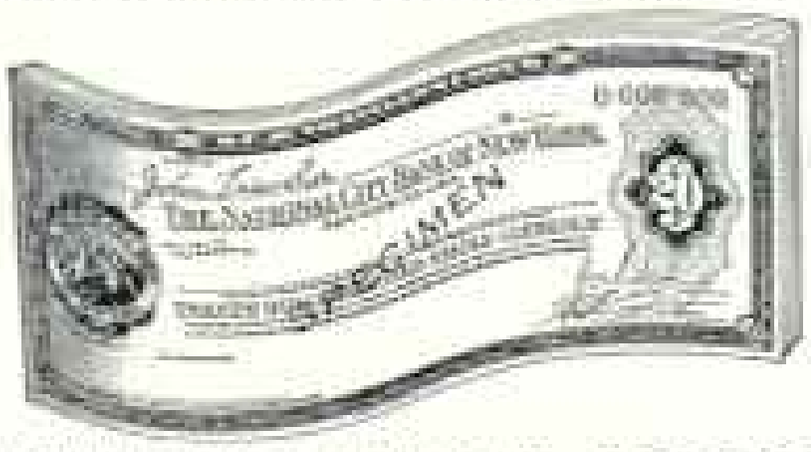

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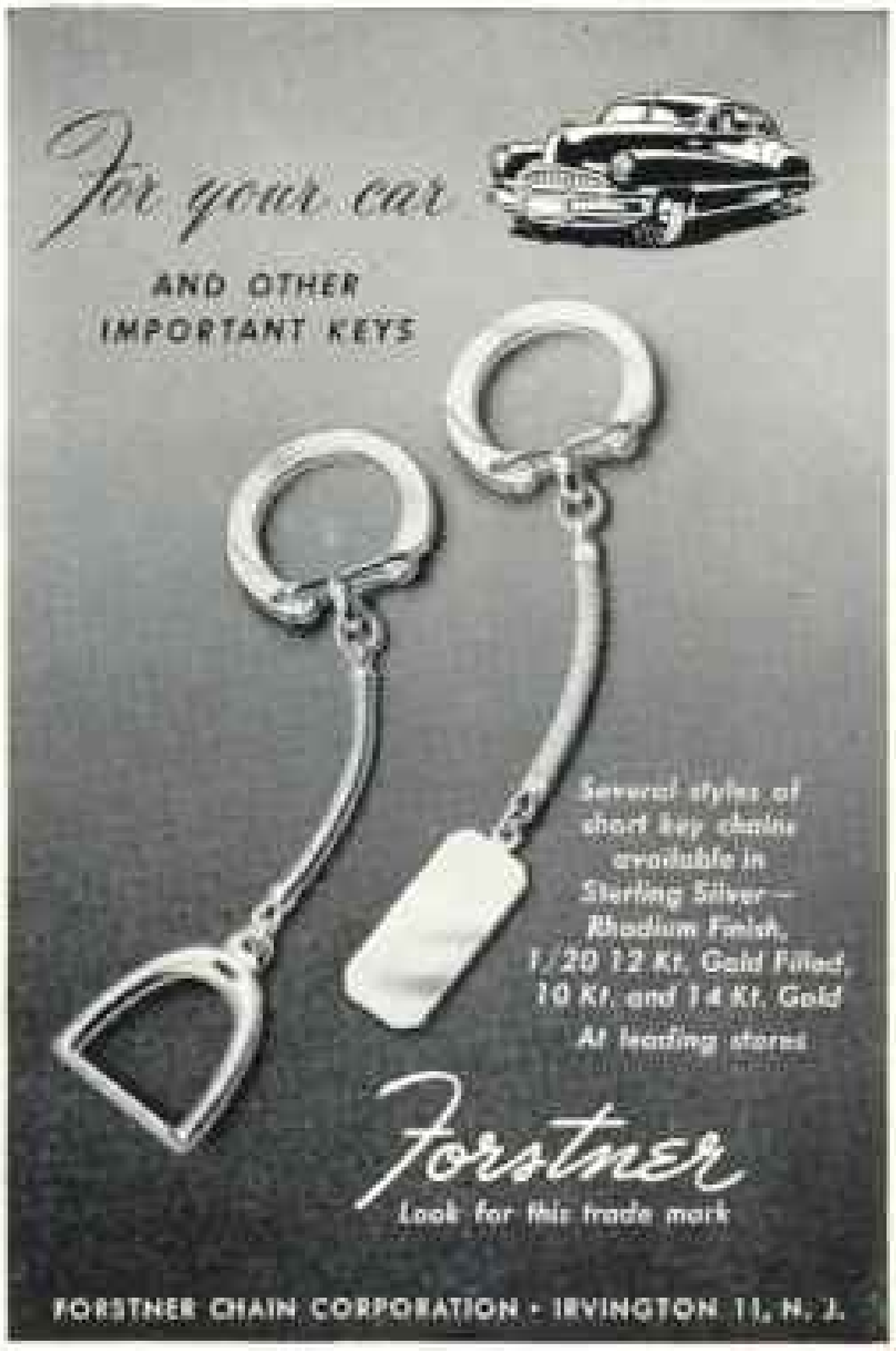

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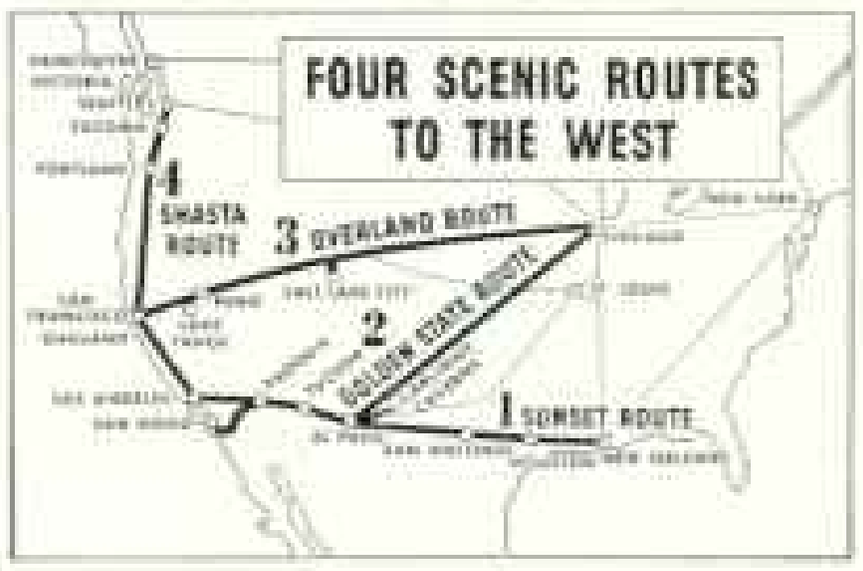

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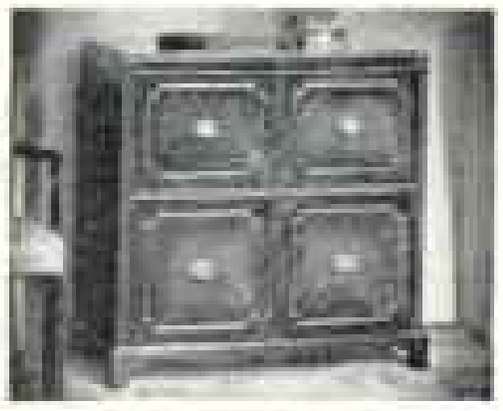

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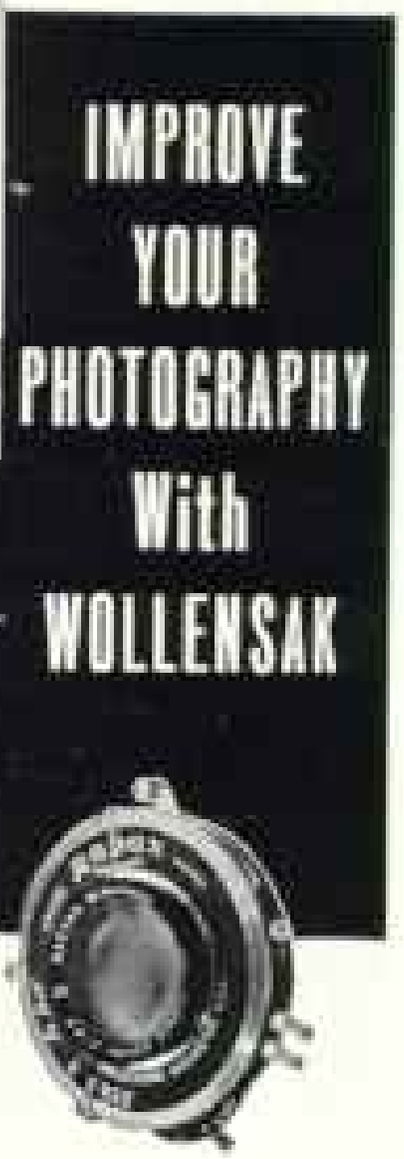

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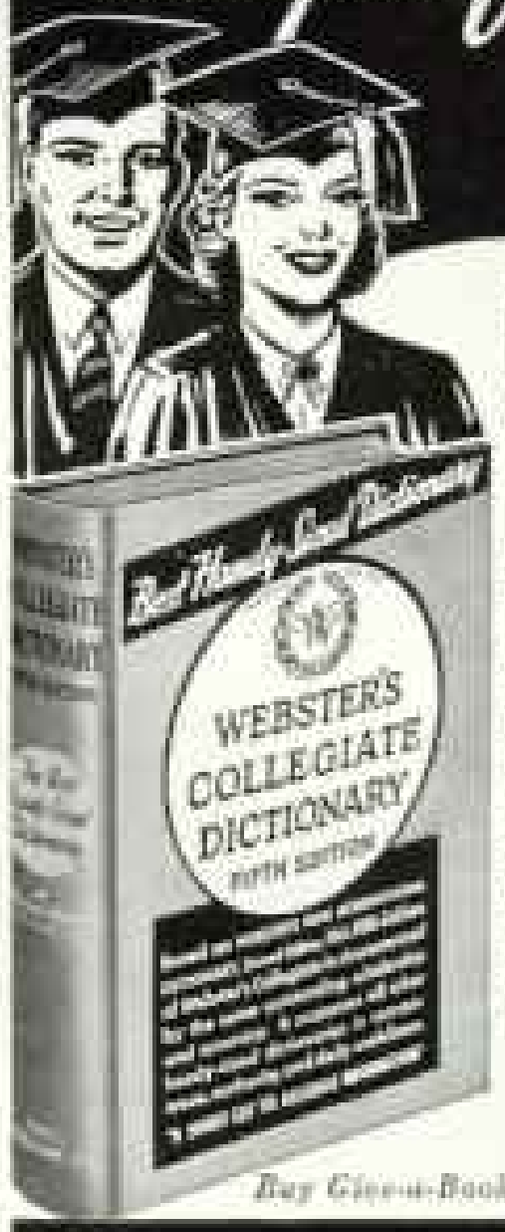

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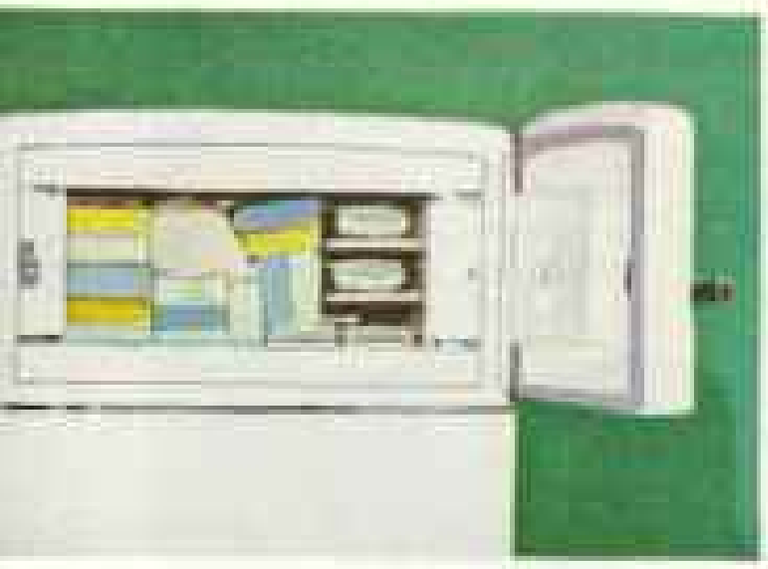

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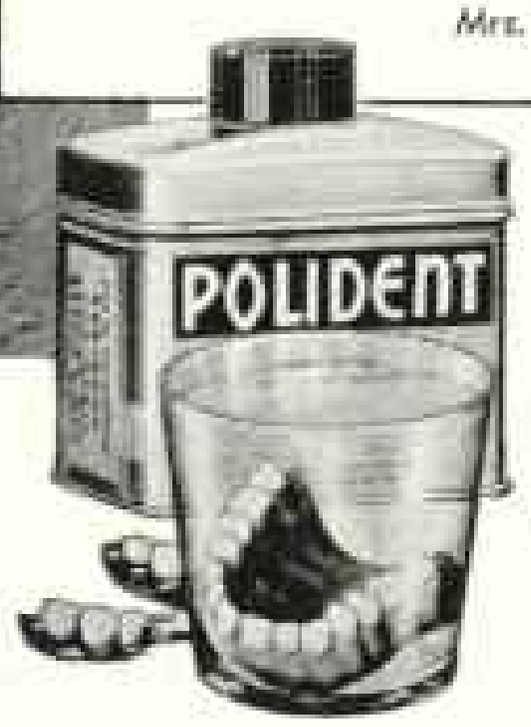

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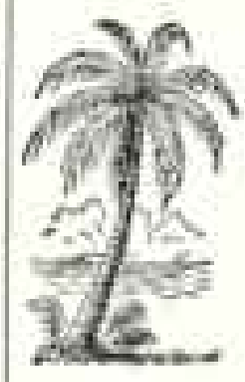

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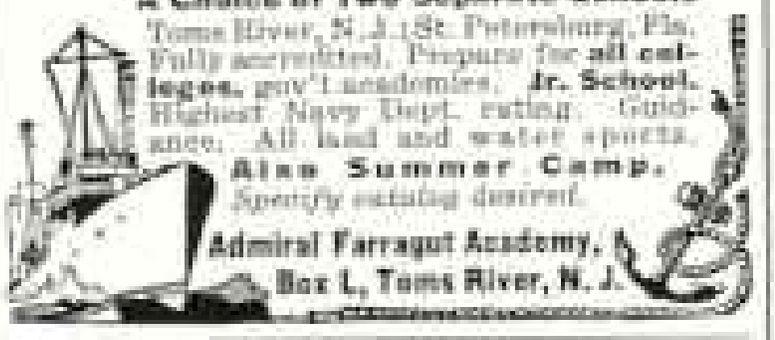

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