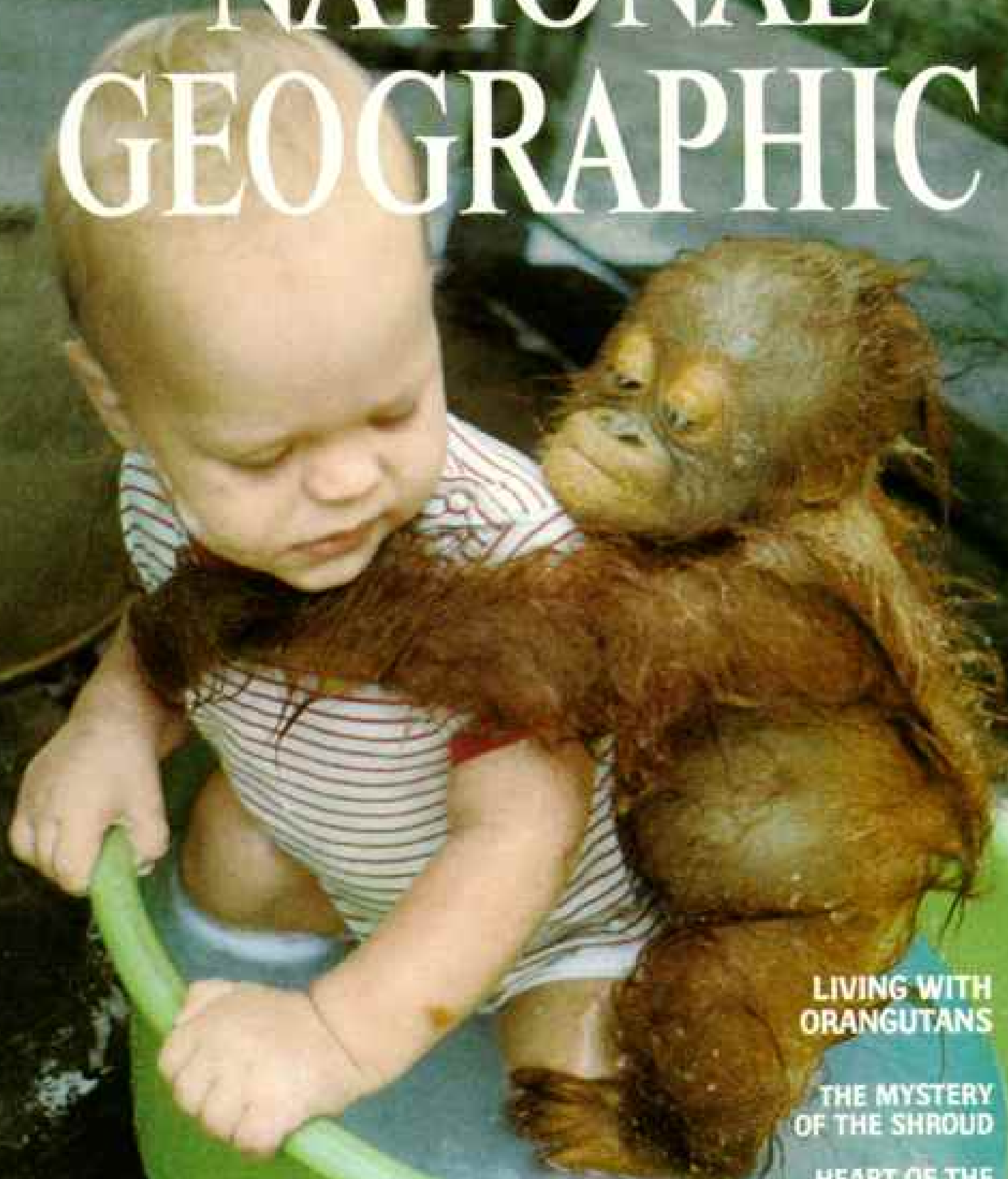


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JUNE 1980

NATIONAL GEOGRAPHIC



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NATIONAL GEOGRAPHIC

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June 1980

THE VISAGE of the man called Jesus Christ has been one of the most challenging in art. Most of the masters have tried their hand at it. In time, a standard version emerged—a soulful-eyed man with a beard. His face marked with either suffering or triumph.

Also, in time, a business of sacred relics sprang up, including a number of images that purported to be miraculous representations of the true likeness of Jesus, such as Veronica's veil, allegedly a cloth pressed to the face of Jesus during His agonizing progress with the Cross.

When our Science Editor Kenneth F. Weaver, a few years ago, undertook coverage for an article on art forgeries, he was interested in Etruscan horses and faked Rembrandts and the run-of-the-mill duplications of originals through which clever people hope to get rich quick.

When his path crossed that of the Shroud of Turin, a demonstrably old artifact, he found himself puzzled, along with many others, by how the image came to be on the cloth, and to what period of history it belongs. His interest in the object occurred at a most propitious time, since other curious minds were also addressing themselves to those questions.

The questions have existed since the invention of photography, and since the first photographs of the Shroud of Turin revealed the powerful fact that the image on the cloth was actually a negative. The image on the photographic plate thus emerged as a positive—and with characteristics that demanded some further explanation.

Ken's account of the work of scientists involved in producing that explanation is a gripping detective story. We realize that in publishing it we run related risks. Those who regard the shroud as unquestionably a sacred object may be somewhat distressed by the scientific approach, while those who are entirely skeptical may regard it as unworthy of scientific study.

Between those points of view is a considerable audience of the curious, to whom we present the facts as they are known at the moment. It may never be possible to prove the origin of the shroud, but I consider the search for fact in itself a mystery story in the grand manner.

Silvestro A. Brown

The Mystery of the Shroud 730

How was the faint human image on the hallowed Shroud of Turin formed? Could it be that of Jesus? Kenneth F. Weaver reports on intriguing new investigations by modern science.

Heart of the Canadian Rockies 757

Nine million visitors a year to Banff and Jasper National Parks share a high realm of snowfields and forests, bighorns, bear, and moose. By Elizabeth A. Moize and Jim Brandenburg.

The Mexican Americans: A People on the Move 780

In the four Southwest border states, residents of Mexican heritage—already millions strong—are growing in numbers, pride, and political power. Griffin Smith, Jr., and photographer Stephanie Maze tour "Mexico U. S. A."

Chincoteague, Watermen's Island Home 810

Nathaniel T. Kenney returns to his father's birthplace, a Virginia coastal isle famed for briny oysters and wild-pony auctions, and finds that life there retains the same simple graces he knew as a boy. Photographs by James L. Amos.

Living With Orangutans 830

Anthropologist Biruté M. F. Galdikas, after eight years of close study of the great orange apes of Indonesian Borneo, tells of their strong maternal instincts, curiosity, ability to learn sign language—and her own son's first years growing up among them. Photographed by Rod Brindamour.

Mississippi's Grand Reunion 854

For one spirit-renewing week each summer, the Neshoba County Fair mixes people, politics, and plain old-time conviviality in a temporary cabin town. Carolyn Bennett Patterson describes the event, photographed by C. C. Lockwood.

COVER: Scientist's son Binti joins an infant orangutan at bath time in the Borneo jungle. Photograph (page 853) by Rod Brindamour.

SCIENCE SEEKS
TO SOLVE...

The Mystery of the Shroud

THEY CALL IT the Shroud of Turin. You may never have heard of it; few had, until recent years, outside of Italy. Yet this treasured strip of linen cloth—an object of veneration by millions—is one of the most perplexing enigmas of modern times. It is, in fact, the focus of an intensive scientific investigation that reads like a mystery story.

The curious blend of history and legend behind that story glitters with kings and dukes, crusaders and popes, and perhaps a consummately clever charlatan. The modern detectives probing the mystery include art historians, pathologists, linguists, biblical scholars, textile experts, chemists, physicists, and photographic specialists.

Among the clues to the riddle are such bizarre items as a Roman whip, wizened specks of pollen, bones from a Jerusalem cemetery, and photographs enhanced by space-age instruments designed to study the moon and Mars.

But the clue that transcends all others is the remarkable image on the shroud itself—a ghostly image, life-size, of an unclothed, bearded man with long hair.

The face, hauntingly serene in death,



By
KENNETH F. WEAVER

SENIOR ASSISTANT EDITOR



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Carving in cardboard reveals the three-dimensional quality of the face on the Shroud of Turin. The linen cloth bears the full-body image of a crucifixion victim that some believe to be that of Jesus of Nazareth. A computer

density scan of a photograph of the face enabled scientists to plot true-to-life relief, normally an impossibility. Examination of the shroud with space-age technology may help determine how the image was formed.



GALLERIA BARBUDA, SCALA/EPH INC.

Miracle, forgery, or natural phenomenon? The shroud has provoked controversy since its first recorded display in France in the 14th century. Its previous history can only be theorized. New Testament accounts of Christ's Crucifixion mention a linen cloth in which His body was wrapped. A 16th-century painting (right) attributed to Giovanni Battista della Rovere suggests how the cloth would have been draped to achieve front and back images. The shroud has been housed in the Italian city of Turin since 1578.





GIANNI TORTOLI (ABOVE AND BELOW)



Public display of the shroud in the fall of 1978, only the third in this century, drew more than three million people to the Cathedral of San Giovanni Battista (left). The baroque chapel rising above the cathedral normally safeguards the relic. During the six-week exposition steel and bulletproof glass-encased the shroud (above). Celebrating Mass, the Archbishop of Turin and custodian of the shroud, Anastasio Ballestrero, raises the Communion wafer.

would grace a masterpiece of art. The body, anatomically correct, bears the frightful marks of scourging, crucifixion, and piercing—perhaps by thorns and lance. It would appear to be a portrait, uncannily accurate when matched against the Gospel accounts, of Jesus of Nazareth.

And, indeed, some believe that this stretch of ivory-colored linen is the very cloth that Joseph of Arimathaea placed under and over the body of Jesus in the rock-cut tomb near Golgotha nearly 2,000 years ago.

Did a Crusader Acquire Relic?

Undisputed records go nowhere near that far back. The shroud first emerges on the stage of history in the mid-14th century, in the town of Lirey, France. Its owner was a famed knight, Geoffrey de Charny, seigneur of Lirey. Where and how he got the relic, no one knows, although there was talk of "spoils of battle."

A chronicler of the Fourth Crusade, Robert de Clari, had written of seeing in Constantinople, in 1203, a *sydoine* (shroud) that bore "the figure of our Lord." The following year, he recounted, it had disappeared when the crusaders looted the Byzantine capital. If the Lirey linen and the sydoine of Constantinople are the same, the secret went with de Charny to his grave.

A British writer, Ian Wilson, believes he can trace the shroud all the way from Jerusalem to Edessa (now the town of Urfa, Turkey), where an image-bearing cloth was famed, thence to Constantinople, and eventually to Lirey. But—as Wilson himself admits—the connections are exceedingly tenuous and circumstantial.

Over the years dozens of shrouds—some with images, some without—have been put forward as genuine. The 14th century, especially, was notorious for relic mongering, when chicanery and fraud abounded. So it is not surprising that the local bishop of Troyes denounced the Lirey shroud as false when it went on public exhibition in 1389. He cited the charge by a predecessor that, "after diligent inquiry and examination," he had determined that the cloth was "cunningly painted, the truth being attested by the artist who had painted it."

This judgment was, in future years, to provide ammunition for those who denied

the shroud's authenticity. But the Avignon Pope Clement VII ordained that the Lirey cloth could continue to be an object of devotion and pilgrimage so long as it was exhibited as a "representation" of the true shroud.

For reasons that are somewhat murky, de Charny's granddaughter, Marguerite, surrendered her prized possession to Louis, Duke of Savoy, in 1453. One 16th-century account, related by David Sox in his admirable book *File on the Shroud*, says that Marguerite "gave the cloth to Duke Louis because when she was returning to Burgundy the relic-bearing mule stopped at the gate of Chambéry [then capital of Savoy] and refused to budge." That explanation, says Sox, is as apocryphal as it is charming.

Whatever the reason, the shroud from then to this day has belonged to the House of Savoy. Duke Louis built a special church at Chambéry—the Sainte Chapelle—where the shroud was enshrined with honors from pope and pilgrim alike.

An incident at Chambéry in 1532 takes on special significance today. Fire broke out in the sacristy of Sainte Chapelle; before the shroud was rushed to safety, drops of molten silver from its casket dropped on the cloth and severely charred some of the corners of the folds. Water used to put out the fire left large and unsightly stains.

The damage, partially covered by patches, is all too evident, though fortunately the image was largely spared. As it turned out later, that fire provided valuable clues that scientists are now interpreting.

In 1578 the Duke of Savoy moved the shroud across the Alps to his new capital, Turin (Torino), in Italy's northwest region of Piedmont. Save for a period during World War II, it has been there ever since.

Four centuries passed, and, in 1978, the shroud was brought out for public exhibition to commemorate the anniversary of its arrival in Turin. It had not been seen in public display for 45 years, and only once before that in the 20th century, in 1931.

More than three million pilgrims came to Turin during the six-week exposition. Among them were several hundred shroud students and enthusiasts who call themselves sindonologists (from the Greek *sindon*, fine cloth). They compared notes during

(Continued on page 743)

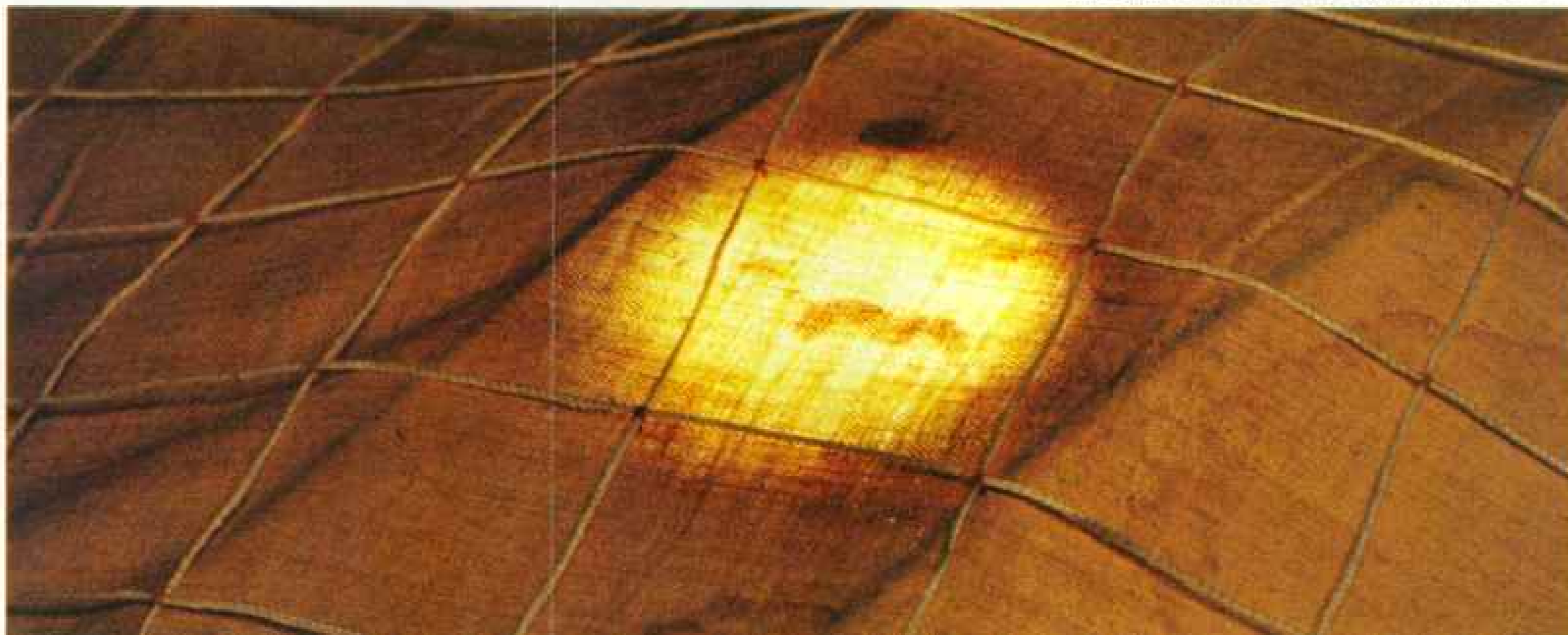


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SISSA BAUMBACH AND WALTER C. MICKONE (ABOVE), © 1990 BARRIE M. SCHWORTZ

Pilgrims of science, with white-glove care, anchored the shroud to a rotating frame designed for an exhaustive series of tests (above). Organized as the Shroud of Turin Research Project, more than thirty Americans worked nonstop for five days alongside Italian scientists. An early discovery: "Blood" images, unlike body images, penetrate the shroud and are dense enough to be visible under back lighting (right). But is it blood? Biophysicist John Heller, silhouetted before minute shroud fibrils (above right), ran chemical and spectroscopic tests on fibrils and concluded, "It's hemoglobin." But he and other team members plan more tests.



Anatomy of the shroud

THE MAN OF THE SHROUD, whatever his origin, bears obvious wounds of crucifixion; a practice outlawed in the Roman Empire in the fourth century A.D. Rivulets of "blood" that encircle the head and the heavy flow on the side recall the biblical crown of thorns and thrust of the centurion's lance during Christ's Crucifixion.

The life-size image, photographically enhanced here (right), actually appears as faint as an apparition (bottom). Scourge marks that pepper the body (diagram below) resemble the pattern inflicted by a

Notes in CAPITAL LETTERS refer to wounds associated with crucifixion.

BLOOD FROM NAIL WOUNDS IN THE FEET

Backing cloth; corner section of shroud missing

Narrow side strip attached at unknown date

SCOURGE MARKS

Burns made prior to 1532

Size of shroud 14 feet 3 inches by 3 feet 7 inches

BLOOD FROM SIDE WOUND RUNNING TO THE BACK

SHOULDER ABRASIONS

BLOOD FROM PUNCTURE MARKS ON THE HEAD

Water stains from putting out 1532 fire

SWELLING FROM BLOW'S TO FACE

Crease in shroud

LARGE FLOW OF BLOOD AND FLUID FROM SIDE

BLOOD FROM WRIST WOUND DOWN ARM

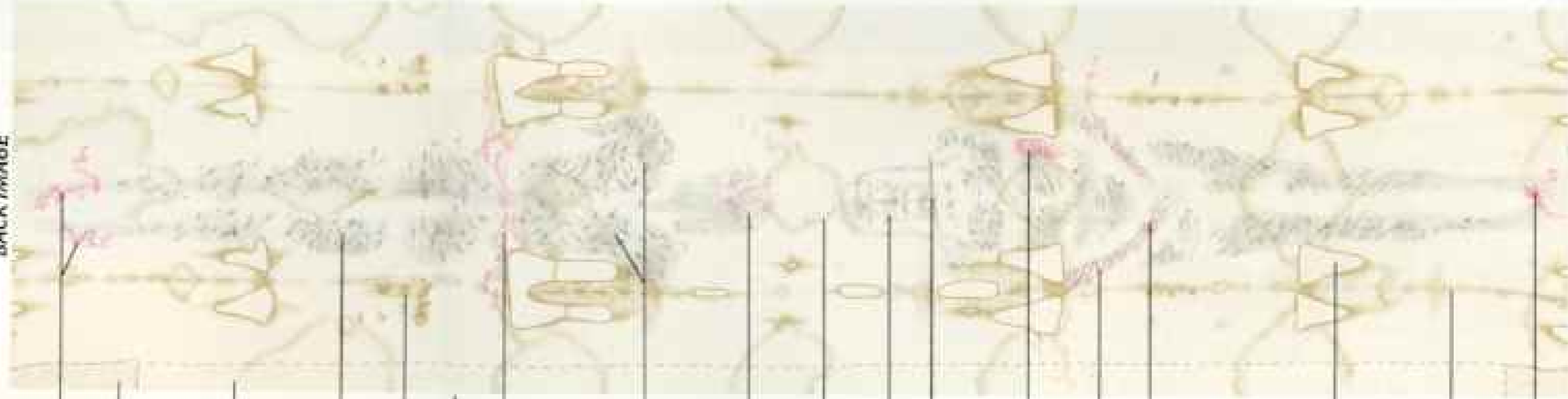
BLOOD FROM NAIL WOUND IN THE WRIST

The 1532 fire burned an edge of the folded shroud; resulting holes patched in 1534

Scorch along folds from 1532 fire

BLOOD FROM NAIL WOUNDS IN THE FEET

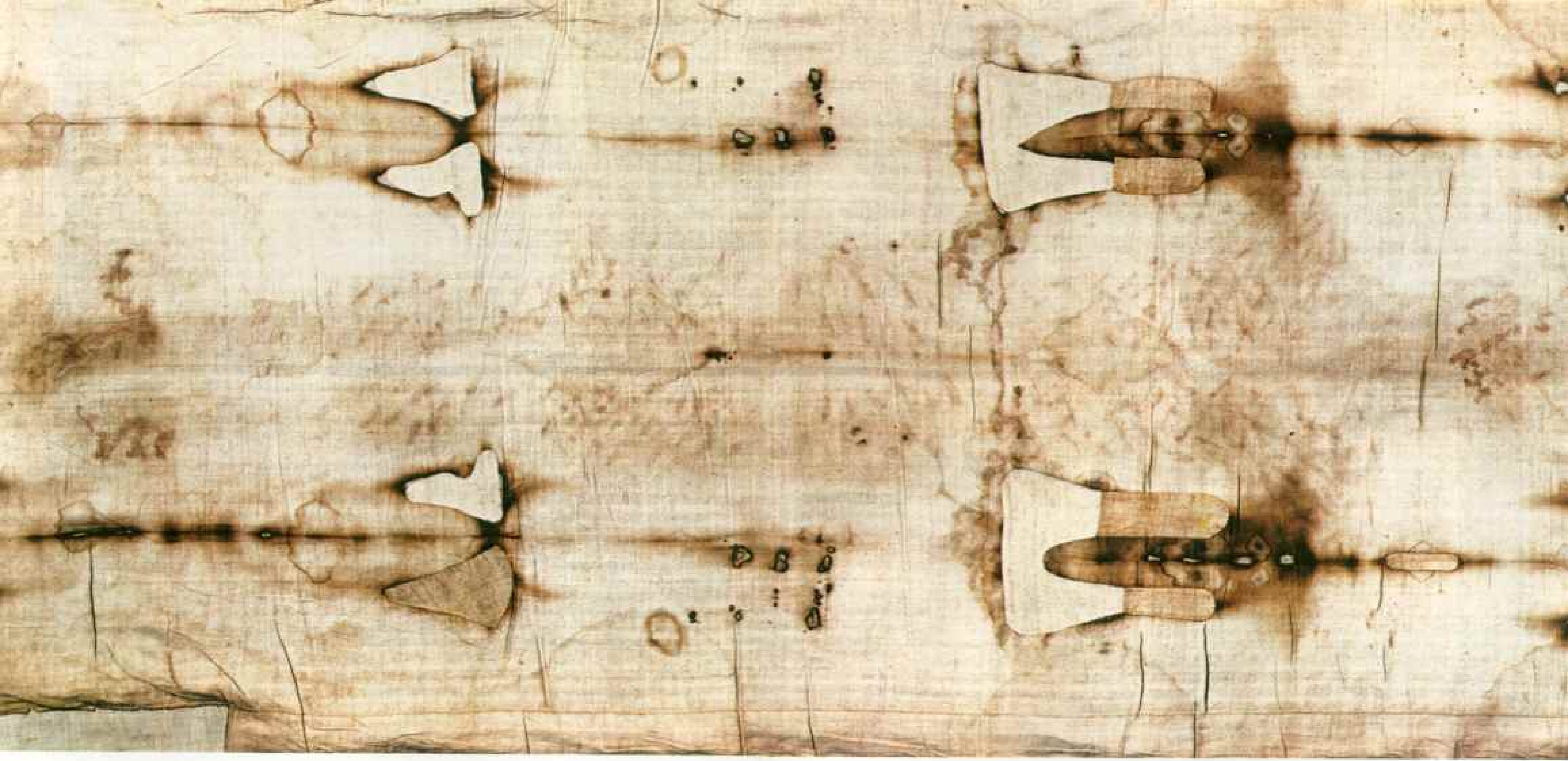
BACK IMAGE

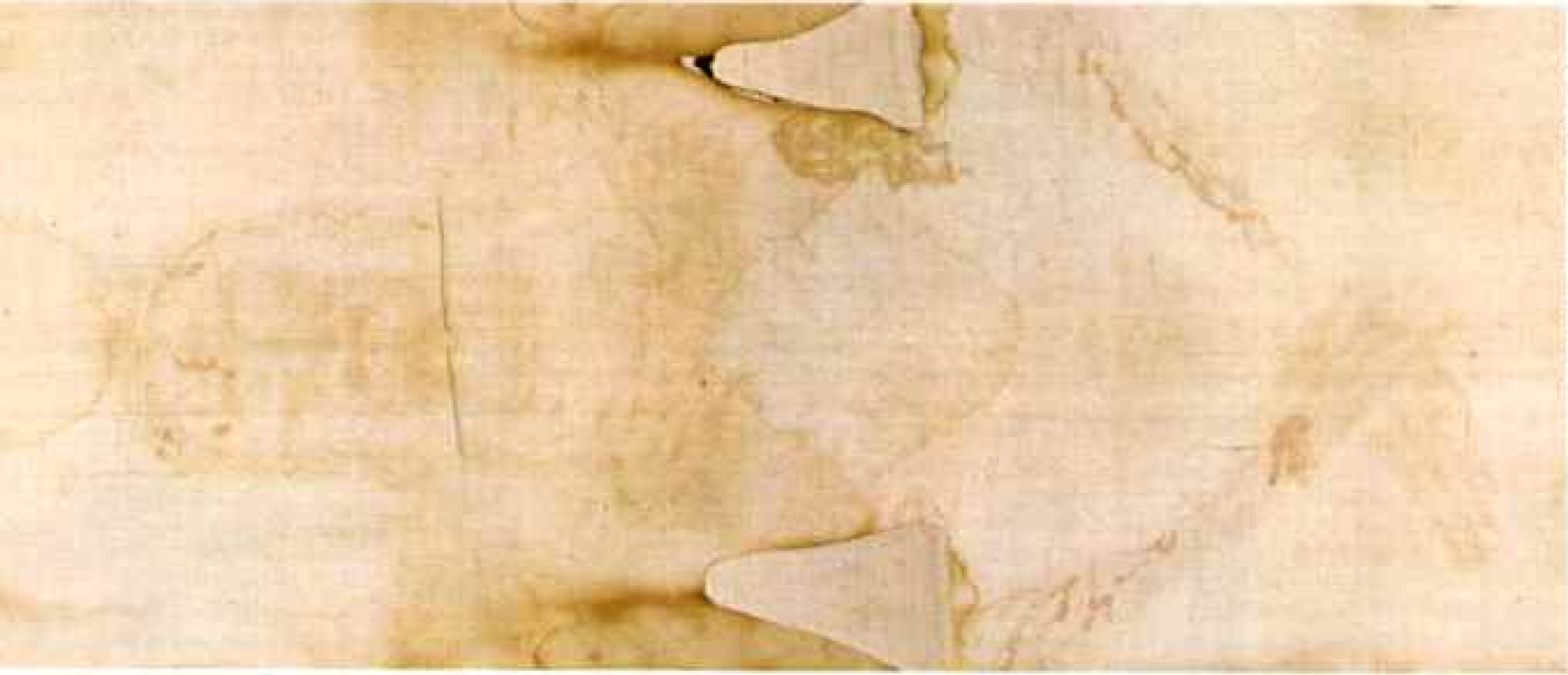


FRONT IMAGE

Image of body on one side of shroud only

DRAWN BY SILAS SHAPIRO
COMPILED BY DAVID B. MILLER
NATIONAL GEOGRAPHIC, SET DESIGN



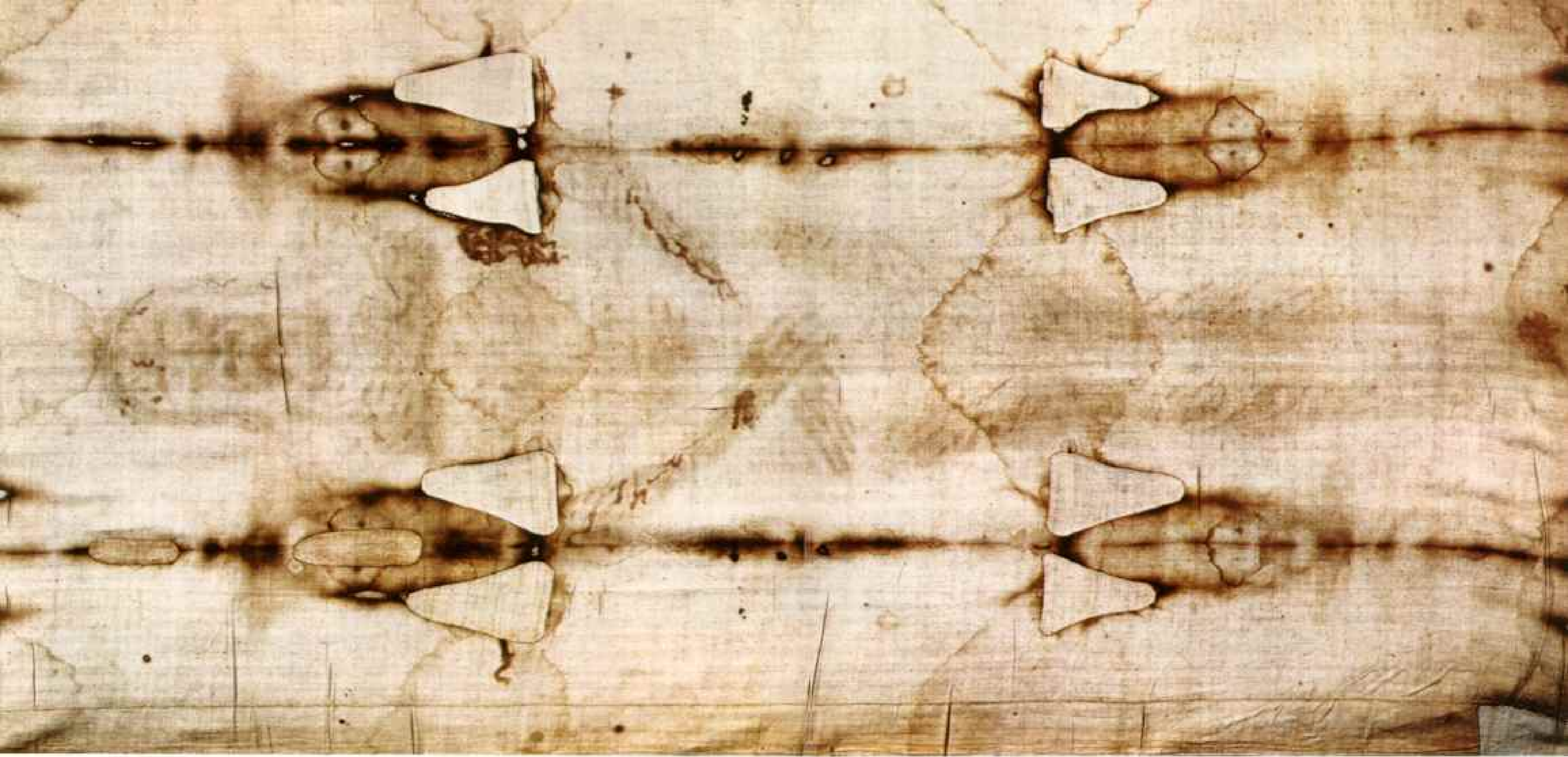


BOTH BY YERSON MILLER, PHOTOGRAPHICALLY ENHANCED BY ROB A. STURDY,
NATIONAL GEOGRAPHIC STAFF (RIGHT)

flagrum, a multi-thonged Roman whip tipped with lead or bone. Significantly, a nail wound is on the wrist. When a French physician used cadavers to reconstruct the shroud wounds in the 1930s, he discovered that bones in the hand cannot sustain hanging body weight. A medieval forger, shroud scholars reason, would follow artistic tradition and center the nail wound in the palm. Although the Gospels specify hand wounds, "hand" is translated from the Greek word *cheir*, which can also indicate the wrist and forearm.

Mirror-image burns and water marks date from a 1532 church fire when molten silver from the shroud's storage case fell on corners of the folded cloth. Triangular patches and a linen backing cloth repaired the worst damage. The origin of circular burns, which predate the major fire, is unknown.

Woven in a herringbone twill, the shroud measures 14 feet 3 inches by 3 feet 7 inches. The narrow strip sewn to the left edge is of essentially identical weave. Research indicates that the apparently hand-spun fibers and the weave of the cloth are compatible with ancient Middle Eastern textile technology. If radiocarbon tests are allowed, they would date the shroud to within 150 years of origin. A dating near the first century A.D. would not rule out a forgery on ancient linen, but science is as yet unable to determine how such a forgery could have been made.





Rare glimpse under the shroud allowed Giovanni Riggi of Turin, director of this experiment, Samuel Pellicori of the American team, and Luigi Gonella, a scientist representing the archbishop, to examine "blood" penetration (above).

Narrowing the focus to millimeters with a photomicroscope, team member Mark Evans (right) produced the first photomicrographs of the shroud (far right) for close study of burns, "blood," and body image. Rust was probably left by a tack used in the 1931 exposition.

Whereas "blood" spread through the threads and was trapped in the crevices, the yellow stain of the body image is found only on the top fibrils of thread

segments. Had the image been forged using a hot statue, as some have suggested, high spots like the nose would show deeper scorches. Each stained fibril is an identical shade; the darker areas reflect only a greater number of stained fibrils. There is no evidence that color entered the fibrils as a gas or liquid, and there is no trace of pigment buildup.

Some of the scientists speculate there was nearly complete contact between a body and the cloth, and that sweat and body oil produced the image over an unknown period of time. Others feel there is stronger evidence that the image is faint scorch, but how it could be produced has not been determined.

© 1980 (ABOVE) AND (1ST) (BELOW) BARRIE M. SCHNORF; © 1980 MARK EVANS (RIGHT), ALL



"BLOOD" (IMAGE, LOWER BACK) 32X



RUST LEFT BY OLD TACK 32X



BURN MARK PREDATING 1532 40X



BODY IMAGE, TIP OF NOSE 40X

(Continued from page 734) a two-day international congress on the theme "The Shroud and Science."

I had long been interested in art forgeries and the amazingly clever ways in which scientists detect them. This interest led me to Turin to attend the congress and to get a rare firsthand look at perhaps the most important relic in all Christendom. To Turin came also a team of three dozen Americans, bringing 72 crates of sophisticated instruments and electronic gear with which they hoped to crack the secrets of the shroud.

Floodlights blazed as I entered the Renaissance Cathedral of San Giovanni Battista. High above the altar, behind bulletproof glass, the old-ivory linen—more than 14 feet long—glowed so brilliantly that at first I could see no markings. But as I climbed a ramp and turned into a raised walkway in front of the "Santa Sindone," I began to discern the image that has stirred such imagination and devotion—and controversy—over the centuries.

The twin lines of scars and the water stains from the 1532 fire dominated. The image itself—mistlike sepia impressions—seemed to fade into the cloth as I moved in closer. It was necessary to back off for the eye to resolve details.

The "blood" showed darker than the body and stood out more sharply: trickles on the head and arms; splotches on the side, wrist, and feet; and multitudes of what appeared to be lash marks. At the ends of the lash marks seemed to be contusions of a type that could have been inflicted by a Roman whip called the *flagrum*, whose thongs were tipped with bits of lead or bone. Clearly, the figure on the shroud had suffered savage and humiliating treatment.

I could not guess, from my vantage point, whether the linen was ancient or merely old; how the image had been imprinted; whether the "blood" was really blood; whether the shroud was genuine or a hoax. These were the questions the scientists had come to address.

It would not be the shroud's first brush with science. That happened eighty years before, in 1898, with the first photographs of the relic. Those pictures uncovered the most

surprising of the shroud's many mysteries.

When the photographer, Secondo Pia, examined his first glass-plate negative as it emerged from the developing bath, he almost dropped it in shocked excitement. He was looking not at the usually unrealistic, confusing photographic negative, but at a clear *positive* image. Highlights and shadows were reversed from those on the cloth and were far more lifelike and realistic. Moreover, they showed details never before seen in the shroud, which was now revealed as a *negative* image.

A negative image? Hundreds of years before the invention of photography? The idea that the shroud was a hoax suddenly seemed less plausible, for how could a medieval artist have produced a negative image, and why would he choose to do so?

Turin's treasure was now the object of much interest, and also of heightened controversy. Just at this time it came under attack from a distinguished cleric and historian, Ulysse Chevalier, said to be "the most learned man in France and perhaps in the entire world." After a study of some fifty records concerning the shroud, Chevalier threw the full weight of his reputation against it; he pronounced it false.

Biologist Propounds Vapor Theory

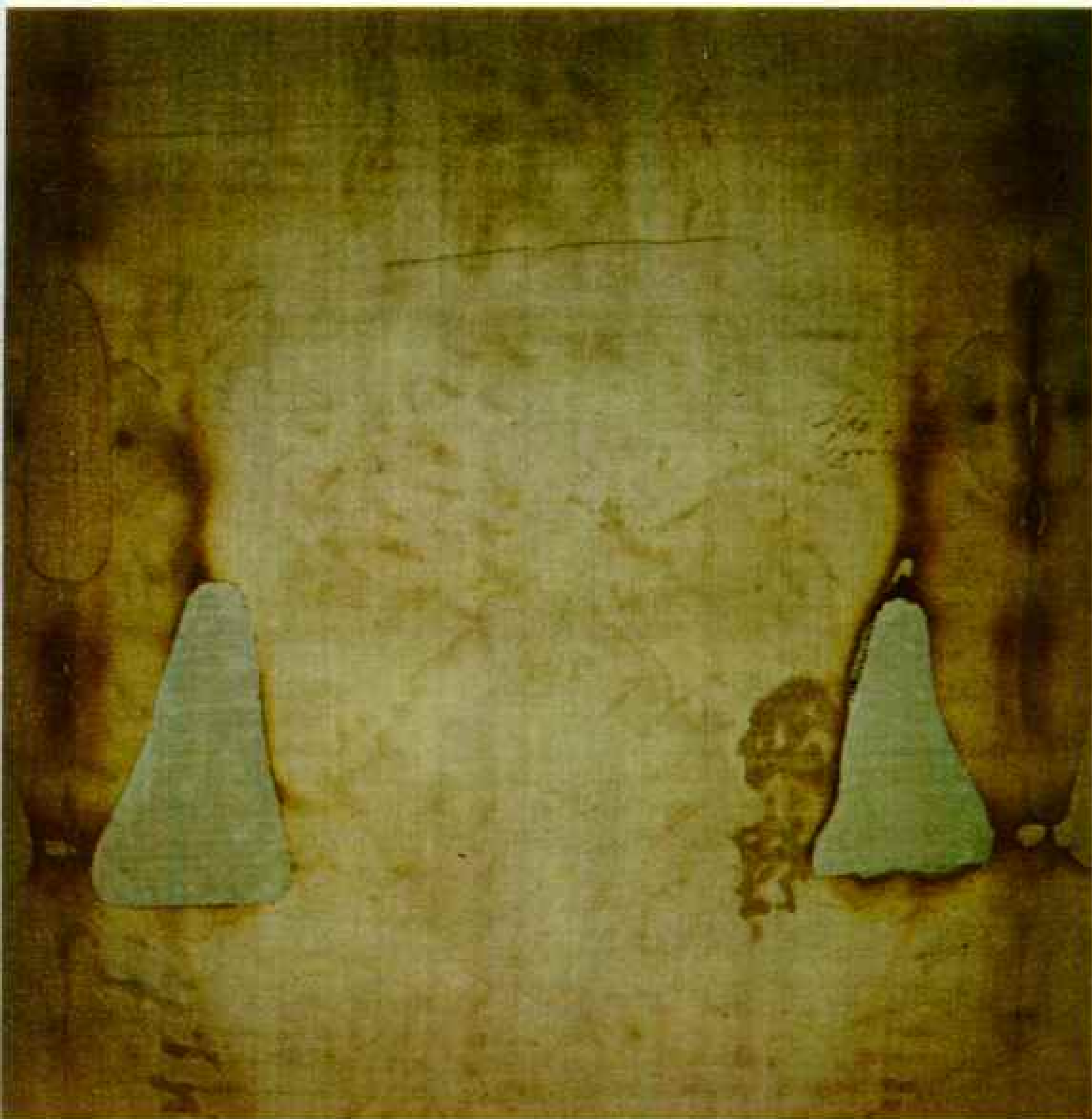
Ironically, it was a scientist—and an agnostic to boot—who came to the shroud's defense. He was the internationally noted zoologist Yves Delage. With a young biologist assistant named Paul Joseph Vignon, he had carefully studied Pia's photographs and pondered how the image had been produced. Could it have been painted? He and Vignon tried to duplicate it with oils; they tried watercolors. Nothing worked.

Then Vignon pursued another approach. He theorized that myrrh and aloes—spices used with oil in ancient burial rites—might sensitize burial garments. He knew that morbid sweat from a tortured body produces urea, which in time gives off ammonia vapor. This vapor, he reasoned, would cause the impregnated cloth to turn brown.

He tried an experiment and produced an image of sorts. The "vaporograph" theory was born, and the two men were sure they knew how the image had been formed.

In 1902 Delage went before the French

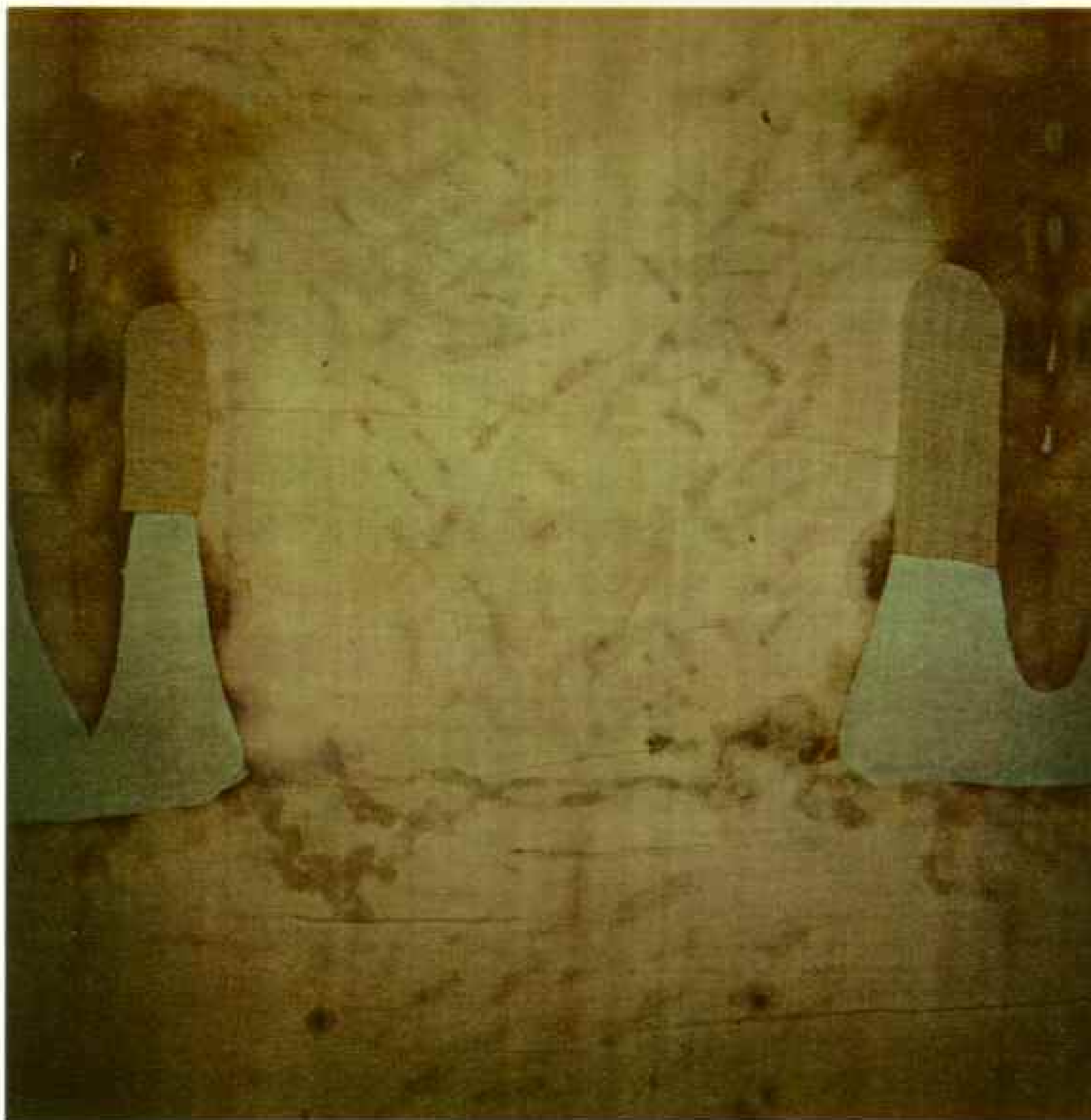




NATIONAL GEOGRAPHIC ART DIVISION (BELOW AND RIGHT)

Pale aura around the side wound is enhanced in an ultraviolet fluorescence photograph (above and diagram). Some team members think it may be serum, which separates from blood at death. Fluorescence is a clue to chemical makeup. Electrons excited by radiation give off energy, but not all compounds emit this energy by fluorescing. Whole blood does not fluoresce, so it is notable that neither scourge marks nor "blood" images show fluorescence.





© 1980 VERNON MILLER, BROOKS INSTITUTE (LEFT AND ABOVE)



Shroud scholars think it unlikely that a forger would anticipate the flow of "blood" across the back (above and diagram), which might have spread from a side wound when a body was moved.

In these photographic tests the scorches from the 1532 fire show reddish fluorescence, while the body image does not. Some project members believe this casts doubt on the scorch theory. Yet in other tests the body image and fire scorches react similarly.



© 1980 VERNON MILLER, BROOKS INSTITUTE (BOTH)

Apparent absence of thumbs on the hands (left) may be related to nail penetration through the wrists. Such piercing might stimulate the median



NATIONAL GEOGRAPHIC ART DIVISION



nerve and cause an involuntary contraction of the thumbs.

Auras around "blood" on the wrist and one foot (detailed in diagrams) are also thought by some to be signs of serum. Watery serum is squeezed out of clotting blood.

Fine diagonal scratches, found with scourge marks, are revealed in these ultraviolet fluorescence photographs. They appear strongest on the back of the legs (left).

Academy of Sciences and presented details of the experiment. At enormous risk to his reputation, he pronounced: "The man of the shroud was Christ."

The academy was outraged and refused to print his statement. Controversy became more intense.

Some thirty years later a noted French surgeon, Dr. Pierre Barbet, saw the shroud and became interested in a new set of photographs made in 1931 by Giuseppe Enrie. Barbet sought to verify the anatomical accuracy of the marks on the shroud by experimenting with cadavers. He quickly learned that nails in the palms will not support a man's body. On the other hand, a nail in the wrist or forearm will not tear out.

This knowledge made the case for the shroud's authenticity seem stronger. For the mark of the nail on the shroud image is *not* in the palm (as it is traditionally seen in paintings of the Crucifixion) but in the wrist area. A medieval hoaxer would presumably have based his image on what he had seen in paintings and on the fact that the Gospels speak of nail holes in the hands. He would not likely have known that the Greek word for hand, *cheir*, can include wrist and forearm as well.

Although the Romans put many thousands of victims to the cross (6,000 after the revolt of the slave Spartacus), no skeletal remains were known until the unearthing of a cemetery in Jerusalem in 1968.

In one ossuary archaeologists found the bones of a man named Jehohanan. The lower legs had been broken, as was the crucifixion custom, and a spike still lodged in the heel bones with a bit of olive wood from the cross clinging to it. But most remarkable: The nail driven into the right arm had left a clearly defined scratch and worn place on the inside of the radius, close to the wrist. Archaeology had confirmed the medical evidence that the shroud's image is correct.

Until this time the shroud had been studied almost entirely from photographs. But in 1969 and again in 1973, experts—chiefly Italian—were allowed to examine the shroud itself. The first group made only a cursory inspection and came up with no new knowledge. But the 1973 group made several startling discoveries.

For one thing, they learned that the image

is completely superficial; it lies on the very topmost fibrils of the threads, and has not penetrated at all. Moreover, they reported that no pigment could be seen, even under magnification.

Detective Finds Pollen From Palestine

Another discovery seemed to place the shroud in the Holy Land at some time in the past. A Swiss criminologist, Max Frei, was permitted to press sticky tape on the shroud to remove dust and other particles for laboratory analysis (page 750). Under his microscope Frei found 48 samples of pollen—tiny male reproductive bodies, produced by seed-bearing plants, that survive for centuries even in hostile conditions.

Pollen grains vary—some are fuzzy, some spiny, some grooved—and no two species are exactly alike. Thus many plants can be identified with high accuracy by comparing pollen to a standard reference collection.

Among his identified samples, Frei found a number from plants that are found in France and Italy, as would be expected. In addition there were seven from halophylic (salt-loving) plants found in saline areas such as the Dead Sea, and others from Palestine and Anatolia.

On the face of it, Frei's findings suggested that the shroud had been in the Holy Land at some time in its history. Not all scientists, however, are ready to accept this evidence uncritically. They note that pollen is borne great distances by the winds and by birds and travelers, and the shroud is known to have been exhibited out of doors, without protection, on occasion over the centuries.

A further set of findings was based on two small fragments and a number of threads snipped from the shroud in 1973 and turned over to an internationally known textile expert, Professor Gilbert Raes of the University of Ghent, Belgium.

Some of the textile indications seem to point to the Holy Land and to great antiquity. The material is linen, commonly used in ancient Palestine for graveclothes. Raes found that it has traces of cotton of a Middle East variety.

The weave is a herringbone twill, a pattern not unknown to the ancients, although plain weave was much more common in those days. The thread appears to be hand

spun, an ancient technique; after about A.D. 1200, European thread was spun by the wheel. Finally, the threads are believed to have been bleached before weaving, also an ancient practice.

A Readout in Three Dimensions

The current scientific interest in the shroud in the United States began with two young Air Force scientists, John Jackson and Eric Jumper. As long ago as 1974 they had begun an intensive study of the Enrie photographs. Like Vignon, they observed that the darkness, or intensity, of each part of the image varies in direct proportion to how far that part of the body would have

been from a covering sheet. The darkest portions would have been closest to the sheet, and the lightest farthest away.

They concluded that whatever had created the image could have acted at a distance, not just by direct contact.

To demonstrate their idea, they processed the pictures with the VP-8 Image Analyzer, a sophisticated instrument designed to convert image intensity to vertical relief. To their surprise they found that the shroud contains accurate three-dimensional data, something that ordinary photographs or paintings do not have. With the computer information they were able to construct a three-dimensional model of the image.



To map a shroud-covered body, stereometric photography charts contours. A man matching the height (approximately 5 feet 11 inches) and build of the image is photographed under a shroud replica (above left), and then uncovered (above center). Contours are compared to measure cloth-to-body distances. Experiments

This work attracted the attention of other scientists, highly qualified in their fields. In March 1977 a group of them met in Albuquerque, New Mexico, with a number of shroud scholars from Europe. That meeting set in motion a plan to test the shroud scientifically the following year when it would go on public exhibition in Turin.

Working through Father Peter Rinaldi, a native of Italy who had for years served a parish in the United States before returning to Turin, and Father Adam J. Otterbein, long a leader in the American shroud movement, they sought official permission. Umberto II, former King of Italy and the shroud's legal owner as head of the House of

Savoy, had for years favored testing. From his home in exile in Portugal he gave approval. Turin's Archbishop Anastasio Ballestrero, to whom the relic is entrusted for safekeeping, also approved. He gave scientists a free hand for any nondestructive tests.

And so the Shroud of Turin Research Project came into being. The team began detailed preparations to build and collect specialized instruments and work out a schedule for their tests.

On Sunday night, October 8, 1978, the Turin exposition ended. As the last pilgrim left the cathedral, the shroud was carefully taken from its nitrogen-filled case and moved to the adjoining Royal Palace.



ALL BY NATIONAL GEOGRAPHIC PHOTOGRAPHER VICTOR A. BOEWELL, JR.

show that intensity of the shroud body image varies in proportion to the distance between cloth and body. Scientists John Jackson and Eric Jumper (above, left and right foreground) also dressed models with chin bindings, forehead phylacteries, and coins on the eyes, images of which some believe they see on the shroud.

There, in the handsome gilt-and-crystal hall once used to receive visiting royalty, it would remain for five days. The scientists—including Italian groups and a Swiss expert as well as the Americans—would work around the clock making their tests.

A long tilting table had been built on which the linen could be held by magnets and clamps. As the shroud was smoothed out, the scientists noted that the fabric was well preserved and surprisingly supple—though yellowed with age, creased, and showing evidence of much folding.

Perhaps never before had an object of art or archaeology been subjected to such exhaustive examination. The scientists bombarded the relic with ultraviolet radiation and X rays and watched for fluorescence. They measured variations in the way the image, the "blood," and the background emitted or reflected energy across a wide range of the electromagnetic spectrum. In infrared, visible light, ultraviolet, and X ray, they searched for "fingerprints" of the shroud's chemical makeup.

X-ray fluorescence, for example, can

detect iron and potassium in blood, or spot heavy metals usually found in paints.

Other specialists photographed every square inch of the linen in detail—some 500 exposures using various wavelengths. They examined it microscopically and took photomicrographs (page 742). With sticky tape and a vacuum device they captured bits of fiber, dust, pollen, and other particles for analysis. They loosened the backing cloth (stitched on by 16th-century nuns) to see what is on the back of the shroud. Biologist Giovanni Riggi of Turin photographed the back surface with the use of fiber optics and collected micro-particles. Several additional threads were taken.

Investigators Begin Analyzing Data

Elated but exhausted, the team finished its work on Friday night. The shroud was rolled in red silk, replaced in its silver-bound reliquary, and returned to the ornate chapel where it has rested for centuries. High above the marble altar, it remains behind a glass window and iron bars.

Back home in their laboratories with their



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Microscopic clues cling to tape applied to the shroud by Swiss criminologist Max Frei. Samples taken by Frei during a 1973 examination held pollen from plants native to the Palestine area, which some cite as evidence that the shroud was once in the Middle East. But the relic was sometimes displayed unprotected, and far-ranging airborne pollen could have easily collected.

Chemist Ray Rogers, left, took 36 tape samples for the American team. Researching textile history, Rogers uncovered the ancient practice of washing cloth in detergent made from a soapwort, *Saponaria officinalis*. Experiments show that *saponaria*-treated linen scorches more easily. *Saponaria* is a known fungicide, which may explain why the shroud has no obvious mold or mildew.

six tons of equipment, the team members* began the laborious task of processing and analyzing the data, the photographs, and the samples. It was slow work, depending on spare time. Today, more than a year and a half later, much of the work continues amid some disappointments and conflicting evidence, but with an abundance of new information that brings the answers to the riddle ever closer.

What is the nature of the image? Under magnification, the scientists report, the fibrils from the image area show a light yellow coloring that lies only on the very topmost surface of the threads. The coloring has not diffused or soaked into the threads, has not run down the sides of the threads, and has not left deposits between threads as one would expect if pigments had been painted or rubbed on.

Here the fire of 1532 becomes helpful. Some of the scientists say that heat sufficient to char the fabric should have been enough to alter the color of organic pigments or vehicles, and the color change should be greatest close to the burned area. Yet the yellow coloring on the shroud image is remarkably uniform right up to the edge of the burns; it has not been altered. Moreover, water thrown on the shroud to put out the fire would have caused inks to run. Clearly that did not happen.

In light of these facts, the scientists as a group have settled on one far-reaching conclusion. Chemist Ray Rogers of the Los Alamos National Scientific Laboratory sums it up: "Nearly all of us now believe that the shroud is not a painting. Except for a small amount of iron oxide, we find no pigment. And we do not think that either liquid or vapor could have produced the image we see."

One team member, microscopist Walter C. McCrone of Chicago, has developed a hypothesis based on microscopically visible amounts of red iron oxide he sees clinging to many of the yellow fibrils. He describes this finely divided material as similar to artists' iron-rich earth pigments, such as red ocher. He proposes the idea that this material was used at some time to enhance the image. This hypothesis is regarded as doubtful by many of the other scientists.

One other team member—spectroscopist Samuel Pellicori of the Santa Barbara

Research Center—proposes still another hypothesis: The image, he suggests, was formed by the darkening over the course of time of body oils, sweat, or spices such as myrrh. It is, in that case, an image formed by contact. Spectroscopic evidence seems to support his idea, but—as other team members point out—such an image would have no three-dimensional qualities. Moreover, the image shows details in the face where a cloth would not have touched.

Likely Explanation Inexplicable

What, then, is left to explain the image? On this point the findings from various instruments suggest that the image is like faint scorch. Indeed, the image shows up in the tests in much the same way as the lightly burned portions of the areas damaged in the 16th-century fire.

Unlike pigments, scorch would have gone through that fire without changing color. Also, scorch could have been subjected to water without fading or running.

What scorching mechanism could have produced the delicate image we see on the shroud is still undetermined.

One curious sidelight of the scorch hypothesis emerges from the research of Ray Rogers and an associate, Diane Soran. Combing books for leads, they found a reference by the Roman historian Pliny to the use of a substance called *struthion* for washing and softening fabrics. *Struthion* was the classical name for a soapwort, *Saponaria*

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officinalis. Some of the sources indicate that weavers used starch to coat warp threads to stiffen them and then washed out the fabric with saponaria when it was completed.

Diane Soran procured linen samples similar to the shroud material, washed some in saponaria and some without, and then briefly applied heat. The saponaria-treated swatches scorched much more rapidly and deeply than the untreated samples. Thus, if the shroud had ever been washed with saponaria, it would have been rendered quite susceptible to scorching.

Saponaria proves of interest in another way. It is toxic to lower forms of life and is a fungicide. That, perhaps, could explain why the shroud shows no obvious mold or mildew despite having been kept for long periods in damp and musty churches.

Questions Many, Answers Few

Is the "blood" really blood? It has long been clear that the "blood" stains and the image are quite different. Secondo Pia discovered this fact when he looked at his negative plates. The "blood" areas showed white on the negative, proving that those stains on the shroud are positive, while the body image, as we have seen, is negative.

The scientific team at Turin found another significant difference between the "blood" and the image. When they loosened the backing cloth, they saw that a viscous liquid in the "blood" areas had penetrated all the way through the linen. Yet the body image is invisible from the back. Obviously the two areas were produced in some completely different way.

No test so far decrees that the "blood" is not blood. On the other hand, a number of tests suggest that it could be. The stains under X-ray and ultraviolet radiation respond very much as does blood. In addition, the X-ray tests show the correct percentage of iron for blood.

Finally, Dr. John Heller of the New England Institute has found in the debris on the tapes a tiny crystal that he considers to be a form of hemoglobin much altered by age. He believes the crystal is blood. Other team members are divided on the question and await further tests.

How old is the shroud? This most obvious question of all has not been touched. Radiocarbon dating would determine the age of the fabric, but it has not so far been permitted. Some material has to be destroyed in radiocarbon testing, and the authorities have feared it would require too much of the shroud.

A new technique, however, now meets that objection. It is a fast, highly accurate method involving an accelerator used as a mass spectrometer, and it requires only a smidgen of material.

Dr. Harry Gove of the University of Rochester says that with one square centimeter (the size of the tip of your little finger) he can provide an age conservatively accurate within 150 years. Even after purifying the material and ridding it of all contamination, enough carbon would be left to repeat the test several times.

Indications from Turin now lead to the belief that Turin's archbishop will eventually give permission for carbon dating.

Even if all tests should say that the shroud is truly ancient, that it dates from the first century A.D., mysteries would still intrigue us. How is the three-dimension information encoded in the image? If the image is scorch, how was it produced? Have the scientists considered all the techniques by which a forger could have done the work? Could a vehicle for an iron oxide pigment have aged and caused the yellow fibrils?

Above all would remain the question: *Is it the shroud of Christ Himself?* That, say both scientists and theologians, will remain forever outside the bounds of proof. □

A positive image on a photographic negative? Light and dark areas now appear where the eye expects them, and the man of the shroud becomes astonishingly lifelike. When the first photograph of the shroud revealed this phenomenon in 1898, it triggered an interest that has not abated. But the genesis of the image remains unknown. As more questions are answered, more arise.

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Heart of the Canadian Rockies

By ELIZABETH A. MOIZE
ASSISTANT EDITOR

Photographs by JIM BRANDENBURG

THE SONG that awakened me carried an incredible sense of mournfulness. It seemed to be the prolonged cry of a lone animal calling in the night. Then, as I listened, I realized that it was not one voice but a chorus, with each member picking up the song of another so perfectly that they sounded as one. An ululation, low and eerie.

Wolves! A wolf pack serenading. Serenading what? Each other? The star-spattered sky? The peaks that guard their valley home? As I lay huddled in my sleeping bag, the tent walls suddenly seemed scant shelter. Here, in a remote valley tucked into the northern reaches of Canada's Jasper National Park, the sound spoke of their belonging, of my intrusion.

This, I thought, is what lures a city dweller to the wilderness. That feeling of wonder, of vulnerability, some primal yearning to touch nature at its source; to see, to hear creatures in their element; to try in some way to make it your own.

Summer's tide of life brings poppies to Bow Pass (right) in Banff, Canada's oldest national park. The Ice Age reigns where the Columbia Glacier (overleaf) spills out of the Rocky Mountains' largest ice field in neighboring Jasper Park.







Of the wilderness regions in North America, few match the Canadian Rockies in grandeur. Two parks dominate the area: Jasper, largest preserve in the Rocky Mountains, and neighboring Banff, Canada's oldest park. Together they comprise 6,764 square miles of peaks, valleys, glaciers, and green-blue lakes (map, page 762). Here lie the jewel of Lake Louise, the sprawling Columbia Icefield, and the brawling Athabasca River. Here roam bear, elk, mountain goat, bighorn sheep, moose, caribou, wolf—and nine million visitors a year.

At the town of Banff one July Sunday it seemed as if all nine million were crowded onto the main street. Only eighty miles from Calgary, Banff gets the bulk of visitation in the two parks—seven million.

"Not all of those are bona fide visitors," explained Assistant Park Superintendent Tom Ross. "Since the Trans-Canada Highway passes through the park, probably 50 percent of those counted are just driving through toward Vancouver."

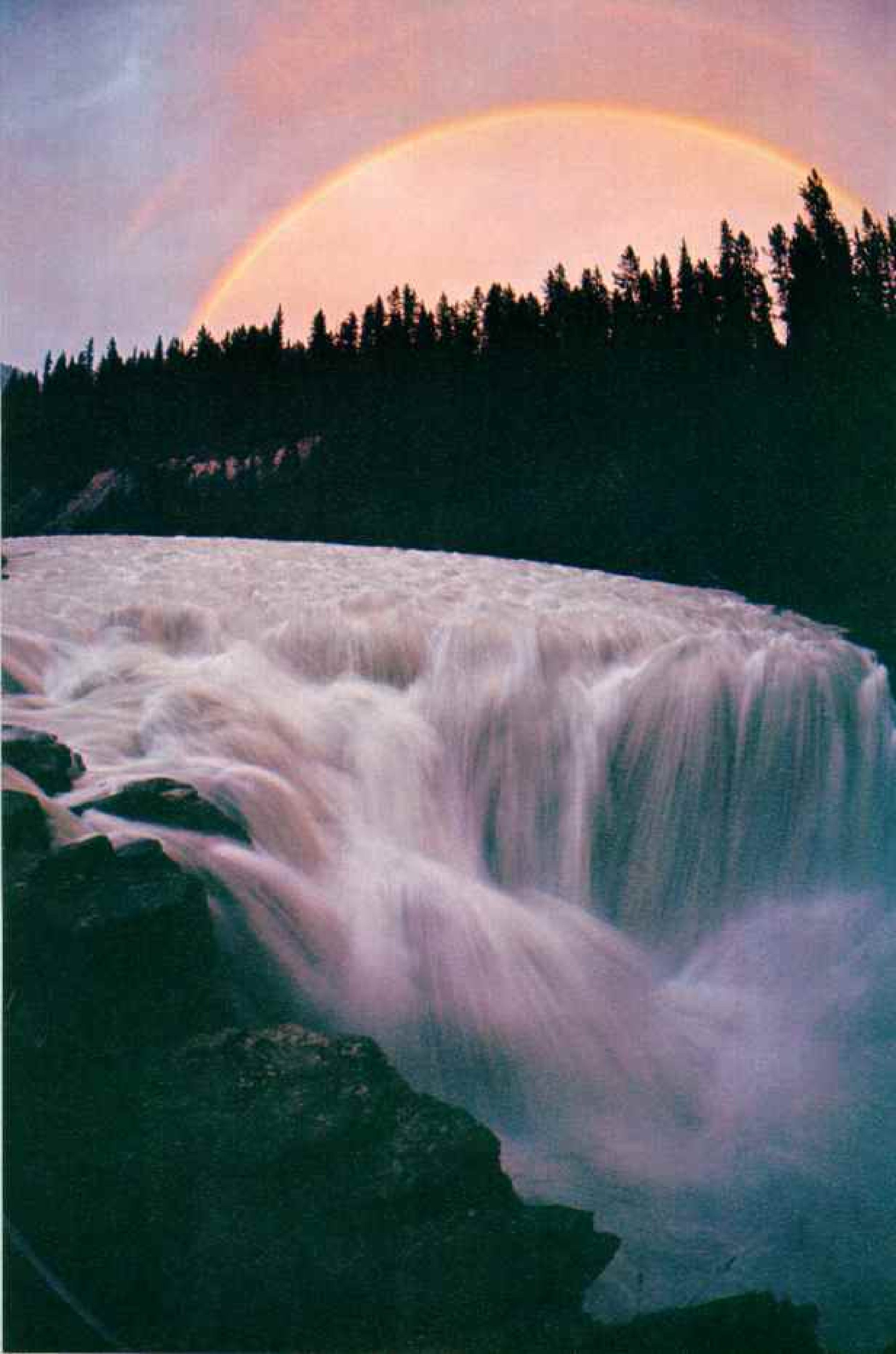
Towns Feel Crush of Park Crowds

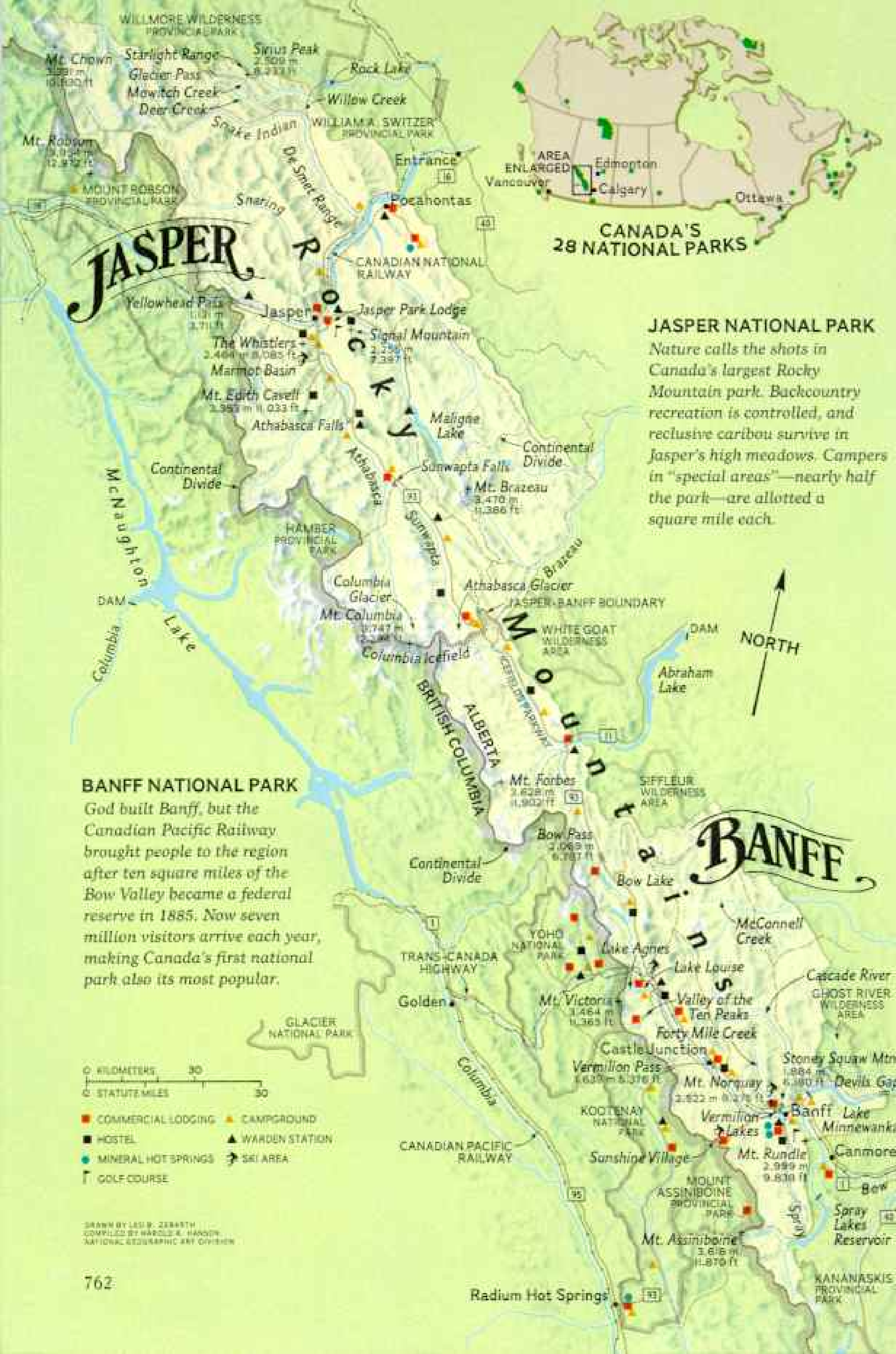
Just as Jasper and Banff share common glories, so they share common griefs. Major highways, for example. When overcrowding hits, particularly on holiday weekends, there is no way to close off the parks. The townsites themselves are another problem. Each has a population of 3,500 to 4,000. Jasper is made up of park personnel, tourist-services staff, and railroaders—the town is a divisional point for Canadian National Railway crews.

Banff's population is all park and tourist staffs. Motels, restaurants, bars and discotheques, souvenir shops, clothing stores, gasoline stations, mountaineering and ski shops—Banff has them all.

How to provide adequate services without infringing more on the wilderness has long been a bone of contention between the

Born in silence out of meltwater channels (left) on the Athabasca Glacier, the Sunwapta River roars over rainbow-haloed Sunwapta Falls (right). From the Columbia Icefield atop the Continental Divide, waters reach the Atlantic, Pacific, and Arctic Oceans.





CANADA'S 28 NATIONAL PARKS

JASPER NATIONAL PARK
Nature calls the shots in Canada's largest Rocky Mountain park. Backcountry recreation is controlled, and reclusive caribou survive in Jasper's high meadows. Campers in "special areas"—nearly half the park—are allotted a square mile each.

BANFF NATIONAL PARK

God built Banff, but the Canadian Pacific Railway brought people to the region after ten square miles of the Bow Valley became a federal reserve in 1885. Now seven million visitors arrive each year, making Canada's first national park also its most popular.



- COMMERCIAL LODGING
- HOSTEL
- MINERAL HOT SPRINGS
- ⌄ GOLF COURSE
- ▲ CAMPGROUND
- ▲ WARDEN STATION
- ➔ SKI AREA

DRAWN BY LESLIE ZIEGLER
 COMPILED BY HAROLD E. HANSON
 NATIONAL GEOGRAPHIC ART DIVISION

residents and business people and the park service. New park policy calls for firm municipal boundaries to be legislated for the townsites and the four ski areas, three in Banff and one in Jasper. Parks Canada now provides all public services: roads, sewers, sidewalks, electric and telephone lines.

Why is there an actual town in Banff? For the same reason there is a park here at all—the transcontinental railroad that knitted together the Canadian confederation.

The great mountain chain springs abruptly from Alberta's prairies. Slate gray, it dams the western horizon, a huge, thrusting mass of rock and snow, seemingly impenetrable. It was the search for breaches through the barrier that brought white men to the heart of the Canadian Rockies, first fur traders, later railroad builders.

Hot Tourist Attraction Discovered

In 1883 two railroad construction workers turned prospectors discovered a cave and basin containing warm, sulfurous springs in present-day Banff. As workmen came to soak in the springs, entrepreneurs saw the commercial possibilities. The federal government set aside ten square miles, including the springs, which in 1885 became the beginning of the Canadian park system.

William Cornelius Van Horne, president of the Canadian Pacific Railway, realized the potential of the region: "We can't export the scenery—we'll import the tourists!" And so he built the great hotels that would lure European aristocracy and American magnates to the growing parklands.

The Banff Springs Hotel—built, enlarged, burned, and rebuilt finally in 1928—looms in Scottish-baronial-French-château splendor above the confluence of the Bow and Spray Rivers. Here in the golden days of Van Horne's dream came the rich and the powerful, many bringing steamer trunks and servants for the entire summer's stay.

Nowadays formal wear is no longer mandatory, but graciousness still prevails in the Alhambra Room as Irish harpist Jacqueline Dolan serenades the diners. Her rendition of a Japanese folk song brought polite applause from the many visitors from the Orient. "People ask me if the hotel staff is bilingual," said Audrey de Baghy of the hotel staff. "I tell them yes—English and Japanese."

Pat Brewster remembers the old days. Born in Banff in 1896, he grew up with the park. Like five older brothers, he started in early to take the adventurous out to fish and to hike the wilderness.

"The first trip I ever made was to the Spray Lakes," Pat recalled as we sat in the parlor of the log cabin where he is busy writing his memoirs. "We took a fellow whose name you may have run across—Lincoln Ellsworth, the first man to make both a trans-Arctic and a trans-Antarctic flight."

The Brewsters became official guides and outfitters to the Banff Springs Hotel, a venture that grew into the largest transportation company in the Canadian Rockies.

"I remember one trip where we had 23 packhorses, and that was just for two people," Pat told me. "One was an American diplomat, and he had gotten into the claws of Abercrombie and Fitch."

Then Pat's eyes, though almost blind, twinkled from beneath his thick, black brows. "I'll tell you something that will surprise you. I have traveled through a lot of hard country, and if I had to do it again, I would take women in preference to men any day. When you're going over a high pass and the wind is blowing and the snow is up to your horse's knees, men will holler like hell, but women seldom say anything. They can take discomfort far better than a man."

I got the feeling that if the body were willing, he'd be out there again.

Officials estimate that only one percent of today's park visitors make use of Banff's 800 miles of backcountry trails. Seeing to their safety and rescuing them when in trouble falls to the wardens.

"Most visitors are pretty good," warden Paul Kutzer told me, "but an occasional group gets lost, or inexperienced mountain climbers get stuck. Fortunately we've had no fatalities yet this year."

Unauthorized vehicles were the concern of warden Dave Cardinal when he invited me along to put new boundary signs on the east end of the park near Lake Minnewanka. There had been reports of motorbikers creating a racecourse and doing "doughnuts"—spinning 360 degrees—on the sandy outwash of the lake.

With map in hand, Dave was finally able to determine the boundary at Devils Gap.



BIGHORN MOOCHER looks for handouts where the Trans-Canada Highway crosses traditional sheep range. Illegal feeding of wildlife lures animals onto park roads – sometimes to their deaths.



Constant travel over a dry, rock-strewn stream bed earmarked the culprits' trail, so we installed signs where they couldn't possibly be missed. I held the steel stakes while Dave pounded them in with a sledgehammer, each blow ringing through my arms. While we were installing a third marker about fifty yards away, a blue-and-white four-wheel-drive vehicle drove blithely between the signs and into the park, despite Dave's piercing whistle.

"We'll go find them," he said. But a valiant driving effort over more than a mile of hazardous rocky terrain was finally thwarted by hub-deep sand. "We'll have to keep tighter tabs on the area."

Catching four-footed intruders proved more successful as Dave and I checked traps at the town dump one evening. Despite fences and immediate landfill over each day's garbage, bears find their way to the food. And once they become used to garbage, they will seek it in campgrounds, posing a danger to humans.

One trap was empty; the door on another had been tripped. Dave approached cautiously; I bravely watched from the cab of the truck. If anything was in there, it was mighty quiet—but the bait was quite evident, a ripe haunch from a road-killed deer. A flashlight beamed through the door's steel mesh finally revealed a shaggy head.

"Grizzly," Dave reported, as he carefully hooked the trap to the pickup's trailer hitch.

"We like to catch them the first night, so they don't get conditioned to the garbage," Dave told me as we hauled the trap back to the wardens' compound. "So far this year we have moved eight grizzlies and thirty black bears, and we haven't had any repeats yet."

His remark must have been a jinx. The next day wardens Monte Rose and Terry Skjonsberg carefully tranquilized, measured, and weighed the bear. A tattooed lip disclosed that this was a sow they had captured and helicoptered fifty miles into deep backcountry only two weeks before.

Jim Davies, Banff's helicopter pilot *extraordinaire*, agreed to let me join the bear's second flight into exile. With the animal slung in a net beneath, we flew up Forty Mile Creek. Isolated rainsqualls danced amid the peaks. Beyond the broad valley of the Cascade River we skimmed between

ridges and passed over precipices sheer enough to stop the heart of an acrophile.

Reaching the headwaters of McConnell Creek, some sixty miles from town, Jim gently settled the chopper into a meadow watered by an ice blue tarn. To our surprise, when he released the cargo net, the bear had come to. She lumbered off, staggering a couple of times from residual effects of the drug.

"Hope she doesn't come back." Monte didn't sound hopeful. "Her teeth are shot, so I don't know if we'll fly her a third time."

Bad teeth mean difficulty foraging for natural food—and a bad disposition. I knew Monte meant she would have to be destroyed. The year before, Jasper wardens had to kill a 700-pound giant that, after months of only raiding garbage bins, had begun to harass campers. An autopsy revealed a park brochure and plastic bag in the grizzly's stomach.

Protected, Mountain Creatures Abound

Wildlife of a more peaceful sort populates the Bow River's marshy floodplain on the outskirts of Banff. The scores of subalpine and alpine lakes in the region are relatively barren of plant and animal life, but both are abundant around the Vermilion Lakes.

Early one morning park naturalist Heather Plewes and I put a canoe into the lakes, despite some mild complaining by a red-necked grebe that obviously had a nest nearby. Within a few strokes of our paddles, an osprey and her young nested contentedly atop a snag. Before long a muskrat came gliding by, heading toward her home of reeds and mud, where one of her gray young was grooming itself in the sun. In a grove of spruce a bald eagle kept lookout from the tallest tree, its years-old nest hidden from all but the sharpest eye. Delicate white-water crowfoot, buttercup-yellow bladderwort, and pink, hyacinth-like smartweed blossomed in quiet coves.

That evening beside Vermilion Lakes Drive I watched a beaver chop down a two-inch-thick aspen, drag it across the road through a gantlet of camera-snapping tourists, and ferry it to its lodge.

This wealth of wildlife lives in apparent serenity within yards of the Trans-Canada Highway and its constant flow of roaring traffic. But plans to make the route a dual

four-lane highway pose a threat to the ecologically fragile Vermilion Lakes.

On a hot July day I joined the cars, trucks, and campers headed toward Lake Louise, 36 miles northwest of Banff. An extended dry period had sent the wardens' fire-hazard chart into the red danger range, and haze from forest fires in northern Alberta dimmed the usually clear vistas.

At Castle Junction, named for the massive castellated mountain that dominates the east side of the Bow Valley, I turned west toward Vermilion Pass and the boundary between Banff and Kootenay National Parks. Here an army of silvering tree trunks files across the mountain flanks—gaunt reminders of the 1968 fire that swept through more than 6,000 acres.

But nature heals quickly, and a carpet of lavender fireweed spread beneath the snags. Lodgepole pines had grown to five feet, and chipmunks and golden-mantled ground squirrels skittered along the deadfall. This resurgence of life gave vivid testimony to the naturalists' view that, in the wild, fire is neither good nor bad.

It seemed ten degrees cooler when I reached Lake Louise. The mile-high lake, snuggled between the mountains, riffled as a light breeze blew off the backdrop of Mount Victoria and its glacier.

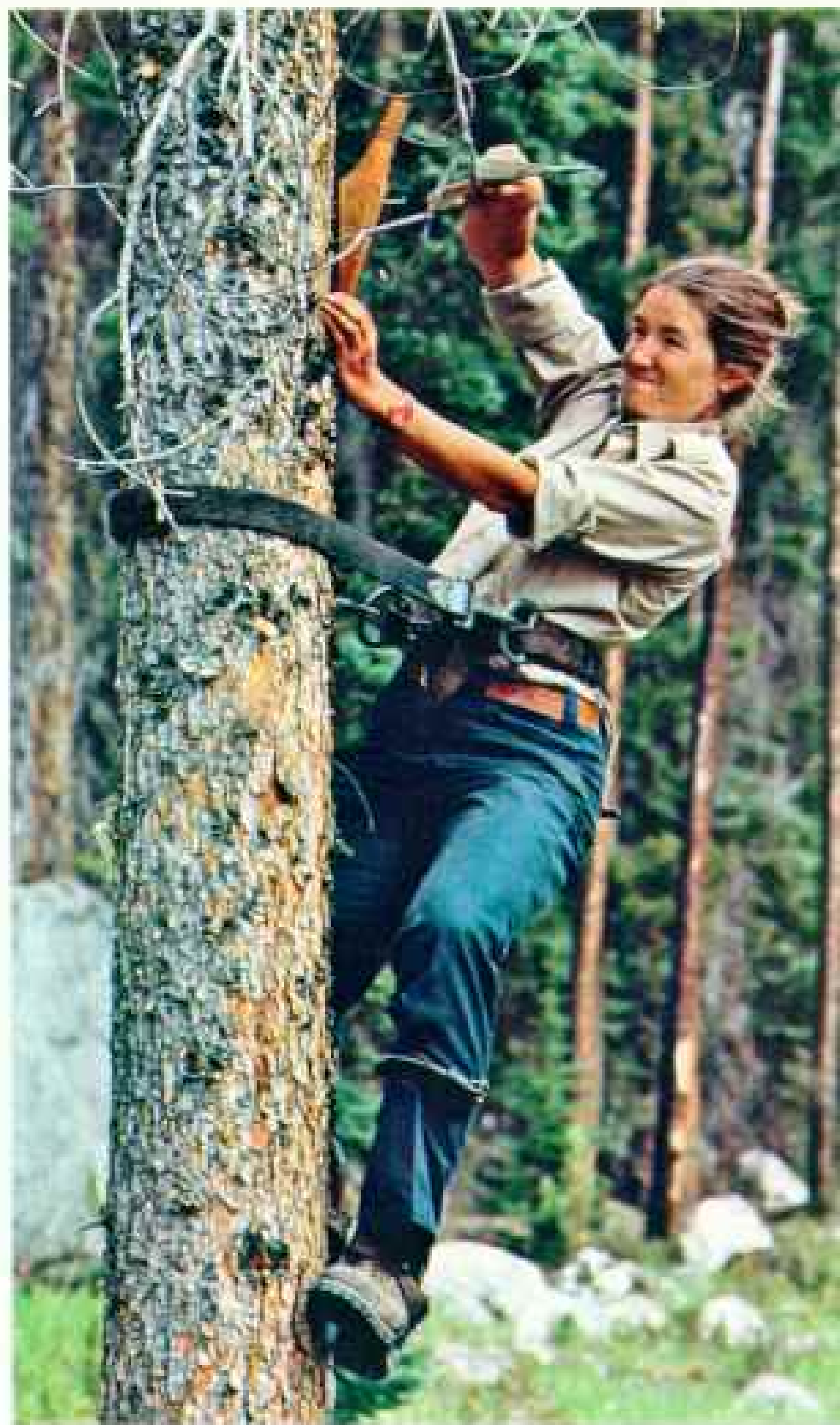
Tom Wilson, an early guide in the region, claimed to be the first white man to see Lake Louise, in 1882. "As God is my judge," he later wrote, "I never in all my explorations saw such a matchless scene," approbation I heard repeated by fellow early risers who witnessed the first flush of the sun striking Mount Victoria and the shifting hues repeated in the lake's early morning calm.

Early morning and late afternoon are the times to enjoy the lakeshore and grounds of Chateau Lake Louise, the other celebrated Canadian Pacific hotel in Banff Park. For the rest of the day the hills are alive with the sounds of tourists—some 10,000 a day, not counting hotel guests. Many make the two-mile, thousand-foot climb up to Lake Agnes, among the most popular hikes in the two mountain parks.

The Chateau conveys a sense of comfortable, if well-worn, elegance. "We are in the process of restoration and refurbishing," explained Michael Broadhurst, the hotel's

affable young manager. The lawn sparkled emerald green and the flower beds blazed with the hotel's traditional poppies.

Just beyond Lake Louise, where the Trans-Canada bends westward, begins the Icefields Parkway that connects Banff to Jasper in the north. For 143 miles it slices through the heart of the mountains, whose twisted faces give clues to the vast, shallow sea that once spread across the region. Pressures from the west 150 million years ago,



Among the lucky few chosen from thousands of applicants for summer work, Jasper seasonal warden Jean Stoner climbs a living pole to repair wires for the hand-cranked telephones that link some warden cabins.



ENTRANCE
GENERAL ~ STORE

probably caused by the coming together of the American plate with the denser Pacific plate, uplifted the land, which broke along great fault lines. Compression forced the rock to fold and buckle and huge sheets to slide over one another.

The largest ice field in the Rockies—the Columbia—spans the Banff-Jasper border. Runoff from the 87-square-mile blanket pours into three oceans: the Pacific, the Arctic, and the Atlantic. A tongue of the ice field, the Athabasca Glacier tumbles inexorably from the mountain heights to sprawl only a mile from the parkway.

Glacier Shrinks Lake Volume

A Montrealer who came to ski in Jasper and can't bring himself to leave, Peter Lemieux of the Icefields Visitors Centre took me to the toe of the glacier, a great cracked slope of ice that spills streams of water from its base to a small lake nearby.

"The milky color of the water is caused by rock flour that is scoured from the bedrock by the ice," Peter explained. "Almost 400 metric tons of debris are dumped in the lake every day. Someday it'll be all filled up."

More than 200 inches of snow fall on the ice field each year. The accumulation—now 2,500 feet—and weight cause the movement of the ice that creates the glacier. Here at the toe we were looking at snow that fell on the ice field 150 years ago.

Some 130,000 visitors a year take a snowmobile tour on the glacier. Joining a group from Oklahoma, I climbed on a vehicle that resembled a bus equipped with giant tanklike treads. We rumbled over the ice, skirting pressure ridges and blue-walled crevasses that plunge 150 feet. Where the snowbus stopped to allow us to walk on the glacier, the ice was nearly a thousand feet thick. Most of the busload had brought paper cups to sample the glass-clear surface melt, so pure that it had virtually no taste.

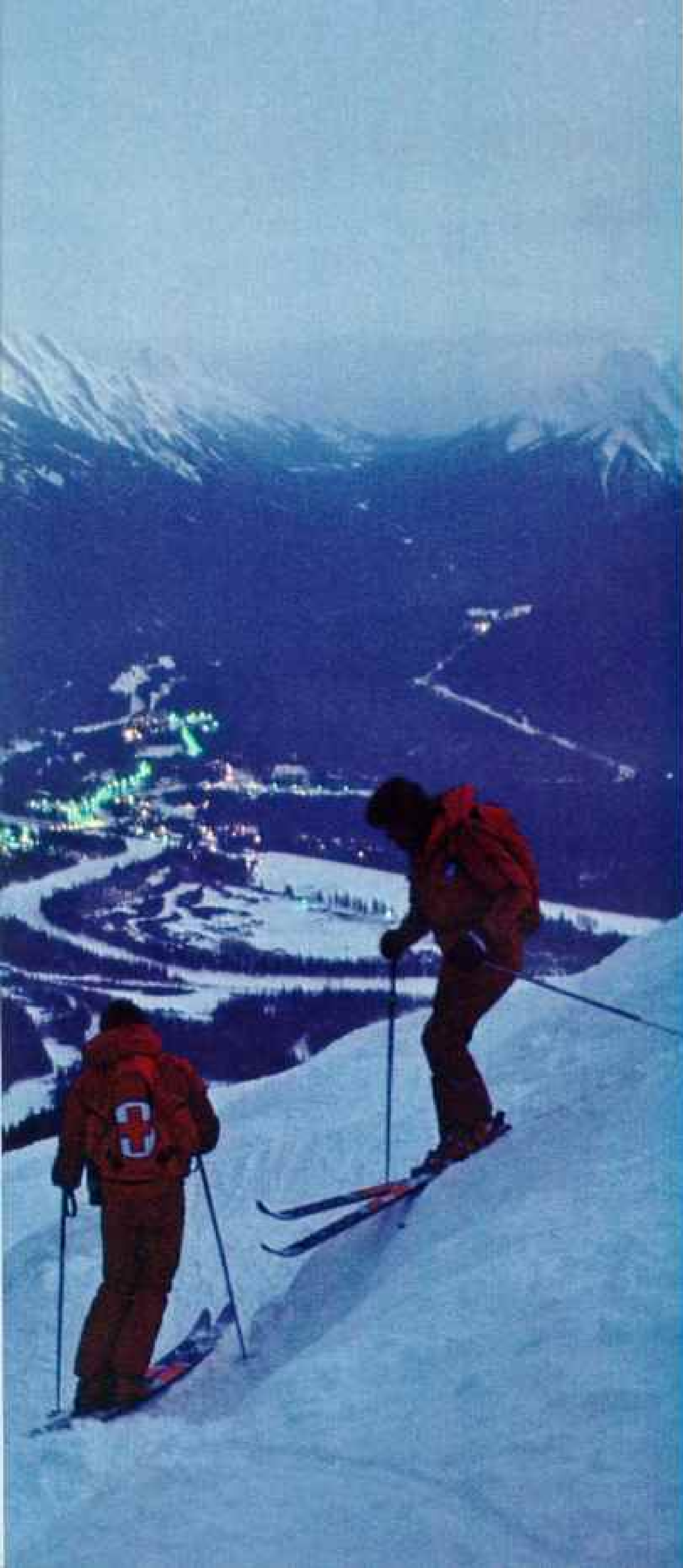
The mighty Athabasca River, born of the Columbia Glacier, is full grown when it swings through the town of Jasper with its tidy homes, businesses, and the elegant log chalets of the Jasper Park Lodge—the Canadian National Railway's answer to the Banff Springs Hotel. From the banks of the river outside my cabin on the edge of town, I often watched the cloud shadows play



To live off the land in traditional fashion, a small band of Indians, mostly Cree, moved to a remote site near Jasper's border in the mid-1960s. Shunning non-Indian ways, they hunt for grouse (above) and other food.

Only a few miles from Jasper's east gate, but off the main highway, the general store in Entrance, Alberta, (facing page) still sells gasoline from vintage gravity pumps.



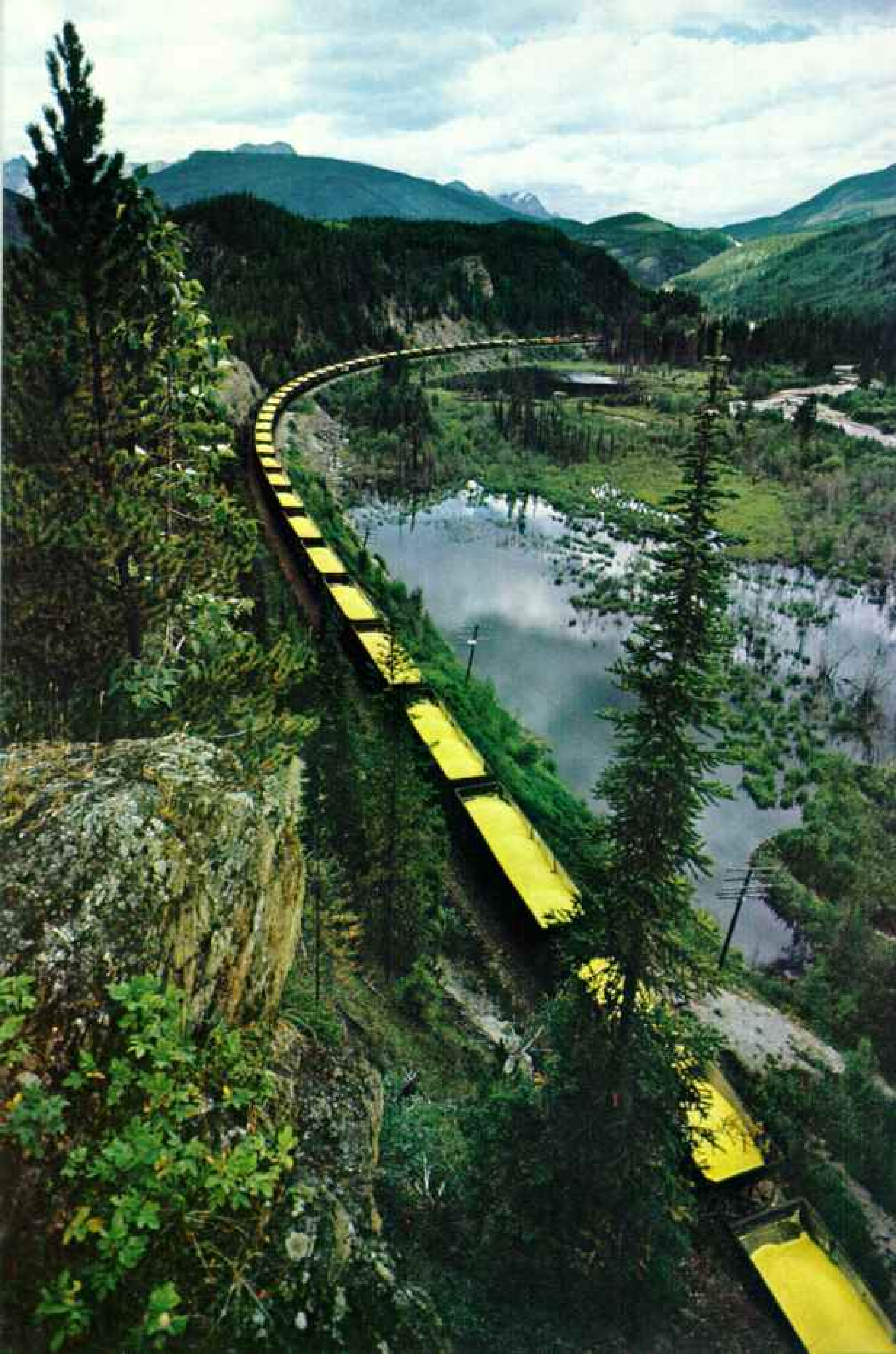


Last sweep for the day brings members of the Mount Norquay ski patrol to the heights above the town of Banff, whose lights spangle the Bow Valley floor.

Beyond rises the sheer flank of Mount Rundle, named for a Methodist missionary who was one of the first white men to visit the region.

The Lone Pine ski run on Mount Norquay, with a consistent pitch of 37 to 38 degrees, is among the steepest in the park. Both Sunshine Village and Lake Louise, Banff's other ski areas, offer runs longer than four miles.

Skiers, both downhill and crosscountry enthusiasts, keep Banff townsite bustling in winter. But the crowds do not compare to the crush of summer when thousands of shoppers and sightseers daily meander Banff Avenue, the town's main street.



hopscotch with the sun across the peaks of Edith Cavell, The Whistlers, and Signal Mountain. Animals were always in evidence, a testament to Jasper's less crowded condition. In late evening mule deer could often be seen browsing on willows and buffalo berries on an island across the way. One morning just outside my door a huge bull elk was munching a breakfast of sweet clover.

Animal jams are a common occurrence throughout the region. Small groups of bighorn ewes and lambs bring traffic to a standstill at Jasper's east gate and down by the ice fields. One day in a meadow across from Bow Lake, I watched a dozen foolish photographers surround a bull moose.

As in parks throughout the world, the feeding of wildlife is forbidden—and the law is just as often ignored. "People feed those bighorns potato chips, cheese, bread, anything," a warden told me. "Not only is it not good for them, but it keeps them right on the road where they can easily be struck by one of those large trucks that use the through highway from Edmonton to Vancouver."

The road kill last year in the two parks was 200, mostly elk and sheep.

Crowd Growth Outstrips Staff Size

Lack of manpower makes it impossible for the warden staff to enforce the anti-feeding law. And lack of funds dictates manpower. Jasper's chief warden, Don Dumpleton, complained that he was operating with 32 wardens, the same manpower that the park had in 1967, while the number of visitors had risen from 300,000 to 2,000,000.

As Roger Wilson, the assistant park superintendent, explained it: "We're already stretched to the limit; now we are beginning to vibrate."

Like Banff, the Jasper park bears the expense of maintaining a townsite. "We don't want the town to grow uncontrolled," explained its manager, Stan Wright. "That's why we have a need-to-reside rule; you can

Bound for the distant Pacific, carloads of sulfur cross Jasper's Yellowhead Pass (left). On a steeper grade a gondola lift was built last summer (right) to carry skiers at Banff's Sunshine Village.



live here only by reason of employment.”

Park problems seemed far away one sunny afternoon as I pitted my fishing skills against the feisty cutthroat trout that lurk in the deep pools of Mowitch Creek (pronounced “crick” by most self-respecting Albertans). I managed to pull four of the ten-inch torpedoes from the snaking waterway that cuts through meadowland and muskeg in a remote valley called Little Heaven.

Nine days earlier, photographer Dean Conger, his wife, Lee, their 15-year-old son, Chris, Carole Jones, a friend of mine, and I had joined a horse pack trip heading into Jasper's north boundary area. Our guide was Jim Simpson, one of the last of the traditional outfitters. Jim—wiry and tough as a

mountain goat—has been busting horses, guiding hunters and wilderness buffs, and occasionally rodeoing for years.

We had met at Jim's corral at Rock Lake just outside the park boundary on a cool, cloudy August morning. Jim and his crew saddled and packed the 21 horses. Watching a champion packer at work is a wonderment. Hefting panniers and pack boxes filled with food, duffel bags full of clothes, tents, stoves, and miscellaneous equipment, Jim selected parcels of equal weight to lash onto either side of the pack saddles. Then, quicker than a dude's eye could follow, the tarpaulin-covered mounds were snugged with the packer's ultimate weapon—the intricately tied diamond hitch.



Saturday's parade heads west on the Trans-Canada Highway in Banff (right). Frequent traffic jams have prompted plans to widen the vital national artery. A cross-country skier dons wheels (above) to keep in training during summer months.



When all was loaded, Jim told us to hold our horses while the fractious pack animals moved out. As they galloped away, the rest of us filed in behind—only to have all tarnation break loose within seconds. Something spooked one of the horses and they erupted everywhere. I had barely pulled my pinto off the trail when one of the packhorses came bucking past, her panniers gone, tarp flying, and cooking pots scattering in all directions. As Jim came thundering in pursuit, I hollered, “What happened?”

“Had a wreck,” came the reply.

That was the first, but certainly not the last time we heard that phrase. “Having a wreck” was anything that went wrong, but the ultimate was a spooked pack animal.

The rest of us rode ahead, led by cook Ann Simpson and her assistant, Alyx Nemeth, while the crew rounded up the pack string and caught up. Four hours in the saddle through hundred-foot-tall spruce forests hung with moss, and across flatlands thick with willow, buffalo berry, and cinquefoil, brought us to a campsite at Willow Creek. Shucked of their saddles, the horses eased their muscles with a roll on the ground. I wasn't sure my own would ever be the same.

Rain dogged us on the ride in and plagued us the entire trip. Rain gear became almost permanent apparel as we fished, hiked, and rode the surrounding countryside for four days. Jim had hoped there would be ample wildlife for us to see.

775





Chill pick-me-up refreshes a hiker in the Valley of the Ten Peaks (above) south of Lake Louise. Only a handful of visitors strike out into the backcountry in either park, and

ironically, the author notes, "An automobile driver is more likely to see wildlife, because backcountry animals are more wary of humans."

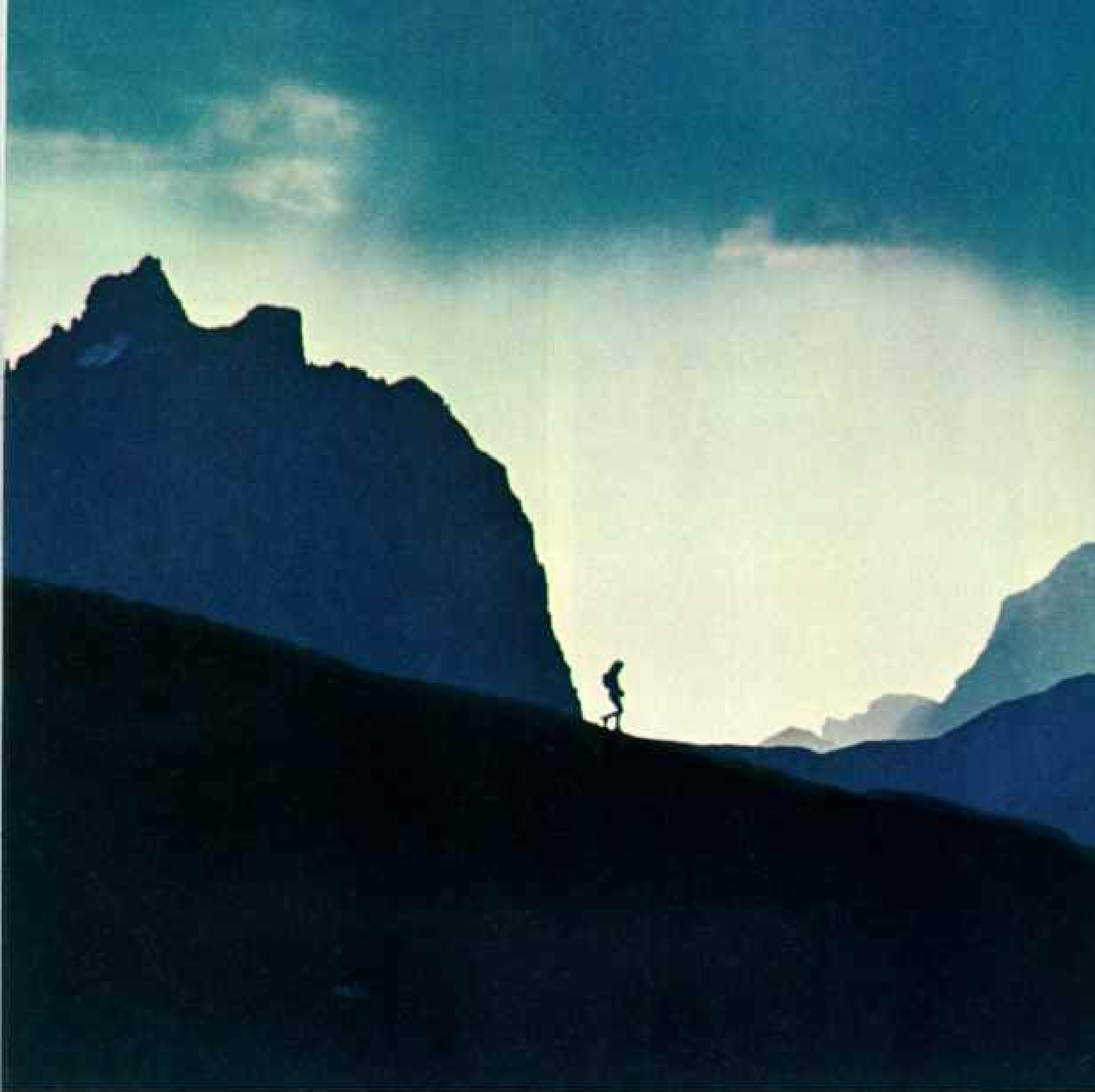
Ospreys are few in the parks, but this



NATIONAL GEOGRAPHIC PHOTOGRAPHER DEAN CORNER (ABOVE)

pair (top left) nests by the Athabasca River near Jasper's main road. A moose (above) grazes on bottom plants in Maligne Lake, where tourists ride sight-seeing boats. Mountain goats (top

right) haunt the highest mountainsides, yet often visit mineral licks beside the highways. Wolves and caribou, least in numbers of the parks' large mammals, are also the rarest roadside visitors.



With peaks for companions, a solitary hiker in Jasper savors the

"With this rain, they're not moving around," he complained. "And there's too much wolf sign."

One day the men had seen a wolf and found a den dug in a timbered hillside about three miles from camp. Alyx, Carole, and I hiked over one afternoon, finding the site above a meadow marked by bleached elk and moose bones and grass flattened by resting animals. The look of an arena invoked visions of the wolf conclave from Rudyard Kipling's *Jungle Books*, a vision that was to return the night we heard the wolves howl.

It was a long, rain-wet 12 miles to Little Heaven, a campground tucked in the evergreens overlooking Mowitch Creek and the Starlight Range beyond. As the clouds broke for late evening, we brought out binoculars and Jim's spotting scope to watch a lone caribou on Sirius Peak and some mountain goats that grazed above the timberline behind us.

On a rare day of sunshine Lee Conger and I determined to try to get a close look at those goats. It was an exhausting lesson in geographic perception. It's easy enough to plan a route when sitting back and looking at a



mountain parks' greatest gift—a chance to talk to the wilderness one on one.

mountain; it's another to follow it when you're deep in timber.

When we finally breached the timberline, we found that what looked like a gentle slope from camp was more like 45 degrees. Climbing through stunted willow and scrambling across scree slopes, we were finally defeated by a rock wall that barred the way to the goats' meadow. But the 2,000-foot climb was worth it for the panorama that spread beyond us—Deer Creek Valley, home of the wolves, the Snake Indian River glinting silver in the distance, and the peaks of the

De Smet Range, dusted with a recent snow.

Two more days of rain, including a sodden ride to Glacier Pass in hopes of seeing bighorn rams, and it was time to head back to civilization.

I'd take that trip, or any like it, tomorrow—rain and all. Someday in the future I may once more drive the Icefields Parkway, or hike up Banff's Stoney Squaw Mountain and watch a snowshoe hare at lunch, or listen to music ringing across Lake Louise.

But will I ever again hear the cry of the wolves? □



By GRIFFIN SMITH, JR.

Photographs by
STEPHANIE MAZE

BOOTH PEDRO and Eloisa Soriano were born in America, yet both are very Mexican. They live in Texas, one of four states along the 1,952-mile U. S.-Mexican border—a region where two cultures often clash, cooperate, and merge.

Lifelong residents of San Antonio, Pedro and Eloisa raised 17 children there. Part of the clan, which includes forty grandchildren, gathers in the Soriano backyard (above). An equally important family meeting place is half a block away at St. Timothy



Catholic Church, which Pedro helped build and where Eloisa is employed.

The church, the Spanish language, and a rich Hispanic heritage unite Mexican Americans, a people who are growing—in numbers, in pride, and in power.

THE MEXICAN AMERICANS

A People on the Move

IN HOUSTON, back in 1973, Ninfa Lorenzo put ten tables in her failing tortilla shop and began serving *tacos al carbón* and other “real, first-class Mexican food, not Tex-Mex.” Today she rings up sales of more than ten million dollars a year. A widow, gracious and self-assured, she showed me about the grand dining room of her newest restaurant. “People became aware of our culture and our food,” she said. It’s the in thing to be Chicano.

Among the 7.3 million Mexican Americans are a number whose success ranks with Ninfa’s—Tony Sanchez of Laredo, for example, who struck it rich in petroleum leases. And there are other achievers like Bernie Hernandez of San Diego and Al Juárez of Los Angeles, who in the white-collar professional world have built comfortable livings far beyond their childhood dreams. There are those, too, like Rocendo Hernandez, a farm worker, whose life follows the harvests, and George, just George, who spent his boyhood in the endless gang warfare of the barrio and, when I met him, was soon to die, by the gun, at 16.

And finally, there are the border crossers, who dash across from Mexico for work, for a better life, perhaps hoping someday to become Mexican Americans themselves.

Mexican Americans are as diverse as America. Their median family income is \$12,570 a year—well under the national average of \$17,640—and about 20 percent fall below the government-drawn poverty line. Most live in cities instead of on farms, as commonly thought. On the whole they



Bold Aztec totems stand as testaments to community determination in the San Diego barrio. The property beneath the bridge had been designated for a new



highway-patrol station. But residents had more aesthetic ideas, fought city hall and the statehouse, and won. Now the 7.9-acre site is Chicano Park.



come from larger families and have higher birthrates and less education than Caucasians or blacks.

Although nine out of ten Mexican Americans live in the four southwestern border states, regional differences there are vivid. Texas sustains a deeper, older, more homogeneous Mexican-American culture than California. In Arizona the Indian presence is strongly felt; tribes like the mysterious Yaqui exist on the periphery of Mexican-American life. In New Mexico a growing

Chicano consciousness is making inroads even among the aloof descendants of Spanish colonial settlers who have preserved a separate existence for centuries in the mountains north of Santa Fe.

Too little known, Mexican Americans also are too often misunderstood. But that is changing. In a decade they have become a phenomenon to be reckoned with. As their numbers swell and their ethnic awareness grows, they are transforming much of the U. S. Southwest into Mexico U.S.A.

TEXAS-SIZE portrait showcases the interests of successful businessman Antonio Sanchez of Laredo (left). Sanchez has banking and petroleum holdings and publishes the Laredo News, largest bilingual Mexican-American-owned daily newspaper in the U. S.

Bending an ear to an old friend, Representative Henry B. Gonzalez of San Antonio (right)—one of only four Mexican Americans in the U. S. Congress—jots notes while talking with labor consultant Henry Muñoz, Jr.

Saffron from Spain is but one touch that helps Ninfa Laurenzo (below) create dishes



a cut above standard Tex-Mex fare. Starting with a small Houston tortilla factory, Ninfa now has six restaurants and four more on the way.



Who are the Mexican Americans? During a meandering 7,000-mile journey from Houston to San Jose, I received many answers. Julian Nava of Los Angeles, designated to be U. S. Ambassador to Mexico, put it this way: "A Mexican American is a citizen of the United States whose family originated in Mexico. Beyond that, it's a state of mind."

Carlos Ovando, a California educator, told me this: "The central fact is a feeling of straddling two different worlds. There is a

duality of heritage and experience." To Carlos, Mexican Americans "tend to share a sense of being controlled by external forces, of being on the margin of society as a powerless nether class . . . a symbolic bond of brotherhood forged by suffering and a perception of injustice."

Most Mexican Americans would agree that the Roman Catholic religion, the Spanish language, and a close family life are basic. Some say the Mexican-American family is a sanctuary against the world. It is

undoubtedly a circle of deep affection—within a rigid order. The father is the unchallenged master, the mother is guide and nurturer of the children.

Sometimes that paternal authority can be astonishing. I once listened in amazement as a man considered whether he would permit his 25-year-old daughter, who was about to graduate from law school, to accept a job in a faraway city he disliked.

Pride in Heritage Grows

Mexican Americans are a people in transition. They are concerned not only with upward mobility and economic success, but also with the acceptance of their ancestral language and traditions in an America that has not always received them gladly. They are energetically surveying their distinctive contributions to the nation's life and embarking on a quest for self-definition. The days of being slightly ashamed of things Mexican are past.

In Houston, businessmen like pharmacist Abel Chapa have revived the equestrian traditions of the charros, performing the elaborately costumed and challenging rituals of gentlemen riders. In Tucson, government worker David Herrera, explaining, "I wanted to do something great for God," has brought back echoes of old Spanish religious solemnities with his Good Friday procession and cross raising on a hill outside of town.

In Northridge, almost 2,000 California State University students are enrolled in Chicano courses. In El Paso, a liberal Democrat tells me of his enthusiasm for the

Presidential bid of Ben Fernandez, a Republican who rings the bell of ethnic pride.

In Phoenix, in San Antonio, in Albuquerque, middle-class parents strive to outdo one another in the festive extravagance of their *quinceañeras*, the celebrations for daughters who turn 15 (page 808).

It is all part of the spirit of being Mexican American. For those who had submerged their heritage in order to blend into the larger American society, there is a feeling of joyful rediscovery. As one south Texas community organizer told me simply, "It's safe again to say, 'Hey! I enjoy that stuff.'"

Mexican Americans stand together in their cultural pride. But on almost any other subject—even what they should be called—individuality reigns. Over a cup of coffee in an East Los Angeles café I found myself listening to a Chicano—his own label—school-board candidate discuss this subject.

"There are about ten different terms," he said. "There's Mexican American and Chicano, of course; and there's Latino, and Latin American, and Spanish American, and Mexican. Plus," he continued, tapping one index finger to the other, "there's Spanish surnamed, Hispanic, Mexicano, and brown. There's also La Raza—The Race. That's eleven."

His own name happened to be Vahac Mardirosian, he was a Baptist preacher, and his Armenian parents had immigrated to Mexico. He thus was giving all of us a lesson not only in labels but also in the pitfalls of trying to stereotype the Mexican American. (Continued on page 791)

Nation within a nation



Where one country ends and the other begins is simpler on paper than in reality. Countless border crossings—legal and illegal—blur the line. Four border states hold 90 percent of the 7.3 million Mexican Americans who live in the U. S. legally. Los Angeles County is home to two million, 100,000 of them in East Los Angeles (right, foreground). Estimates of illegal aliens in the U. S., mostly Mexican, range as high as 12 million.





Solidarity spoke with silence as United Farm Workers listened to their leader, Cesar Chavez, eulogize union member Rufino Contreras in Calexico, California.



Slain during a strike against Imperial Valley lettuce growers, Contreras became a martyr of the union that has organized more than 10,000 Mexican-American farm workers.



Which tag comes closest to being right? "That depends," a Houston community leader later told me, "on age, background, and perhaps on the degree of militancy."

When the Treaty of Guadalupe Hidalgo ended the war between Mexico and the United States in 1848, some 75,000 Mexican citizens were living in the vast southwestern area that became United States territory. The American settlers who claimed the plains and deserts all the way to California were joined occasionally by Mexican pioneers like the Madrid family of remote Redford, Texas. They still cherish their land grant signed by the governor of Texas in 1876, issued to Secundino Luján, Lucia Madrid's grandfather. But settlers like the Madrids were the exception until 1910, when revolutionary fervor in Mexico produced a wave of refugees seeking asylum.

In 1924 the number of immigrants rose to 100,000. After World War II far greater numbers came seeking jobs and opportunity. The 1970s experienced a torrent of illegal immigrants that shows no sign of abating.

For Mexican Americans the recent influx has been both a problem and a source of pride. Unlike the much earlier tide of emigrants from many European countries, the new arrivals from Mexico reflected its mestizo heritage: Indian in "blood and soul," Spanish in "language and civilization." And—again unlike those from Europe—they did not separate themselves by an ocean from their old homeland. Mexico was still just across a river or a line in the desert. The proximity of friends and family helped preserve a bond that emigrants from more distant places lost.

Finding a Bit of Mexico

I glimpsed that bond one Sunday morning as I walked toward a red-brick church with San Antonio City Councilman Henry Cisneros. "This parish," he told me, "hasn't changed much in sixty years. What you're seeing is just like a little town in Mexico."

We passed a sidewalk table where three old women were selling plastic bags of *nopales*, slices of cactus pads that make a popular stew. Inside the sanctuary Jesuit Father Edmundo Rodriguez celebrated a Spanish-language Mass, while weathered and wise-looking old men played fiddles and

strummed guitars in the rhythms of Mexico.

Then Councilman Cisneros and I visited a small fiesta in the asphalt lot behind the church. Parishioners munched hamburgers and tacolike *chalupas*, venturing over to shake hands respectfully with their young political leader. Teenagers wearing the colorful costumes of a dozen Mexican states performed folk dances to the music of scratchy amplified recordings. Spirits were high.



WAITING TILL DARK, job-hungry Mexicans (left) stay just north of the California border, close enough to retreat if pursued. Last year the U. S. Border Patrol returned 860,000 illegal Mexicans. Yet several million live in the U. S. Such measures as the fence separating Mexicali, Mexico (above), from Calexico, California, have had limited effectiveness.

"Their parents enjoy seeing them dressed up," said Henry, "but it means much more. It's also an affirmation of our culture."

The parish house at Father Rodriguez's church, Nuestra Señora de Guadalupe, was home to me during my journey across Mexico U.S.A. Through my window by the rose garden, accordion-based melodies of Tex-Mex *conjunto* music drifted in from Loly's Record Shop. The chain supermarket on the corner found room on its shelves for homemade lard and *yerba buena*—dried mint leaves. Across the street Dolores Solis made tortillas twice a day, as she had in the same small shop for more than 18 years.

Just over half of San Antonio's population is Mexican American, concentrated on the west side. The vast barrio is far from an impersonal place. Small shops are the rule, and life is neighborly. Most homes are modest; many show care and pride—flowers, gardens, an occasional religious shrine.

There also is poverty, convincingly etched in the statistics, and etched, too, in the lives of people like Hortensia Cabrera, mother of 14, widow, not an atypical parishioner of Guadalupe Church. Mrs. Cabrera lives in a two-story housing project. In her cramped living room are a stereo, two TV sets, a bronze Jesus, and a large collection of athletic awards garnered by her sports-minded children. Among several family portraits, the place of honor is reserved for her son, a U. S. Marine.

"Money," she says with quiet understatement, "is kind of tight. But I manage."

A Hub for the Community

Most of the 11,000 people who reside within Guadalupe parish—a square mile—are Catholics. The church sees a steady day-long flow of activity: children coming to class, old people gathering in the social hall for comradeship and a hot lunch, aspiring young mariachis practicing trumpets and guitars in the afternoons while their mothers watch approvingly, a basketball court in constant use.

In a small outdoor chapel, a red-robed statue of the scourged Christ suffers under a realistic crown of thorns. Nearby, two bulletin boards are covered with notes of prayer, photographs of relatives, and poignant supplications for the sick and needy (page 794).



I caught up with Father Rodriguez as one of his busy 16-hour days was ending. He is a portly, shambling man with a cherubic smile who resembles a Jesuit version of Friar Tuck. Sitting in the rectory's sparsely furnished dining room, I asked him what accounted for the vitality of the Catholic Church among Mexican Americans.

"For one thing," he began, "it's not only a religion; it's a culture, with a very expressive tradition. For another, people look to the



MEXICO IS HOME, but, with work permits, the Hernandez family stays most of the year at a Soledad, California, labor camp. Before leaving for work as a record keeper for vegetable growers, Irma hugs 2-year-old Henry (above). After a day in the field as a foreman, Rocendo (left) does the same.

priest to help them deal with their various problems. They often can't afford other kinds of help." He poured us glasses of wine from the cupboard.

"In the past," he went on, "Mexican Americans found themselves trying to preserve their traditional religion among clergy who did not always understand their customs or their way of life. As late as the 1960s the Catholic Church saw itself as a vehicle to Americanize people. There was a reluctance to have Masses in Spanish. Now if their priests do not offer Spanish Masses, Mexican Americans tend to go to other churches where they do."

By any standard Father Rodriguez is an activist priest. He helped organize a successful political and social movement in San Antonio called COPS—Communities Organized for Public Service. One parishioner told me that when the neighborhood sought a new elementary-school building, officials would only consent to make repairs. "We got together with Father Rodriguez," she said, "and he helped coach us in what to say. We went through a lot, we were on TV, and finally we did get a beautiful school."

Better drainage was another COPS cause on the low-lying west side. Now there was

evidence everywhere that the city was building storm drains, laying new pavement, and adding sidewalks.

COPS has pointedly ignored traditional racial issues. And its leaders have not been politicians but men like Andy Sarabia, a federal civil servant at Kelly Air Force Base. His highest previous office had been chairman of a committee at Holy Family Church.

Andy told me: "What COPS has accomplished is that we Mexican Americans see ourselves differently. We *do* have power. People who fear us misinterpret it: They'll say, 'Don't let these people take over your city.' But we want justice, and we have forced the issues out into the open."

Separatist Movement Is a Concern

Fear of a Mexican-American takeover lies deep in the psyche of many Texans. For them the old ancestral struggle for independence from Mexico remains alive.* They point to Crystal City, less than a hundred miles from San Antonio, which has become an enclave of Latin separatism. They wonder whether much of the Southwest—Mexico U.S.A.—might someday go the way of

*See "Texas!" by Howard LaFay in the April 1980 NATIONAL GEOGRAPHIC.



STOOPING TO CARESS a child, Patricio Flores, a former migrant laborer and now the Roman Catholic Church's second Mexican-American archbishop, pauses during a



church dedication in Tularosa, New Mexico (*far left*). Calls for Christ's help take tangible form in letters, photographs, and written prayers in a San Antonio church (*center*). In Santa

Ana, California, aid through earthly hands comes from a healer (*above*) who, like the *curandero*, or Mexican folk healer, combines herbs, chiropractic, and spiritual-psychological arts.

Quebec, turning its back on the larger American society, refusing assimilation.

For an answer I returned to Councilman Henry Cisneros. Born and raised within two miles of Guadalupe Church, he is Harvard educated, a professor. Many regard him as a potential bridge builder among San Antonio's disparate ethnic groups.

Henry is not pessimistic. "America," he said, "has a dominant culture because it has dealt with ethnic differences for so long. Its tenet is that people *will* come together. Do you remember Archibald MacLeish's 'American Letter'?" Slowly he recited the lines from memory:

*... we that . . . have had
Neither the old walls nor
the voices around us,
This is our land, this is
our ancient ground—
The raw earth, the mixed
bloods and the strangers,
The different eyes, the wind,
and the heart's change.
These we will not leave
though the old call us.
This is our country-earth,
our blood, our kind.*

"I can read that poem," he continued, "and get a standing ovation at Cinco de Mayo or any other Mexican holiday. That is what people believe. Those lines tell me that what we are going through is something America has lived through before."

So varied are the lives of Mexican Americans that at times I felt as if I were opening a succession of doors to separate worlds. San Antonio's west side was one such world. The world of the farm worker was another—was, in fact, several others.

Some workers are trapped in the endless cycle of migrant labor, following the crops by season to half a dozen states. Others stay in the same locale year round. Some live in abject poverty, in jerry-built cubicles of concrete blocks that lack running water; others live in \$80,000 homes on pleasant suburban streets. Some—particularly in California—are politically active and unionized, members of the Teamsters or Cesar Chavez's United Farm Workers (UFW). Others—especially in Texas—are loners, signing on with a contractor at the packers' piece rate.

Hidalgo County in the Rio Grande Valley ranks first in crop production in Texas. In McAllen, elderly Yankees play shuffleboard under the palm trees, "snowbirding" the winter months away in this warm climate. The palms run out a few miles away, near La Joya, where some of the county's estimated 12,000 farm workers live in ramshackle settlements called *colonias*. In Hidalgo County's metropolitan area, the per capita income is only \$3,859, one of the lowest in the country. Its unemployment rate is 12 percent. It is the bottom rung of America's economic ladder.

Leo J. Leo has run La Joya for as long as anyone cares to remember. With his towering frame and his wide-brimmed hat, "Big Leo" seems cut from the cloth of a south Texas *patrón*. But his has been a passionate voice on behalf of his fellow Mexican-American farm workers.

In his battered pickup truck, Big Leo and I jounced one morning along the rocky streets of La Joya and the *colonias*. Periodically he pulled up in front of a home, honked the horn, and waited for the occupant to trot out.

It was March, and most of the migrant families were leaving for distant harvests. One was packing for the drive to California, where the father would be working cotton and grapes until September and the children would enroll in whatever school they could.

One man was headed for Illinois. "He never went to school," Big Leo told me. "All he knows is farm work. They pay him ten cents a pound to pick asparagus. At 500 to 600 pounds that gives him fifty to sixty dollars a day."

Death of Striker Stirs Alarm

When I moved on to California's Imperial Valley, I found the mood sadly different (pages 788-9). Violence had broken out during a strike, and a UFW picketer, Rufino Contreras, was dead. As the lettuce harvest began in Salinas, striking farm workers moved in. Along narrow roads that slice between farms of that beautiful valley, crowds lofted the red flags of the union—while others worked uneasily in the fields.

Even in this storm I encountered islands of calm. Life was placid at the home of Irma and Rocendo Hernandez (pages 792-3).

They were living in Cottage Number 15 at the Guzman Labor Camp, thirty minutes south of Salinas. I met them as they returned from a day of harvesting strawberries—he as a foreman, she as a card keeper, recording the number of boxes other workers had picked. Inside they introduced me to their five children—from Dora, 10, to Henry, 2.

Cottage Number 15 has two small yellow-and-green rooms. One serves as kitchen, living room, and storeroom. The other holds five beds, a TV set, a jumble of suitcases, and a small religious shrine. While Irma fixed dinner, the children persuaded me to join in a game of Monopoly; Hugo, 8, acquired the Boardwalk at once and cheerfully fattened on rents.

Rocendo brought an album of pictures of his rancho in the Mexican state of Nayarit.

“There,” he said, “is where my heart is.” He had come to the U. S. in 1968; his family followed. Because so many different crops are harvested around Salinas, he said, work was always at hand. There was no need to migrate. Nevertheless, the family returned each November to the rancho in Nayarit.

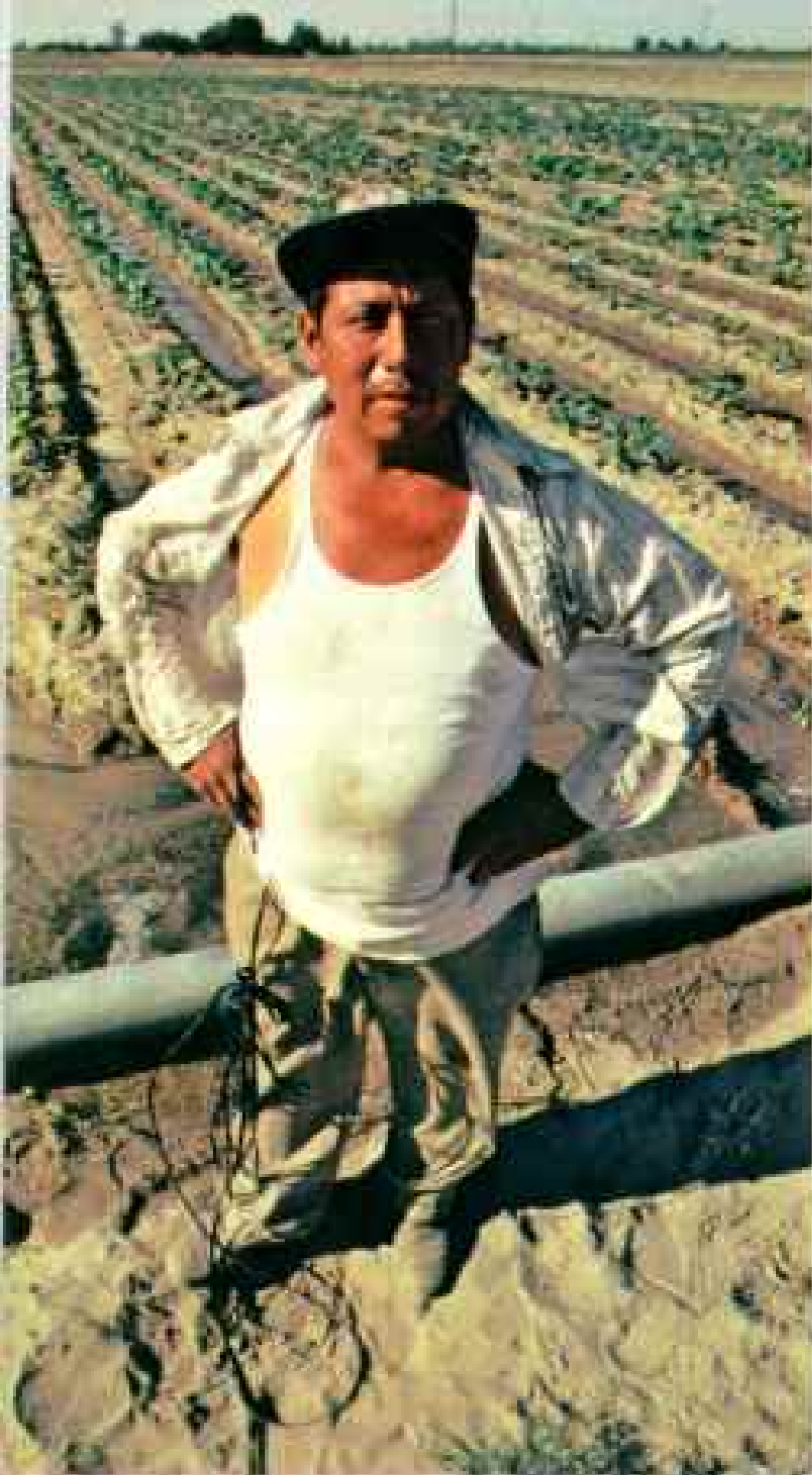
Soon, in groups of three (for there was no more room at the table), the family took turns at their dinner of rice and beans, chili sauce and *carne asada*—roasted meat. There were cans of beer for the adults.

Not far away, long green buses of the U. S. Immigration and Naturalization Service were rolling down Highway 101 toward Mexico, bearing a cargo of illegal aliens behind their barred windows.

The U. S.-Mexican border is the most crossed international boundary on earth.



SHOW AND TELL with the aid of a student helps Georgianne Matthews teach anatomy to Mexican-American children in the Imperial Valley town of Holtville, California. Hers is a classroom on wheels, a mobile trailer she uses to follow the drift of migrant farm-worker families.



NO MORE A MIGRANT, Gabriel Martinez stands fast on the land he bought near Fresno (left) after 18 years as an itinerant farm laborer. For her job, Silvia Rosas (below) crosses



Even Laredo, Texas, population only 70,000, registers more than 12 million lawful crossings every year.

The border, for nearly all its 1,952 miles, follows river contours or slashes across open desert and has few fences or other man-made barriers. It is easy to slip across; last year as many as three million may have done so. Of the million who were apprehended, half were caught near the two biggest border cities, El Paso and San Diego.

If estimates of illegal aliens in the U. S.—from under five to twelve million, mostly Mexicans—are anywhere near correct, about a tenth of Mexico's citizenry are clandestine residents of this country.

Illegal aliens, says the law, are foreigners who have entered the United States without being processed by an immigration officer, or who have entered legally and then overstayed visas or taken jobs. The United States admits 20,000 legal immigrants from Mexico annually. But those who apply often must wait years; those who cross illegally immigrate in hours—or minutes.

What I saw along the border shattered many of my misconceptions. I had thought that the illegals hiked miles through desert, loaded with packs, dodging spiny lechuguilla and keeping a wary eye for rattlesnakes. Well, some do. But many bus to a border town and dash across in daylight.

I had thought that the illegals headed mostly to farms, a sub-rosa international work force consigned to the meanest stoop labor. Some do. But many bring blue-collar skills to the cities, earning good money in construction and factory jobs, joining (and sometimes controlling) local labor unions.

I had thought that the illegals came as transients, saving every penny and returning in a few weeks or months to their homes across the border. Some do. But many bring their wives and children and settle in this country for good.

They and others like them are propelled by Mexico's poverty and its birthrate, one of the highest in the world. The rewards offered in the United States are great, the punishments for illegal entry usually negligible.

the border every workday. A resident of Mexicali, she has a green card permitting her to hold a job in a Calexico clothing factory. In San Antonio, Jesse Torres (below) works on the tail section of a C5 transport at Kelly Air Force Base, where the majority of the 16,000 civilian workers are Mexican Americans.



SHADOW OF A BOXER plays against the wall at Cleland House, a gang rehabilitation center in East Los Angeles. Along East L.A.'s Whittier Boulevard, youths in the garb of the *vatos locos* (crazy guys) watch a nightly ritual: the promenade of "lowriders," low-slung cars popular among young Mexican Americans.



Lack of jobs in Mexico, and the tendency of Americans to spurn work that seems socially unattractive, have turned the trickle of illegal aliens into a torrent.

One crisp spring day I drove along the Rio Grande levee, which border patrolmen in El Paso call the Line, with Oscar Tejeda, one of 382 Mexican Americans on the force. Rounding a bend near downtown, I noticed stepping-stones across the shallow river. Over this makeshift bridge, perhaps twenty people had just crossed from the shantytown fringes of Juarez. They looked with mild

interest at our patrol car—but none was worried enough to move back to the water, even as we stopped near them.

"All they have to do is run 200 yards, and they're in," Tejeda said. "As you can see, we don't have enough patrolmen or vehicles. I could catch one of them, but the others would slip past. It's a waiting game. They'll just try to outlast the agents, even if it takes eight hours."

We drove away, to the sound of "adios!"

All along this section of the Rio Grande I saw similar crowds, some on the Mexican



side, others on the American riverbank. "When we do catch them," said Tejeda, "the only thing they have to worry about is the inconvenience."

The fact is that few illegal aliens are held in detention centers, and fewer still are convicted of violating the law. Most are simply returned to Mexico, whence they try again.

When he is not working the Line, Tejeda recruits for the Border Patrol at local high schools. He is sensitive to the dilemma that illegal immigration poses for a Mexican worker. "If a man has 11 kids who've got

nothing to eat, he's got a moral *obligation* to come to the U.S.A. and find work. But it's my job to stop him. He's got to live, but the U. S. cannot continue to support two countries."

At the El Paso detention center, the faces I saw reflected forlorn spirits and broken hopes. Some men had come across to claim prearranged jobs as far away as Denver; others had drifted north for whatever luck might bring. They were earnest, salt-of-the-earth people driven by a pitiable need.

They and millions of others are making

a profound impact on the United States. Texas school districts along the border cannot build new schools fast enough to accommodate alien children. Housing, health, and crime problems have intensified in Mexican-American neighborhoods that are steadily more crowded with new arrivals.

California is encouraging aliens to register in the current census, because their numbers will give the state more congressional seats and a windfall in federal grants.

In Houston, tension shows up in many ways, as when Mexican-American children ridicule the accents and clothes of their countrified neighbors from interior Mexico.

Despite the problems there is an epic aspect to what is happening along the Line. Mexican Americans proudly recall that their presence here antedates the *Mayflower*. Now, as the 20th century wanes, some feel that the ancient lands of their people are being reclaimed in another of history's great migrations.

East L.A.—a City Within a City

In Los Angeles the most desirable neighborhoods lie toward the west, where coastal breezes brush away the smog. East Los Angeles, hedged by bleak factories and warehouses, stitched by freeways, stands apart (page 787).

Poverty lies close to the surface in these few square miles, which are the heart of Los Angeles County's Mexican-American community. * Most of its families lead hard, useful lives and measure success not in the size of a paycheck but in the warmth of home and family and personal relationships.

For the *cholos* and *cholas*—young men and women who join the many gangs—success may be measured by toughness and simple survival. Of all the different worlds of Mexican-American life, East L.A. is the most urban and the most intense.

The gateway is Whittier Boulevard, where even the street signs hint that things are different here. "No Left Turn, 9:30 p.m.-5 a.m.," they direct. Is there another street in the U. S. whose traffic peaks at midnight? By then, shoppers have given way to a slowly circulating procession of highly polished cars. Young people smile, laugh, joke, and shout from one line of vehicles to the other. "It's the old Spanish paseo

tradition," explained a friend watching with me on the corner. "Boy meets girl, back and forth. Except now it's on wheels."

By day a visitor in East L. A. has to notice hundreds of brilliantly colored murals and the omnipresent spray-can graffiti. Sculptor Charles Felix fondly calls this artistry "Chicanoglyphics."

The bearded artist told me: "I asked myself, 'What can I do for the Chicano movement?' We are trying to define our rights here. Murals are a vehicle for that."

He helped design one of the largest mural collections in the Southwest at a Los Angeles housing project called Estrada Courts. I strolled among its decorated walls, dodging hanging laundry and listening to the clatter of empty garbage cans rolled by little boys. The murals cast a spell. Here was moonlight on cypress, there a psychedelic fantasia in red, white, and blue. I saw Maya geometrics, dreams of flight, Che Guevara with a clenched brown fist.

One particularly caught my eye. Among the blue-black depths of space, with pinpoint galaxies, floated a spaceshiplike bubble, glowing inside with lights. In the foreground, on the barren surface of a nameless planet, stood two cholos, watching, wondering. I studied the bubble a long time before I realized that the lights inside it were the skyscrapers of Los Angeles as seen from East L. A. Here was the city and the shimmering world beyond, Westwood and Malibu and the rest, the glitter and the dreams, hovering out of reach, remote as a star.

Various groups in East Los Angeles try hard to overcome the feeling of isolation and hopelessness in that mural. One of them is UNO, a community-organizing cousin to San Antonio's COPS, and TELACU, The East Los Angeles Community Union.

"In many ways," said TELACU's John Echeveste, "we do what a city council would do. We generate funds for economic development. We are building a 32-million-dollar industrial park that will employ 2,000 people. We want to get people off welfare and build a healthy economic community."

When I met Francisco Mendoza, a former

*The new flavor brought by the flood of Spanish-speaking newcomers to the United States' third largest metropolis was described by William S. Ellis in the January 1979 GEOGRAPHIC.

gang member, he was one of TELACU's men in the front lines. He headed its youth programs. That meant finding jobs.

"A kid comes in to see me because there's nowhere else for him to go," Frank said. "He can't risk stealing or getting into any more trouble. He's been through all the institutions. Now it's time for him to try to make it straight. I go out to employers and say, 'Hey! these *vatos locos* are hard-core dudes, their vocabulary is off the wall, they've got more tattoos than a tattoo store, but they're basically good kids. They're willing to work. They're honest. Give 'em a chance.'"

Starting at age 8, Frank rose through the ranks of a gang called the Dukes—first the Tiny Dukes, then the Midget Dukes—learning all the while to survive on the street. "I didn't look on it as something negative," he said. "All the other guys in the gang—their parents were friends of my parents."

In time he saw it all: small-time extortion, jail for stealing hubcaps, killings for honor, killings for revenge, a world of bravado, a world turned upside down.

"The Dukes have a picnic once a year. The fathers, mothers, sons, daughters, their kids, *compadres*, all get together to reminisce about the old gang fights." He paused, remembering.

"Sometimes you see a 2- or 3-year-old wearing the uniform of a gang member—the hat, the white T-shirt, suspenders, the Hush Puppies, the work pants. A lot of people would say that's *garbage*. But from the point of view of the gangs, that's a little home boy who in the future might have to give up his life to defend his neighborhood."

Some Have Bridged the Chasm

Across the freeway on another day East L.A. seemed far away to me. At a cocktail reception in a sophisticated downtown business club, influential Mexican Americans gathered to meet a new city official. Among them were lawyers, funeral-home directors, certified public accountants, and corporate presidents. Most had risen from childhood poverty en route to California.

"Our fathers and uncles would never have believed we'd be here at the Athletic Club," said Al Juárez, chairman of the Los Angeles Board of Civil Service Commissioners and an administrator of a law firm, as he

welcomed guests. "But what really impresses me is this: Ten years ago, we'd have been running federal programs. Now we're in the private sector."

A few days later I lunched with Juárez at a tree-shaded garden restaurant in the hills north of the city. We talked about the years he had spent in East L.A., at an office called One-Stop Immigration, and his new career on fashionable Wilshire Boulevard.

"In California there is so much prosperity all around you, so much opportunity," he



BIG TORTILLAS in the style of her native Sonora, Mexico, feed Angelita Ochoa's big family. Two of her 15 children and 61 grandchildren help as Mrs. Ochoa, 82, tends the griddle at her Tucson, Arizona, home.



Pink blossoms and a shy niña brighten a run-down dirt street in Alviso, a



small San Francisco Bay community annexed in 1968 by the city of San Jose.

told me, "that in spite of the barriers, people are making it."

As we drove back along the Harbor Freeway to his office, the tall buildings of downtown Los Angeles loomed on either side. "The future of the Chicano," he mused, motioning in a great arc, "is right there. In banking, investment, business. In the boards of directors, in the law firms. We have a choice. We can be like the blacks in South Africa, on the periphery of a society others dominate. Or we can be *part* of it."

Their Banner Is Star-spangled

In San Diego, a similar outlook was expressed by Bernie A. Hernandez, Jr., an accounting supervisor of the local utility company. "In the Mexican-American community," he told me, "you grow up wanting to solve the ills of the community. So you want to be a social worker. But once you see the world, you realize that's not the way. And you find the world of business, just waiting for you."

Hernandez, Adam Gastelum, and Frank Sanchez are among the 530 veterans who belong to the Don Diego VFW Post in Logan Barrio. Ninety-five percent are Mexican Americans. "We want to keep the United States strong militarily, so that if anything threatens it, we'll be ready," Hernandez said. "You could call me a flag-waving conservative. I feel strongly about what this country means. I believe in the family, the church, the Constitution, the colors. People say that's old-fashioned. But when I'm in the Fourth of July parade and they play the national anthem, my hair stands on end."

I visited many public schools in Mexico U.S.A. during my long journey. They have always been a medium for Americanizing newcomers, promoting assimilation by rigid insistence on English in the classroom. But the recent rapid growth of bilingual and bicultural education has made Spanish a medium in thousands of schools.

One-quarter of Houston's 190,000 public schoolchildren are Mexican American. Most speak Spanish at home. At the David G. Burnet Elementary School, about 45 percent are enrolled in bilingual education. They study for much of the day in Spanish, acquaint themselves with Mesoamerican Indian artifacts, and learn about the



A MAN'S CAR IS HIS CASTLE to the lowriders, who believe that getting there is less important than going in style in their lowered and lavishly customized cars. Thousands flock to Fresno for the car show put on by a club called *Thee Individuals*. Elias Lopez of the *Jesters* (above) shows off his '67 Ford LTD, which sports a crushed-velvet interior, welded-chain steering wheel, and crystal chandelier and wine service. Lest a car ride too low for the law, hydraulic lifts can instantly raise it to the legal height. That has led to contests to see whose car can hop the highest in successive bounces (right).



lives of "*famosos Mexicanos Americanos*."

Burnet's principal, Gonzalo Campos, is a strict, forceful man. He disapproves of such classes beyond the third grade.

"If you do the job you're supposed to do," he says, "you don't need them after the third grade. The goal is academic excellence. You have to develop the use of English if you are going to compete. 'Compete' is the key word in this country."

Others are less sure that proficiency in English should be the main objective. In California the law requires a bilingual teacher or aide in every class of ten or more students with "limited English-speaking ability." Ana Maria Martinez, a teacher at

the Humphreys Avenue School in Los Angeles, feels that "English should be imposed only when the parents feel the child is ready for it, perhaps as late as the third grade. The child," she says, "should learn in the language he *thinks* in. The child needs an approving emphasis on his own culture to feel good about himself."

Some bilingual-education enthusiasts feel the programs should do more than maintain ancestral language and culture among Mexican Americans; they should give "equal status to each language and culture found in the community."

Few Mexican Americans are openly critical of bilingual education. Even fewer seem apprehensive that a bilingual American society could be a more divisive one.

Partly the reasons for this are deep and emotional, and partly they are practical. As more government jobs, contracts, and benefits are distributed according to ethnic categories and quotas, a Spanish-speaking background becomes an increasingly valuable identity card. Once a liability, it can now be a ticket of admission. As one teacher told me, "The blacks have the color, and we've got the language. We'd be stupid to let go of it."

Learning to Share One Sun

Differing attitudes toward bilingual education reflect the central question of today: assimilation—or the identity of old? Who are we, Mexican Americans are asking, and where do we fit into the larger American society?

A remark by a Chicano leader in Los Angeles came as close, I believe, to capturing the prevailing mood as any single comment could. He told me: "The Mexican American says, 'I won't impose *my* culture on you; don't you impose *your* culture on me.'"

That seemed, I thought, to be a formula for division and separation. I hope myself that he was wrong.

I heard another, better thought time and time again: "The Mexican American is finally finding his place in the sun."

I will remember the poem Henry Cisneros recited in San Antonio. For many Mexican Americans, the sun has never shone brighter among "the different eyes, the wind, and the heart's change." □



SOME GIRLS KISS childhood good-bye with a Mass and fancy dinner dance called a quinceañera, 15th-birthday celebration. Attendants at a double quinceañera await the honorees at a San Diego church (*above*). In Norwalk, California, Olivia Campos' parents (*facing page*) gave her a less formal farewell before she joined the staff of President Carter's Hispanic-affairs adviser, Esteban Torres.



CHINCOTEAGUE

Watermen's

By NATHANIEL T. KENNEY

FOUR MILES from the Virginia mainland, the island of Chincoteague rises scarcely two feet above the briny waters of a shallow bay called by the same Indian name. Only Assateague Island guards Chincoteague and its bay against waves that have come in almost one unbroken fetch from Spain 3,400 miles across the Atlantic.

Some people, especially little girls and those who were little girls not too long ago, know of it as the home of Misty, pony heroine of Marguerite Henry's book *Misty of Chincoteague*. Still others think of it as the place from which come the best oysters in the world, or as a pleasant vacationland.

For me this tiny island, only seven miles long and a mile and a half wide, is all these things and something much more personal: My roots strike deep into its flat expanses of salt marsh, its winding shallow waterways, called guts by the islanders, and its woods of scruffy pines. My father was born here. A grandfather served as island postmaster. My great-uncle was the doctor. One great-grandfather, a preacher, collected the souls of Chincoteague's Methodists, and another the duties on goods coming into a busy port.

I journey often to Chincoteague, for I have loved it deeply during more than half a century. I prefer to make my journeys in the winter, when it belongs entirely to the 4,500 Chincoteaguers, those rugged sea people whose forebears arrived here in the 17th century, and who are to me the greatest of the island's many assets.

In the early summer, when the mallards nest and the blue crabs are out of their hibernation in the Chincoteague Bay mud, the island becomes another place entirely. Summer folk pour in for weekends and vacations, *(Continued on page 816)*



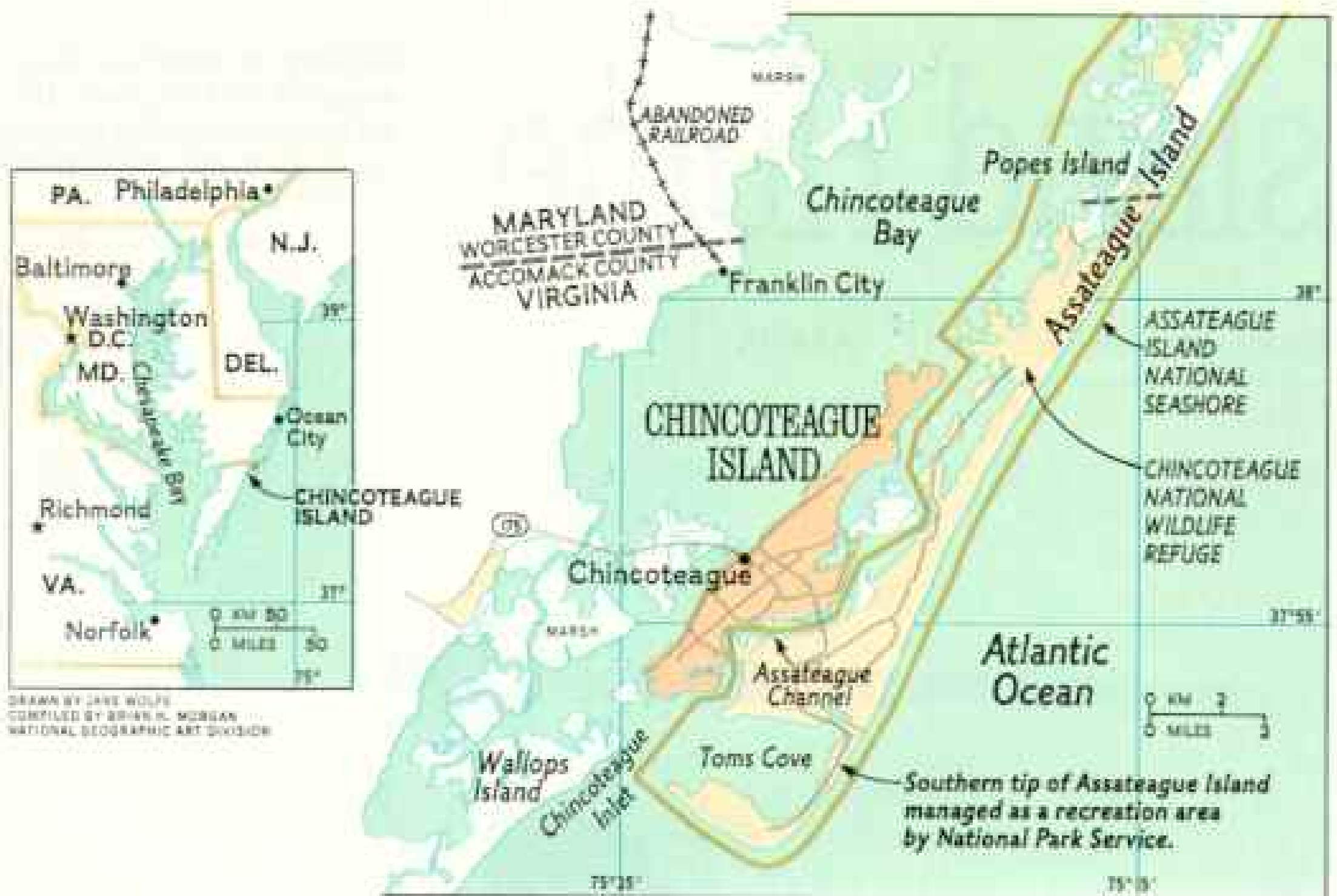
Island Home

Photographs by JAMES L. AMOS

NATIONAL GEOGRAPHIC PHOTOGRAPHER

Walking on water just deep enough to soak his socks, Bill Jester rakes for clams on a tidal flat by his home. The quiet bays and rich salt marshes near Chincoteague Island boast waterfowl, wild horses, and independent-minded watermen who fish, hunt, spin stories, and sing loudly in church.





From a duck's point of view, the dark ponds and serpentine creeks near Gingoteague, as the Indians called it, look ideal as home and haven (right). But Daniel Jenifer, first English landowner on the island, preferred to live inland, keeping horses and cattle here instead. From this beginning a resourceful economy evolved—first livestock and farming, then seafood and recreation. The nearness of Assateague, the 37-mile-long barrier island that shields seven-mile-long Chincoteague from the Atlantic (map), has shaped the smaller island's history. In the 18th century an informal industry developed from the salvaging of shipwrecks off Assateague. Men were quietly known as Molasses Jones, Rum Brown, and Banana Johnson for the booty in which they traded. And in recent years the popularity of both a national seashore and wildlife refuge on Assateague has spurred a boom in motels, restaurants, and museums on Chincoteague.

The island's famous salt oysters (left), sold profitably since the 1830s, are mostly cultivated on leased "rocks," which watermen seed and harvest as tenderly as gardens.





More people than ponies crowd the narrow channel between Assateague and Chincoteague as watermen cowboys drive a hundred semiwild horses past 25,000 onlookers during the 1979 roundup (above). As they have for decades, the town's firemen, owners of the herds on lower Assateague, auction off the year's foals.

J. R. MacPherson (right) of Battles Wharf, Alabama, brought his daughters, Marian and Murray, to bid for ponies after



the girls had read Marguerite Henry's popular novel, Misty of Chincoteague, about another island horse. For their part, the girls earned straight A's in school and saved \$250 from allowances, gifts, and cutting grass. But they set their hearts on a palomino (left) another visitor wanted too, and a tense bidding war followed. Murray and Marian finally won their Misty, but not before the fire department collected a handsome \$625.



(Continued from page 810) and while most are good people who bring money, Chincoteaguers feel a bit submerged and tend to keep to themselves.

So I mostly go to Chincoteague in the cold time, when the great waves spawned by the northeast gales thunder on the beach of Assateague, and the wings of black ducks whistle at twilight over marshes white rimed with salt ice, and the voices of wild swans and snow geese cry down the bitter wind.

For the man of Chincoteague, as the short winter day dies, there comes an hour between the flaming death of the sun in the west and the time when supper moves from stove to kitchen table in tidy old-fashioned frame houses. In this hour the Chincoteaguer noses his boat into its slip, stows oyster tongs or wildfowling gun, and heads for the friendly warmth of places like Alice's Kitchen, or Tanner's Diner, or the American Legion Hall, depending on whether his

taste is running to cold beer or to hot coffee.

Me, I head for the Chincoteague Inn, hard by the harbor, for a beer. The inn is a marvelous seafood restaurant, raw bar, beer joint, and pool hall, a place my preacher great-grandfather would no more have entered than he would have bet on the horse races they had at pony roundup time in his day. But it is the best place to go for a liberal education in ways of the creatures that live in the sea and the tidewater lowlands—provided you understand the Chincoteague speech.

REGULAR Chincoteague Inn customer Woose Reed, if he likes you, will tell you how to catch razor clams, which are great eating although no great shakes commercially. The name isn't Woose, of course, but every island-born Chincoteaguer goes by a nickname, and few of his friends use the one poured on him at



baptism, which in Woose's case was Lloyd.

I know a man called Boolamb, for reasons not known with certainty even to himself, and another who goes by Eagle Breast. There is a Hip Shot, and an Iron Man, and an Eggy. But unusual names are nothing new in Accomack County, in which Chincoteague lies. Old county names include a Brazeleel Watson, a Babel Laylor, a Burnal Niblet, Fetaplace Tizza Ker, and Zorallingtine Bailey.

"To catch a razor clam," Woose explains, "pour salt in his sign, a round hole in the sand. He'll pop up, then you grab him."

Two other inn regulars, Sim Baker and Square-Knot Prater, tell stories of gillnetting fish in the open sea ten miles out of Chincoteague Inlet. If it is early spring, you'll see Cap'n Sim and Mate Square-Knot come to the inn's wharf in Sim's *West Wind* and unload sea trout and bluefish.

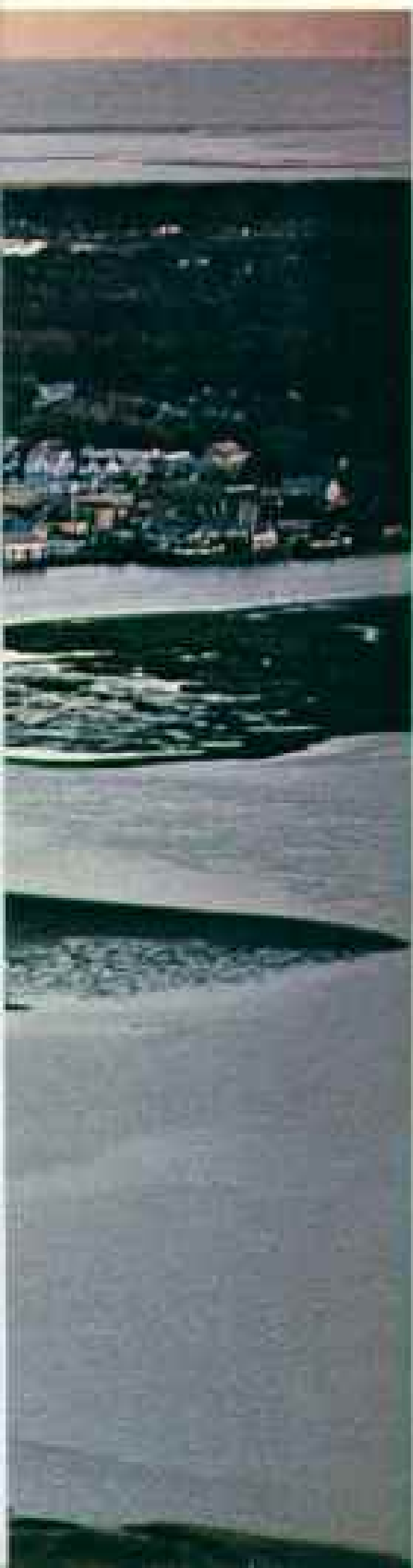
"Hung a big shark," says Sim. "Tore the

net, but Square-Knot banged his nose and pushed him away before he ruint it."

A commonplace incident for a gill-netter, but one with a twist: Square-Knot's right name is Alice. She's 19, and she's attractive even in black oilskins and gum boots aglitter with fish scales.

You won't find Cork McGee in Chincoteague Inn, for he's not a beer drinker, but if you can catch him in Clark's outboard-motor place, this all-around waterman will tell you about oysters and how to grow them. Most Chincoteague oysters are cultivated these days rather than harvested from beds, or "rocks," that are public property. Cork's private oystering grounds, leased from the state of Virginia, lie on the edge of Assateague Channel, close to the bridge from Chincoteague to Assateague.

I went with Cork as he worked his oysters at low tide, walking the long beds, gathering them in wire baskets, picking up snail-like



Islanders are different, says Christine Whealton as she sits on the steps with her husband, Herman (above). "We are proud and self-reliant and help each other in times of need. Newcomers do not feel like strangers after a short time with us." These are traditions, she says, of her small community on the water (left).



Wintry message. The sign tells the story on a South Main Street hunting- and

oyster drills, which are shellfish predators. The waterman of Chincoteague picks his oysters by hand, for most island waters are shallow, and tongs are used only at high tides or in a few deep spots.

Harvesting hard clams, the famed cherry-stones of Chincoteague Bay, is another matter. "You can catch them with a dredge towed by a powerboat," Cork explained to me. "You can 'sign' them in shallow water. Their sign is a keyhole-shaped hole, not a round one like the razor clam's. You dig 'em out with your hands or a clam rake.

"In the warm months, some of us 'wade out' clams in water that's sometimes up to our necks. You do kind of a little barefoot dance until you feel a clam, then you slide the clam up your leg with one foot until you

can reach it with a hand. It's right pleasant work on a hot day."

In many places watermen look upon the sea that nourishes them as an enemy. Not so on Chincoteague. That honor, at least until recently, has gone to the game warden.

Donald Leonard, native islander and motel owner, explains why. "We Chincoteaguers have always made our living from what God put in our sky and water. In the past the wild things were so abundant we never dreamed they wouldn't last forever. Being islanders used to a large degree of freedom, we just couldn't stand for some durned game warden, most often a mainlander, telling us we couldn't take all we needed.

"Today we know we were wrong. Great flocks of redhead and blackhead ducks no



fishing-gear shop, as sea-clam dredge boats, right, wait out a blizzard.

longer blot out the sun. Canvashacks are scarce. And men who broke every game law in the books are now good conservationists.”

CIGAR DAISEY figures he trapped and killed more than 35,000 black ducks for the illegal market in what he calls his “evil” days. He told me he sold not only to reputable clubs and restaurants, but also to judges, politicians, and wealthy businessmen. Now he carves and paints duck decoys too valuable to shoot over, works of art that have won him a roomful of awards and that sell for as much as \$500 apiece (pages 826-7). He may shoot an occasional duck for model or table, but that is all.

“The wardens didn’t catch me but once,” recalls Cigar, as he took me out in his fast

outboard-powered Chincoteague scow to show me the scene of the chase. “It cost me a \$75 fine and them a damaged airplane.

“One warden had a floatplane and landed beside my scow. I made circles at full speed, like this—” and he turned so quickly I nearly fell out of the boat. “The plane couldn’t turn that sharp. It flipped over and stood on its nose in the mud. After I got back to shore the warden came and arrested me.”

Woose Reed’s brother Tom shot and trapped for the illegal market for years. Now he livetraps anything from mosquitoes to rabbits for researchers at Walter Reed Army Medical Center in Washington, D. C. I once heard him tell a city visitor how to handle a trapped skunk: “Do somethin’ interestin’ so he keeps lookin’ at you.”

Most Chincoteaguers manage to "follow the water" all their lives with never a run-in with the law. Like Bill Jester, who may be the most respected, best loved man on the island. He is a pillar of my great-grandfather's Methodist church, where he teaches Sunday School and delivers the occasional Sunday sermon.

Bill and I have been friends since boyhood. During my early journeys with my father to Chincoteague, Bill and I progged (roamed) the windswept marshes and shivered in cold duck blinds together. He taught me to shoot, to pole a boat, and to gig eels out of the muddy bottom of a gut.

I am visiting with Bill at his home beside Assateague Channel on Chincoteague's eastern shore. It is spring, and Bill is doing the things a waterman does after the ice dies in the waterways. He has been stirring since dawn, gathering oysters on his own leased beds and afterward going "on the dungle." The dungle is public property, in this case an

oyster rock open to any Virginian with a state license. The word has obscure origins and is not in our dictionaries.

Now Bill sheathes his venerable scow turned bottom up on his pier. I watch him whack the last flatheaded nail into the sheet metal with which he has covered the boat's bottom. The Chincoteague scow is a blunt-ended, flat-bottomed craft designed and built locally; it may be the ablest small boat on the middle Atlantic seaboard.

"Sea trout oughta be runnin' in the channel," says Bill. "We'll set us a gill net." We put the scow in the water. In spite of a three-knot current, Bill lays the net at a right angle to the channel, and I comment on this.

"Well, it does take a little sleight," says Bill modestly.

WE SCULL ASHORE and sit on the pier while we wait for fish to hang up in the net. A diamondback terrapin raises periscope to look us over. Pronounce the tasty critter "taripin" on Chincoteague. There was even a Taripin Gut on old charts.

Bill, like so many Chincoteague old-timers, is a superb storyteller. Now he tells me how a huge black ox named Mike saved the lives of both our fathers in a savage northeast blizzard many years ago.

I knew Mike well. He lived on Popes Island, ten miles north in Chincoteague Bay. Here my father and his friends had a gunning club. Bill and his brothers were guides, their father, John Jester, club manager.

"Once your father and mine started up Assateague beach for Popes Island in an ox-cart pulled by Mike," Bill says. "A blizzard came up with snow so thick they couldn't see any landmarks.

"If they couldn't find the club that night, they might well freeze to death on the beach. But they gave Mike his head, and he took them across the shallow water between Assateague and Popes Island right to the clubhouse kitchen door."

Mike descended from what you might call one of the oldest families of the islands, so no wonder he knew his way home. The first colonists used isolated Chincoteague and its neighboring bits of land as livestock range. Eventually people built log houses on the islands and settled there themselves.

Arriving in the early 1670s, they were



Just a little off the top could take most of an afternoon at Tig Jester's barbershop (above), where friendly conversation has come first since 1908. Talk at Abbott and Shep Lassiter's house (facing page) will likely turn to glassware, silver, paperweights, or one of their other lifetime collections.

Anglo-Saxon to a man, practically none of them aristocrats but humble herders, sailors, fishermen, and the like. Your present-day Chincoteaguer descends directly from these rugged yeomen and takes pride in the fact. Sometimes, as I watch him setting out a rig of Canada goose decoys or wading out cherrystone clams, I have a feeling I'm seeing my own forebears as they won their fight for survival in a wilderness.

Until well into this century, the outside world rarely impinged on the lives of the Chincoteaguers. British foragers menaced frequently during the Revolution. Union troops occupied the island during the Civil War—my great-uncle Dr. Nathaniel Smith came with them to help with the sick and liked it so much he spent the rest of his long life there—but that was no hostile occupation, for the Chincoteaguers voted to side with the North.

In the 1870s the federal government built lifesaving stations along the Virginia

beaches. Outsiders came to man them, sometimes bringing families who lived near the stations. A railroad reached Franklin City, five miles across the bay from Chincoteague, in 1876 and proved to be an economic boon to the region. It brought in "foreigners," city people who came for wild-fowling, fishing, and summer vacations at a few resort hotels and boarding houses; and it carried oysters north to Philadelphia and New York—thousands of barrels of them. At three dollars a barrel for the shipper, prosperity came to Chincoteague. For forty years or more, ferries regularly plied between Franklin City and the island.

The bubble burst with the depletion of the oyster supply. And, when the present causeway from mainland to island opened for automobile traffic in 1922, Franklin City was reduced to a byway. Today it is a ghost town with a few ramshackle houses still standing on its once busy main street.

If you remember the highways and the





Ponies get potbellies by overfeeding on Assateague's marsh cordgrass, a salty plant low in food value. But a swollen mare in springtime, when most foals are born, could mean something entirely different. How the first ponies reached the island has long been debated locally. Most historians agree that they belonged to English colonists who moved herds off the mainland in the late 1600s when they started to damage crops. Another group of ponies, blinded for duty in Spanish colonial mines, may have reached Assateague by escaping the wreck of the Spanish ship San Lorenzo in 1820.

automobiles of the 1920s, you'll realize that Chincoteague's isolation from the mainstream of mainland life didn't come to a sudden end with the opening of the causeway. The big change came in 1962 when a bridge was built from Chincoteague to Assateague, with its ocean beachfront. Tourism continued to grow after Assateague Island National Seashore was established in 1965.

The federal government today holds title to the entire 37-mile-long island, except for a small Maryland state park near the northern tip and a few small tracts not yet purchased. The National Park Service administers part of Assateague Seashore; almost all of the Virginia portion is the Chincoteague



National Wildlife Refuge, managed by the Fish and Wildlife Service.

THANKS to its nearness to so many large eastern cities, Assateague Island, with about two million visitors a year, ranks among the most popular of our national seashores. Visitors reach it in two ways. Those who choose to come to the northern, or Maryland, section cross over on a bridge from the mainland just south of Ocean City, Maryland.

To get to the Virginia portion and the wildlife refuge, visitors must use the bridge from Chincoteague to Assateague. No road connects the northern and southern parts of

the island, and a Fish and Wildlife Service barrier at the Maryland-Virginia line halts even four-wheel-drive vehicles.

Because there are no hotels or motels and no restaurants on the Virginia end of Assateague, most of those who sun, crab, swim, and fish on the south portion eat and sleep on Chincoteague. Thus when the crowds began coming, the islanders lost the last of their prized privacy.

Chincoteague visitors come in different forms to match the varied recreational fare. In the right seasons you can meet wildfowl hunters, campers, surf fishermen, and bird-watchers. For the latter, this is paradise. Some 260 *(Continued on page 828)*



Tempers flew wild when game warden John Buckalew (above) surprised Chincoteaguer Walter Clark (top) poaching ducks in 1946. Just back from Iwo Jima, Clark shot Buckalew in the shoulder with bird shot and spent eight months in jail. Displaying his wartime

tattoos with pride, Clark here wears the red tag of the pony roundup, in which he has ridden since a boy. And Buckalew, now retired, continues a lifelong project of banding birds, like this young laughing gull, for population and migration research.



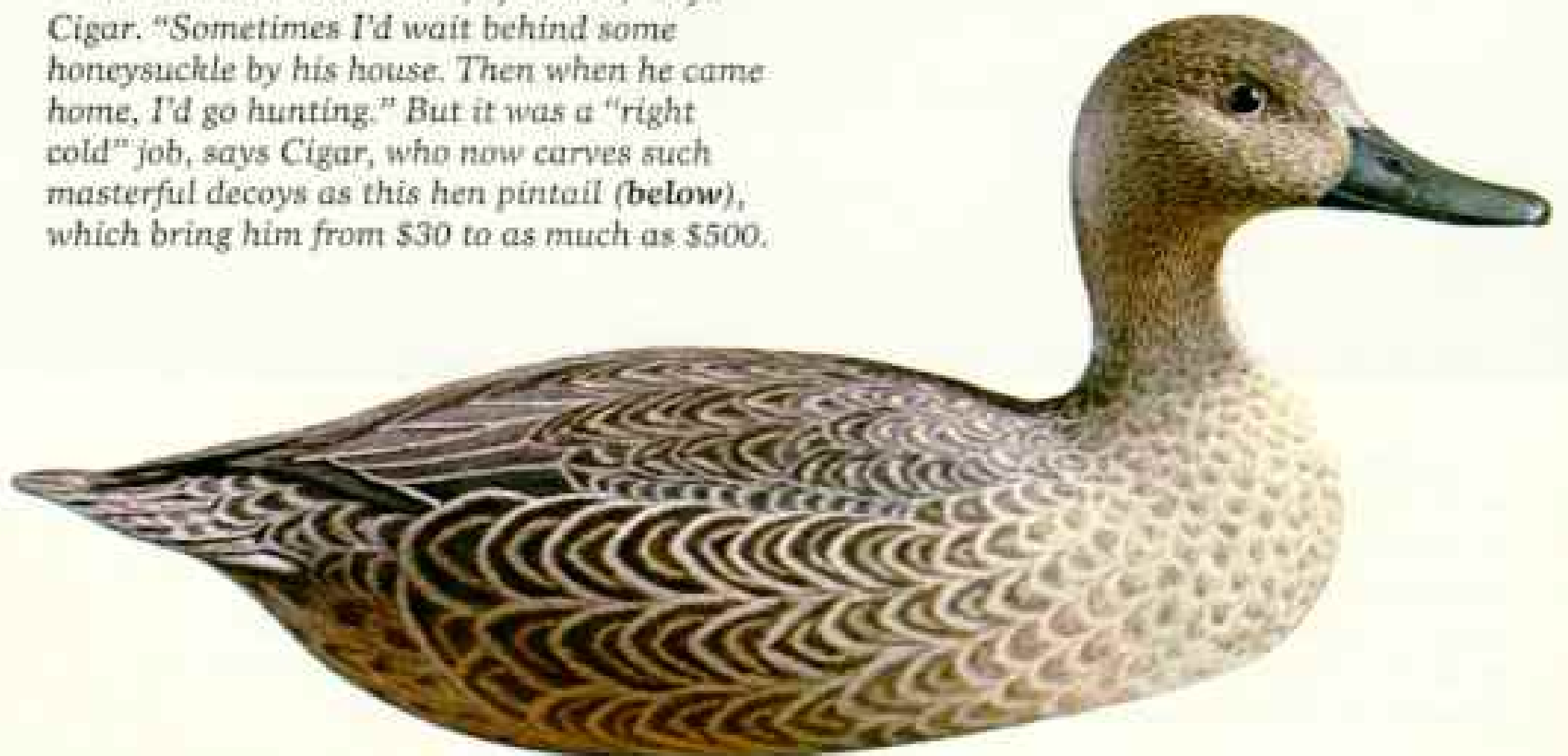
Birdlife thrives at the Chincoteague National Wildlife Refuge, once managed by Buckalew, where more than 260 species have been identified, including the great egrets, pintailed ducks, and great blue heron here startled into flight (above). In late autumn, snow geese,

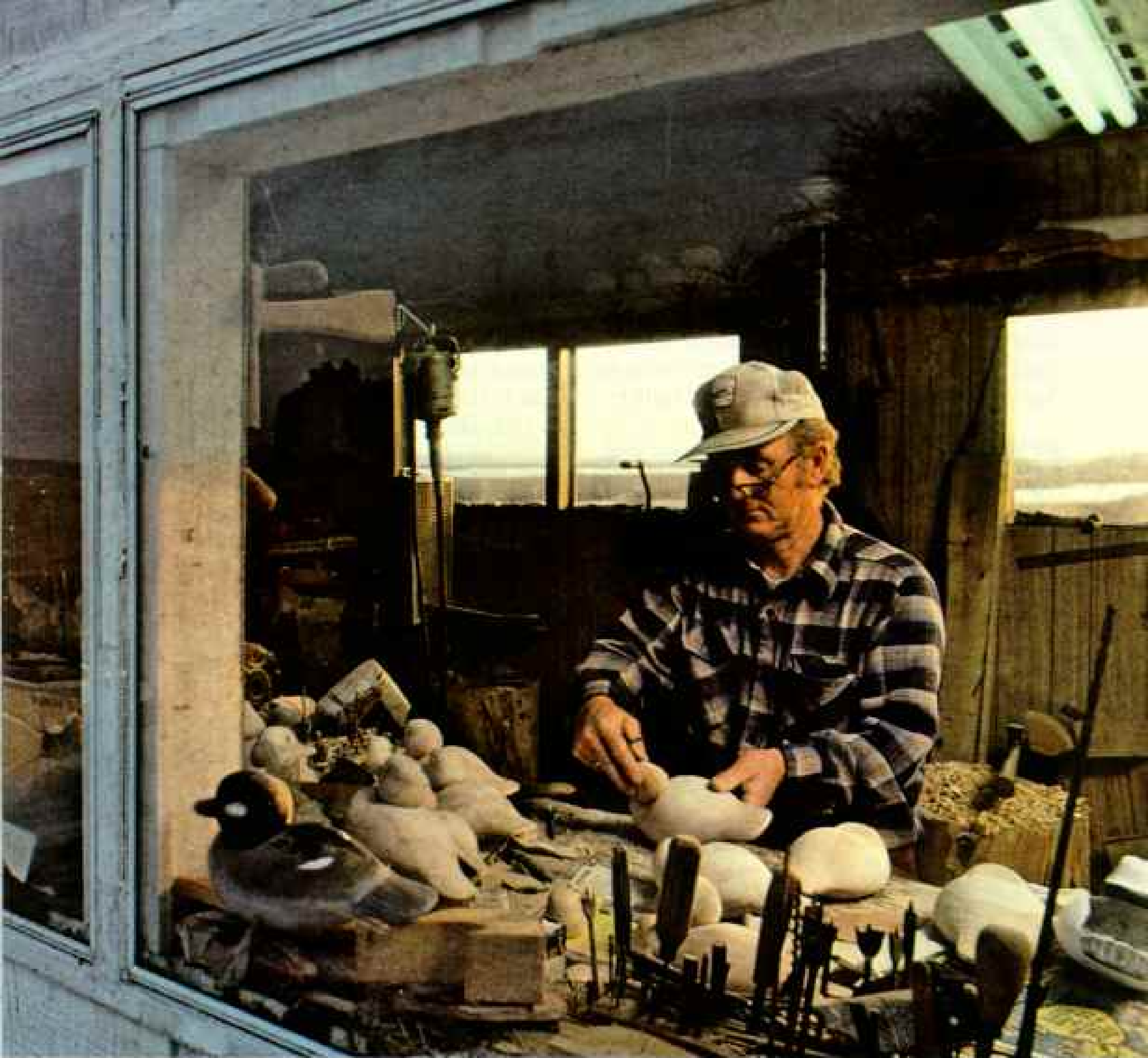
Canada geese, and whistling swans fill ponds near where blue-winged teals, black ducks, and mallards build summer nests. And in pine woods, red foxes, white-tailed deer, Delmarva fox squirrels, and imported sika deer multiply despite some 1.2 million visitors yearly.



Carving a reputation as one of Chincoteague's most skillful decoy makers, Cigar Daisey once worked as an outlaw hunter, poaching ducks and geese. Ducks brought a dollar apiece in those days, when Cigar caught as many as 54 at one time in a small trap such as this one (lower right). He earned his nickname in 1946 when game warden John Buckalew traced back to him a handful of King Edward cigars he had dropped while robbing one of the traps Buckalew set for banding.

"We all knew each other, of course," says Cigar. "Sometimes I'd wait behind some honeysuckle by his house. Then when he came home, I'd go hunting." But it was a "right cold" job, says Cigar, who now carves such masterful decoys as this hen pintail (below), which bring him from \$30 to as much as \$500.





species of birds have been identified on Assateague. The shorebirds that arrive in springtime come in unbelievable numbers. Some species I recognize. I can tell a sanderling or piping plover from a whimbrel, godwit, or dowitcher, but dozens are look-alikes to me.

"Same here," says Donna Jester, Donald Leonard's daughter, who drives a refuge tour bus. "If somebody asks me to name a bird I don't know, I tell 'em it's an 'onshore' bird, meaning I'm 'unsure' what it really is."

THE MAIN EVENT of the island year, Pony Penning Week, comes at the end of July, when no true Chincoteaguer would dream of going about his usual work, and the sheer weight of 25,000 mainland visitors bids fair to sink the island.

Early in the month's final week, the "gum-boot cowboys" of Chincoteague, who

look like watermen but ride like Cossacks, stage a roundup of the semiwild horses in Assateague's marshes and thickets of bayberry and "myrtle" (myrtle) bushes. Next day they swim the herd across the channel to Chincoteague and drive them to a pen on the fairgrounds to await Thursday's auction of the year's crop of foals.

Pony "pinnin'" dates a long way back; horses have probably lived free on Assateague for 300 years or more. Local legend has it that the first ones were survivors of a 17th-century Spanish shipwreck, but it's more likely that the first settlers brought horses with them from England and turned them loose to pasture on Assateague and Chincoteague. When the people needed workhorses, they rounded up the herd and picked the likeliest foals and yearlings to break to harness and saddle. In time the roundup became an annual social event.



An accommodating host, a pony stirs up a meal of insects in the grass for a cattle egret. Biting flies and winter winds: two prices ponies pay to live freely in the wilderness. Future generations need such wild places, President Lyndon B. Johnson said of Assateague in 1965—"a glimpse of the world as God made it."

During the 1940s, the Chincoteague Volunteer Fire Department bought up all the Assateague ponies except for a small band on the northern part of the island. By mixing good horses into the inbred herds, the new owners greatly improved the breed. A few of the imported sires were mustangs from the West. Today's herds, in the main, consist of pinto ponies.

By special permit the fire-department horses have the run of the federal wildlife refuge. They receive only emergency care, such as a ration of hay when snow buries the marsh grass on which they normally feed.

LAST YEAR, as I have many times, I watched the penning and found it as thrilling as ever. Good swimmers, like all horses, the ponies quickly crossed the narrow channel between two rows of spectator boats. The island cowboys then whooped them along South Main Street to the carnival grounds. In a cloud of dust and a thunder of hooves, the herd of a hundred or so animals flowed around parked cars, scattered pedestrians, and played hob with flower beds and lawns.

Once, as a small boy, I watched the drive from my great-uncle Dr. Smith's front veranda. Taking a shortcut across the good doctor's front yard, the horses left his whitewashed fence in splinters. They knocked the fruit from his Seckel pear tree and scared the daylights out of his fat buggy horse in its stable behind the house. But my great-uncle never even thought of complaining. "You ever have this much good fun in the city?" the old gentleman asked.

The foal auction helps make the Chincoteague Volunteer Fire Department one of the best equipped in rural Virginia. Last year's sale realized around \$8,000. To the delight of the fire department, two bidders, who had their hearts set on the same little palomino, waged a tense battle that resulted in a whopping \$625 price—the day's record (pages 814-15).

"More than once, just as in Marguerite Henry's book, I've seen a successful buyer turn his foal over to some disappointed child," said Harry Clay Bunting, fireman, seafood dealer, and master of the herd.

One year a man took away his newly purchased foal tied up and jammed into the

back of a Volkswagen, thereby incurring the wrath of the humane societies, who now police the auction, with the blessings of the firemen, to make sure something like that doesn't happen again.

The morning following the sale, the riders drive the horses back to Assateague, where they will be left in peace for another year.

Not so the people of Chincoteague, for the crowds of summer will not diminish until after Labor Day. Then the first equinoctial gale rages in from the North Atlantic, and in its wake, an autumn westerly bringing a red sunset and surcease from the biting insects of the summer salt marsh.

Gathering in twittering, peeping bands, the birds of beach and slough wing southward. On the wildlife refuge, rabbit, raccoon, white-tailed deer, and small exotic sika deer grow shaggy coats against the coming cold. The diamondback terrapin digs into the bottoms of shallow waterways where, if you know how, you can find his hiding place by poking with a stout pole. Chincoteaguers call this "mungeing." Once you feel the pole strike hard shell, you reach down and pick up your prey.

But I look into the high sky for the sign of the changing season the island people love best of all: the V's and skeins of waterfowl winging from nesting grounds in the north with their strong children of the summer. The ducks and honking wedges of Canada geese are the first to arrive, and then the greater snow geese, for whom the refuge was originally established, drop out of the sky for a winter of growing fat on the dark roots of the marsh grass. Finally, in November, come the whistling swans with their voices like those of hounds on the trail of a fox.

ON A COLD AFTERNOON in autumn, Bill Jester and I huddle on his wharf shucking and eating oysters. Unseen in the first snowstorm of the season, Canada geese honk over Assateague Channel, bound into Chincoteague Bay for shelter in the snug lee of some isolated tump.

"Come back to Chincoteague when the hunting season is open," says Bill, tilting his head the better to hear the music from the sky. "I don't think the Lord will be mad at either one of us if I shoot a goose for Sunday dinner and you help me eat it." □

INDONESIA'S ORANGUTANS

Living With the Great Orange Apes

By BIRUTÉ M. F. GALDIKAS

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Photographs by ROD BRINDAMOUR

ALREADY, at eight in the morning, the air hung hot, humid, and still in the shade of the dark Bornean rain forest. I lay in camp, eight months pregnant, barely able to move. Suddenly my husband, Rod Brindamour, burst into the house.

"One of your orange children is a murderer," he said.

I gaped in astonishment. "Go down to the river and see for yourself," he insisted.

I got up and raced as fast as my swollen legs could carry me. Years of research among the wild orangutans of Tanjung Puting Reserve, and as surrogate mother to numerous former captive youngsters, had not prepared me for the incredible scene across the river.

In a crumpled heap of orange hair lay a large infant, Doe. She was one of my favorites among the ex-captives I was rehabilitating for life in the forest. From all appearances, she had been drowned.

Half a dozen other rehabilitant orangutans had gathered around her inert body. Siswoyo hung from a branch and poked at the body with a stick. A subadult male, Gundul, gently picked up a dead hand and held it for a few moments.

Giant of the rain forest, 150-pound Nick is the centerpiece of a study of the endangered orangutans of Borneo, now in its ninth year. Though he came to accept the author's presence only ten feet away, he chased or grappled fiercely with any male orang coming within 300 feet.





A juvenile female, Sobiarsso, grabbed the corpse by the shoulders and shook it.

Then I noticed Sugito sitting quietly in a nearby tree. As a tiny infant Sugito had been the first ex-captive orangutan to reach our camp, and the one who was the closest to me. He was staring off into space with a funny look that I had never seen before. He studiously avoided looking in Doe's direction.

After some time Sugito slowly turned and came down to the ground. His reaction to Doe's body was totally unlike the others. I watched in fascination as he slowly approached. Then, standing on two legs, he raised both arms over his head and brought them down, fluttering, in front of him. The gesture reminded me of nothing less than a shaman from some obscure tribe performing rituals of obsequiousness to his god.

As Sugito climbed back in his tree, I felt uneasy. It suddenly hit me: Sugito, unlike the others, knew perfectly well that Doe was dead. He had killed her.

I had raised Sugito from infancy. I had cuddled him, called him endearing names, and handed him tidbits of food. Taking my cue from the wild orangutan mothers I was observing, I had let him cling to me night and day.

But when Sugito became a juvenile, at about 4, the process of separation had been difficult. I lacked the orangutan mother's powerful jaws and large canines that enforce a juvenile's quick and relatively painless independence.

Killing Brings Agonizing Realization

Now Sugito was 7, and I faced the dreadful consequences of inadvertently raising an orangutan as a human being—an adolescent who was not only incredibly curious, active, and tool using, but one who killed.

A few months earlier we had found the body of a sweet female infant—drowned, battered, and mutilated. It was unmistakably the work of an orangutan. Shortly afterward, Sugito had caught another female infant and held her face down in the river until we rescued her.

I want to emphasize that these rehabilitant infant killings have nothing to do with wild orangutan behavior. Wild adult orangutans are predominantly solitary and usually very nonaggressive, gentle creatures. They have never been observed to kill.

Sugito was something different. Perhaps the biblical analogy was apt: Raised by a human mother and exposed to human culture, he had eaten of the "tree of knowledge" and lost his orangutan innocence. Now, in a very non-orangutan way, he was acting out his jealousy of the infants who had seemingly replaced him in my affection.

Rod and I were faced with a difficult moral dilemma. We had a responsibility not only to Sugito but also to the other orangutans and to the people in camp. For months we deliberated and agonized over what we should do with Sugito; no solution seemed satisfactory.

Compelling as these developments were, my real work was to study wild orangutans, the most mysterious of the great apes. The



Familiarity breeds content for former captive orangs engulfing Dr. Galdikas. Indonesian law forbids capture, and over the years officials have confiscated contraband apes and placed dozens under her care. She raises young ones at her camp in the study area (map) before releasing them near a feeding station across the river. Three older orangs at upper right, assigned to the author's care by a Java zoo, lack the attachment of longtime rehabilitants and quickly head off into the jungle.







name is Malay for "person of the forest."

Some scientists believe that the last common ancestor shared by humans and apes was a creature that, although very different from both humans and apes, could be characterized, like chimpanzees and orangutans, as a large, fruit-eating animal. Comparison of chimpanzee and orangutan adaptations to specific conditions may give us some useful hypotheses concerning the behavior of the earliest human ancestor.

Research Project Fulfills a Dream

For years I had dreamed of studying orangutans in their native Bornean forests. As a graduate student in anthropology at the University of California, Los Angeles, I had approached the late Dr. L. S. B. Leakey about doing a long-term study of the large pongids. His encouragement and help in finding funds made my dream a reality.*

My husband did something no less important; he temporarily gave up his own studies to go with me to the Tanjung Puting Reserve of Kalimantan (Indonesian Borneo).

After eight years of continuous research, Rod and I have now torn down part of the veil that long shrouded orangutan life in the wild. In total we have amassed more than 12,000 hours of observation of these endangered great apes, which, along with chimpanzees and gorillas, are humankind's closest living relatives and, after humans, the most intelligent of all land animals. And rearing our own child through his early months in close association with baby

*See "Orangutans, Indonesia's 'People of the Forest,'" by the same author, in the NATIONAL GEOGRAPHIC, October 1975. Her work has been supported by the L. S. B. Leakey Foundation, Wilkie Brothers Foundation, National Geographic Society, Jane and Justin Dart Foundation, Herz Foundation, New York Zoological Society, the Van Tienhoven Foundation of the Netherlands, the World Wildlife Fund, and P. T. Georgia-Pacific, Indonesia. Her sponsors are the Indonesian Institute of Sciences and the Nature Protection and Wildlife Management Service.

At ease in the swamp, a wild female with her infant wades a pool on a rare foraging trip to earth. Orangutans have surprisingly little fear of water. Adults are more arboreal and solitary than Africa's great apes, the chimpanzee and the gorilla.

orangutans afforded us some remarkable insights and comparisons.

Our initial research confirmed findings of other workers such as Drs. John MacKinnon, David Horr, Peter Rodman, and Herman Rijksen that adult orangutans, unlike other monkeys and apes, are essentially solitary. Males wander the forest alone looking for the fruits that make up most of their diet. The females are usually accompanied by one or two dependent offspring.

But we also discovered that immature orangutans—adolescent females and sub-adult males—are considerably more social than their elders. In fact we were fortunate to chart the development of three adolescents, Georgina, Fern, and Maud, as they passed from immaturity to motherhood.

We knew that Maud and Fern had different mothers, and thus the close relationship they shared was not that of siblings. Our first encounter with Fern in 1971 presented a ludicrous sight—adolescent Fern determinedly hanging on to the back of Fran, her mother, while infant Freddy clung to Fran's side. It took so much effort for Fran to move through the trees that she never noticed us.

We often observed adolescent Georgina, Fern, and Maud traveling together, even playing and grooming in a friendly manner. But after Georgina gave birth in 1973, her behavior changed. Without apparent provocation she would attack the others. Gradually they stopped traveling with her.

Blessed Event Occurs High in Tree

Then in late 1976 we discovered that Fern was pregnant. We were so excited that we decided to follow her continuously until she gave birth. For more than a month we slept underneath her nest tree every night.

After so much waiting the birth itself was rather undramatic, although it was the first wild orangutan birth ever witnessed. During a light rain Fern raced out of a tangle of vines where she had been feeding and quickly broke and bent branches into a nest. Since the nest was some 22 meters up (72 feet), it was difficult to see details.

For a long time Fern squirmed within the nest, occasionally wrapping her arms around a tree trunk. At one point there was a stream of what must have been amniotic fluid. After two hours movement ceased,

and we assumed that she had given birth.

Only the next morning, however, did we finally see the new infant. We named him Feb because he was born in February. He was tiny, probably weighing about a kilogram (2.2 pounds), and he seemed all head, arms, and legs. Fern frequently cradled him with one hand that almost covered him up. Feb's birth made Fran, Fern's mother, the first known wild orangutan grandmother.

In 1978 Maud gave birth to her first infant. Now all three females, initially known to us as adolescents, had become adults with their own offspring. On a few occasions we saw Maud or Fern meet Georgina and even travel with her or each other, but the relationships were very different from the friendships of their youth. Both seemed



As surrogate mother, the author learned quickly about the dependency of her jungle subjects. At 2 years, Sugito and Sobiarsio (above) expected constant attention; wild

afraid of Georgina and would not come close to her.

Noisey, another female known to us for years, also eventually gave birth. Noisey had consorted with Nick, an adult male, for a year, off and on, before she conceived and gave birth to Ned, a male, in 1976. We did not know for certain the identity of Noisey's own mother, but we did know she shared much of her home range with Beth.

Adult orangutans are relatively asocial animals who seem to express little emotion. Many contacts are characterized by complete indifference. Thus, imagine our surprise one day when we watched Beth and Noisey, both adult females, meet in the top of a fruit tree and embrace each other.

On another occasion I observed little Ned

leave his mother, cross to the opposite side of the tree where Beth was feeding, and get her to play with him. He played with total abandon, but Beth seemed gentle and controlled. She may not be a concerned grandmother, but she is probably closely related to Noisey.

When we first met Beth in 1971, she was carrying infant Bert on her neck. Bert must have been approximately a year old, because he was briefly leaving his mother's body for short distances. Conventional wisdom at the time, based primarily on zoo data, indicated that wild orangutan females give birth every three to four years. But when Beth and then Fran gave birth again in 1979, it established that—in two cases at least—the interval was about nine years.

When Beth came into estrus and weaned



infants cling to their mothers until they are 4 and are not totally weaned until 7. So-biarso at 6 graduated to the feeding station. Swinging from a tree (above), she

does a milk pan. The rehabilitants' tendency to put things on their heads may be tied to the wild ape's habit of making a canopy over its nest, the author believes.

Bert in 1976, it seemed to stimulate new kinds of adult male behavior in the forest. For example, we began much more frequently to hear the "long call," a complex series of grumbles and burbles that ends in a bellowing, probably the most intimidating sound in the Bornean jungle. The complete sequence is emitted only by adult males. The first time I heard it I thought I was in the path of a drunken elephant.

Normally, Nick called three or four times a day. One morning we found him limping badly and not calling. While Nick was silent, another adult male was calling loudly close by. We located him and discovered it was Ralph, whom we had observed years before. He was sporting fresh wounds—a cut on one cheek pad, a cut on his hand, and a large wound on his back—which suggested he had just been in a fight.

I followed Ralph the next day. He was sitting on a large branch resting when Beth, accompanied by juvenile son Bert, approached in the trees. Beth had always been a mild, retiring individual. She would leave a fruit tree at the mere approach of an adult

male. Yet here she was moving right up to Ralph, shaking a vine in his face, slapping his stomach, and tweaking a certain part of his anatomy. Ralph seemed as surprised as I was by this outrageous behavior. He did not react but stared and stared. When he finally moved, she followed.

A few hours later Ralph and Beth were several trees apart when we heard a long call from half a kilometer away. It sounded like Nick. Ralph didn't hesitate. Still chewing on a fruit, he raced off toward the caller. He moved so fast that it would have been difficult to follow on dry ground, let alone through the swamp.

In the distance I heard a barrage of extremely loud growls, hoots, and howls, unmistakably those of orangutans. Although the sounds made my hair stand on end, I kept running toward them.

I found Ralph in the trees grappling with another adult male, almost certainly Nick. The grappling lasted almost half an hour, interspersed with periods when the combatants merely sat facing each other, while Ralph gave short versions of the long call.

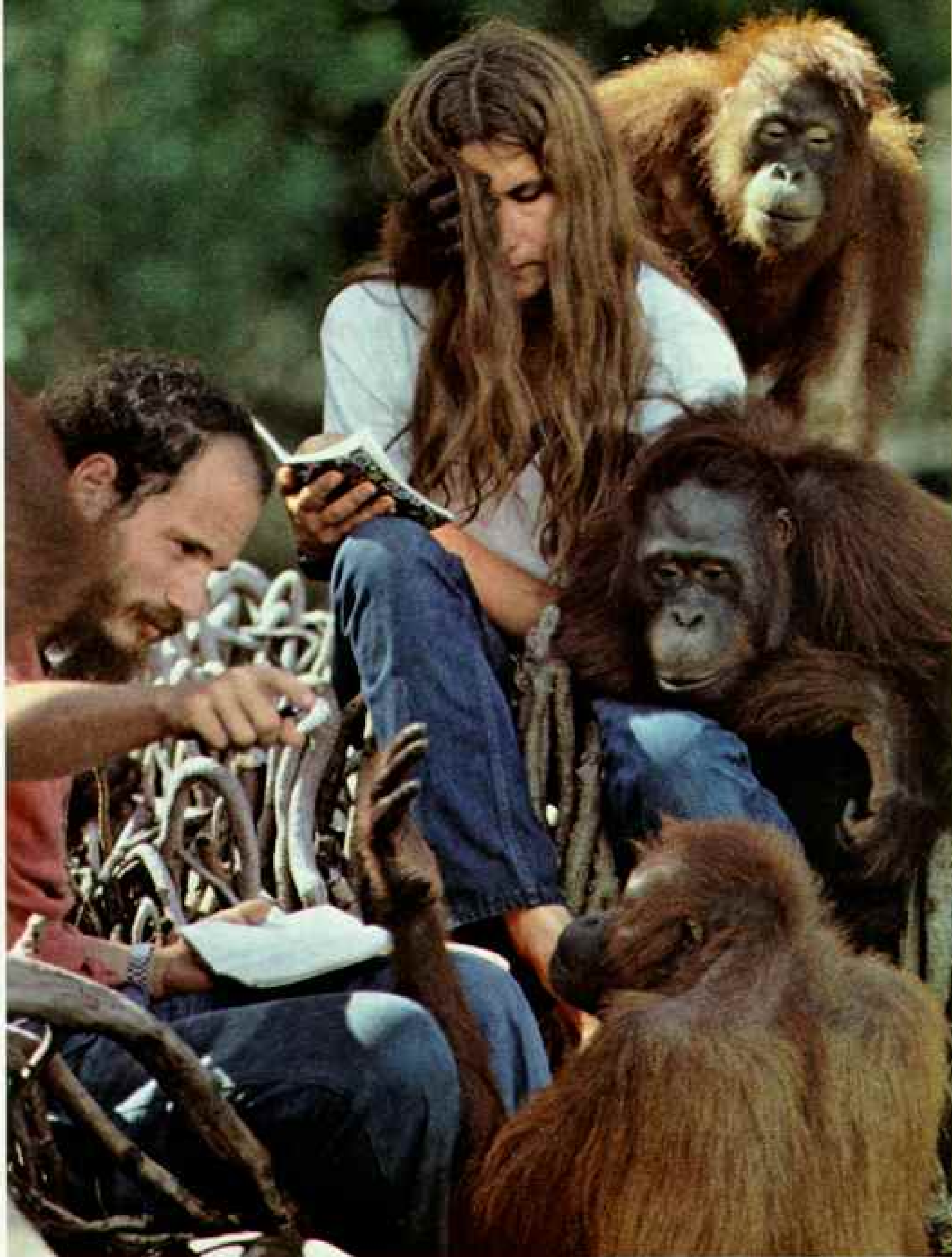


GARY SHAPIRO



Talking with orangs, Gary Shapiro teaches sign language to rehabilitants in the first such study with great apes on their home ground. Watched by a macaque (upper left), Sis with her infant learns "food." She spent so much time in the jungle eating that she later dropped out of class.

Rinnie does better; she cooperates



(left) as Shapiro shapes her hand for "flower," a sign already mastered by the observant infant Princess.

When Indonesian student Benny H. Ismunadji (center) shows Rinnie a photograph, she identifies Shapiro with his sign.

Class grows crowded (above) when Dr. Galdikas comes to observe Rinnie's

lesson. Shy Unyuk inadvertently covers one of her eyes; Rio leans on her knee. Shapiro signs, "What's that?", and Rinnie answers correctly, "tree." Both Rinnie and Princess acquired twenty signs in less than a year, a rate similar to that of the signing gorilla Koko and the chimp Washoe in the United States. Classes in Borneo continue.

Finally, Nick moved away and Ralph long-called after him. Then I noticed Beth and Bert moving toward Ralph. They had followed him in the trees.

Beth and Ralph consorted for ten days and mated several times, each time seemingly at Beth's instigation. We noticed that Beth most frequently approached Ralph after he long-called. About a month and a half later, to our surprise, both Ralph and Nick left our study area.

We observed only three actual combats in eight years. Apparently they occur only in the presence of an estrous adult female. Most of the time adult males simply avoid contact with one another.

While we carried on the wild orangutan research, we continued rehabilitating ex-captives, releasing many of them across the Sikunir Kanan River from our study area. Some adjusted quickly to their new lives. Others, such as Sis, were not so fortunate. We had to bring her back to camp when we found her half-submerged in the swamp, thin, eyes glazed, and unable to raise herself off her haunches.

Sis recovered slowly, and eventually became our first rehabilitant mother. It was the father of one of her babies, in fact, that gave one of our workmen his most frightening experience.

Dolah got the shock of his life when Sis



"Hug me!" Signing rubbed off on Binti Paul, the author's 2-year-old son, here signaling his playmate Princess (above). Binti joins his mother (right) on a check of tagged trees as she studies the orang environment. The Indo-Malayan tropical rain forest contains plants in greater variety than anywhere else on earth.



leaped on his back in the middle of camp. He looked back and, beyond her, found himself face to face with a huge wild adult male accompanying her. Sis then weighed 45 kilograms (100 pounds), so it was with some difficulty that Dolah ran into the staff quarters and locked the door behind him.

The male, named One-Eye because one eye was blind, stayed in the trees near camp for five days. He was jealous and would display vigorously whenever we touched or carried Sis.

I must admit being uneasy. I knew what males could do to their rivals with their great strength and powerful jaws. Fortunately, One-Eye never attacked. Perhaps my

strained grunts and groans as I stumbled along with Sis on my back were enough to keep him at bay. About eight months after consorting with One-Eye, Sis gave birth.

One-Eye and I never came to blows, but one of my own closest shaves with a wild orangutan involved another consorting adult male, Nick. I was trying to get close to his consort, Noisey, when she became disturbed and started kiss squeaking—gasping sharply through pursed lips—and moving into the trees in an agitated manner.

Nick, who was hanging between two vines a few meters up, suddenly hurled himself at me. From close range he stared directly into my eyes as though he wanted to bore







Food is the focus of orang existence, with reproduction a close second. The author followed adult males, such as Ralph (upper left), who are easily recognized by cheek pads, throat pouch, and size, as they ranged as far as 2½ miles a day looking for fruiting trees. At least once a day most males emit a bellowing “long call” to warn away other males and to alert females to their availability.

During monthly estrus an adult female without dependent offspring may travel with a dominant male for up to ten days. During this consort period, copulation (left) may occur several times, usually concealed by the trees. These two, Nick

and Noisey, consorted periodically for a year before she became pregnant and returned to a solitary existence. About eight months later she gave birth to Ned, still in the clinging stage at age 3 (above).

The author observed that females do not bear again for eight or nine years, not the four to five years surmised earlier. With few animal enemies, most offspring reach maturity. But humans are a real threat. Loggers destroy the jungle, and poachers kill mothers to steal and sell infants as pets on the illegal market. Indonesians have increased both the size of their reserves and their surveillance to protect the remnant of their endangered orangutan population.



First mother among the rehabilitants, Sis astonished everyone. Confined for six years in a small cage, she could not walk or open her hands when she arrived at camp in 1975. Then she refused to eat. But after a few months of freedom and attention, she regained use of her limbs and even consorted with a wild male. In 1977 she gave birth to a three-pound infant (left). She showed off the suckling infant at 3 months (below).



holes through me. No orangutan had ever looked at me like that. His gaze was so penetrating, I had to lower my eyes. After a tense half minute, Nick looked away and moved on, followed at a distance by a rather chastened observer.

Son and Young Orang Share Infancy

The birth of Sis's first infant came nine months after the birth of my child, Binti Paul Galdikas Brindamour, nicknamed Bin. We named our son for a provincial official and our adopted father, Mr. G. T. Binti. But it was a good name for another reason: In a local Indonesian dialect, a *binti* is a bird that, though small, flies very high.

Bin's development during the first year helped clear up my own thinking. Up to that point most of my adult life in the forest had been orangutans and more orangutans. We shared our mattress with five or more orange monster babies; we were surrounded by them. We saw them born, we watched them die, and we observed just about everything in between. After five years of living with orangutans, I had reached the point where the line between human and ape was getting somewhat blurred.

Sometimes I felt as though I were surrounded by wild, unruly children in orange suits who had not yet learned their manners. They used tools, liked to wear bits and pieces of clothing, loved to indulge in junk food and candies, were insatiably curious, wanted constant affection and attention, expressed emotions such as anger and embarrassment in a manner seemingly very similar to human beings.

Further, laboratory studies that indicated apes could use sign language and were capable of complex reasoning made me wonder. I was actually beginning to doubt whether orangutans were all that different from human beings.

But Bin's behavior in his first year highlighted the differences very clearly, and offered me a new perspective. At the same time I was hand raising Princess, a 1- to 2-year-old orangutan female. A 1-year-old orangutan merely clings to its mother (or me in this case), showing little interest in things other than to chew on them or put them on its head. For Princess the main interest in life seemed to be sustenance. This trait

would continue throughout life; orangutans are extremely food oriented.

Bin, on the other hand, was not particularly food oriented; in fact, unless he was very hungry, he gave all his food to Princess. He was also fascinated by objects and implements and would watch in great concentration whenever Rod or I, or an orangutan for that matter, used one of them. He was constantly manipulating objects. Another major difference was that Bin babbled constantly, while Princess was silent except when squealing.

I found it fascinating that many of the traits associated with the emergence of humankind were already expressed in Bin's development before the age of 1: bipedal locomotion, food sharing, tool using, speech. These differentiated him sharply from an orangutan of equivalent age. I knew from my experience with Sugito that orangutans were capable of such behavior at a later age, but it never developed as fully.

Language may be a case in point. I had often regretted that I would never be able to talk to Sugito, ask him questions, and hear his answers. But scientists were successfully teaching sign language to laboratory chimpanzees and gorillas.* I longed to do the same with Sugito, so that I could examine how he perceived and interpreted the world. By teaching orangutans sign language in their native habitat, we might find out what was important to them, rather than to us.

So it was that after a long interview, I invited Gary Shapiro to our camp to teach sign language to Sugito and other rehabilitants (pages 838-9). Gary had already spent two years teaching symbolic communication to an orangutan (using plastic symbols); he had also worked intensively with chimpanzees. I knew Gary was the ideal teacher when told that Washoe, the original signing chimpanzee, once had a crush on him.

There was no doubt in my mind that Sugito could learn sign language. He already was capable of simple symbolic communication—for instance, handing me the key to the storeroom when he wanted food. But, unfortunately, although Sugito stopped

*Primate researcher Francine Patterson in the October 1978 *GEOGRAPHIC* described her "chats" with a brainy gorilla named Koko, through sign language and a voice synthesizer.

killing infants, he turned increasingly dangerous and ugly as he grew older. He bit a few workmen and repeatedly raided camp.

Sugito was now entering the stage of development where other males were seen as rivals. Having been raised much as a human would be, Sugito considered human males in this category and either attacked or avoided them. Gary could not get near him, let alone teach him anything.

Eventually Rod and Gary caught Sugito after one of his most destructive raids and released him in the forest a considerable distance from our camp. Sugito was extraordinarily clever, and I have no doubt he survived quite well on his own.

Discovering an Apt Pupil

Gary, having given up on Sugito, decided to teach Ameslan (American Sign Language) to Rinnie, a bright, responsive adult female. A former captive, Rinnie had been released across the river but faithfully came to the feeding station there. Every day Gary swam across the river and spent an hour or more with her. It was her choice as well as his, for she was free to leave, free to climb into the canopy, whenever she became bored.

Although she later slowed down considerably, her initial performance was amazing. Within weeks, she was using signs and stringing them together to ask for edibles or contact. I cannot describe the thrill it gave me when Rinnie signed "Give more food" or "Gary give food." I also had to laugh when she answered "Sweet" when asked "Who are you?"

Before we can say anything conclusive about Rinnie's linguistic skills and the meaning of her utterances, Gary's data will have to be analyzed over the whole period of his research. The signs that Gary taught her seemed to be primarily a device for getting what she wanted most in life—food!

Princess used signs in a broader sense. Her rate of acquisition of signs compared very well with that of captive chimpanzees and gorillas of equivalent age, and she used signs appropriately in a wider variety of situations than Rinnie. Gary adopted Princess as his daughter, carried her around, and worked with her several hours every day. Like Sugito, she was a little terror, and I

Curiosity never satisfied, young former captives explore all the objects in camp all the time. Rio (right) puts on dirty socks; sometimes, after trying on shoes, he is mystified when he can't climb trees. Sugito (lower right) plays with a Malayan sun bear cub, confiscated from animal traders.

Gundul (bottom) tries to poke open a coconut on his first day of freedom; only once during more than 12,000 hours of observation in the wild did Dr. Galdikas or her assistants see similar tool use—back scratching with a branch. Her concern for her charges finds reward in the hug of Gundul, now a healthy subadult (below).







began to understand better all the complaints that had been leveled at Sugito over the years. Now I surprised myself by saying things like "Get that rampaging ragamuffin out of here, or I'll put her in a cage!" as Gary fondly gazed at Princess ripping pillows to shreds or splattering milk over the walls.

Princess became Bin's favorite playmate. I was extremely concerned when Bin, after outgrowing his gibbon stage (where he called and leaped around like the ex-captive gibbons near camp), began mimicking Princess. Their facial expressions, sounds, and postures became very similar. Bin always had to be watched, for he would try to follow Princess and play with her in the trees.

Sometimes he scrambled on all fours like Princess. When I carried him, he would often dangle his arms in the loose manner of an orangutan. In fact, at the age of 3 he could do a perfect orangutan imitation. It would not have been any cause for concern except that, with no other children in camp, orangutans were becoming his role models. On occasion he even bit people.

And Bin was picking up sign language, although we rarely taught him. He didn't talk to Princess; he signed to her as he also did with other nonsigning orangutans (page 840).

Meanwhile, the wild orangutan research continued. Although both Nick and Ralph

had departed soon after their combats, Ralph eventually returned to the area left by Nick. He has now lived there three years. We did not see Nick again until the end of 1977, and then only briefly. Ralph chased him. Then he was gone and I have not seen him since, though I think of him often.

TP, who was the resident male before Nick, also came and went, but the last time I saw him, in 1977, I was shocked at how he had aged. I cannot think of TP without being reminded of Rod's dream in which TP appeared wearing a top hat and a tuxedo!

Scope of Project Expands

Much has changed in eight years, not only in terms of the wild orangutan males, but also in terms of camp life. What initially began as a lone couple, Rod and I, living in a bark-walled hut in the middle of the steaming jungle, has now grown to an operation which includes Indonesian and North American university students, officers of the Indonesian Forestry Department, trained Dayak tree climbers, and other local staff.

Rod recently went back to North America to work on his own career in the computer sciences; his help has been invaluable in the analysis of orangutan data.

As Bin had more contact with other children, he totally gave up orangutan ways. Many of the orphaned infants I raised are

Clowning aerialist, Sobiarso quenches her thirst in an upside-down position that the author sometimes observed among the wild apes. Close by waits the adolescent's constant companion, B.O., short for Binti Orangutan. Immature orangs—both rehabilitant and wild—proved to be more social than adults.

The arboreal instinct can prove hazardous to former pets. Just one day out of a cage, Rinnie climbed sixty feet, grabbed a rotten vine, and plummeted to the ground, breaking her arm. The author's husband, Rod Brindamour (right), adjusts the cast under the gaze of a younger rehabilitant.



ROD BRINDAMOUR





Close as orangutans in a clutch is as close as can be (left). Creating a mirror image, Doe, lower, and Fabiana cling whenever they are distressed. The unrelated orphans, about 3 years old, arrived in camp at the same time and quickly found and mothered each other. Just as an orang mother urges 4-year-olds toward independence, the author eventually placed these two with Majid (above, right) at the feeding station. There B.O. (right) searches a visitor for food, knowing that the author hides treats under her clothes.

While Dr. Galdikas never feeds her wild subjects, she provides for the rehabilitants until they learn to compete on their own. And jungle competition is fierce. Orangutans are the largest-bodied fruit-eaters on earth. They consume more than 300 types of fruits, bark, flowers, and occasionally insects and wild honey. Their solitary nature, the author believes, is most efficient. If a group of orangs tried to harvest a fruiting tree, it would be stripped of every ripe fruit before all were satisfied. In the tropics, where trees fruit on varying cycles, orangs help disperse species by dropping seeds as they travel.



now adolescents, and some have gone back to the forest. I see Akmad and Sobiarso, my two original female monster babies, traveling across the river with wild subadult males. I know that it is only a matter of time before I again become a "grandmother."

The most promising development is that Indonesia's Forestry Department is taking strong measures to protect the forests of the Tanjung Puting Reserve. Although orangutans are on the brink of extinction, I am an optimist. I believe that as long as nature reserves such as Tanjung Puting in Kalimantan and Gunung Leuser in northern Sumatra are guarded, and nature-protection laws in Indonesia and Malaysia are enforced, these rare orange apes will survive in their native habitat.

Orangutans are not only shaped by the forest they live in, they also shape the forest, through the seeds of wild fruits that pass through their digestive tracts and are scattered as they travel their home range.

Melding Creature and Creation

Over the past eight years we have accumulated vast quantities of new data not only on wild orangutans but also on the tropical rain forest that is the orangutan's home. Each month we monitor the condition of 5,000 census trees, belonging to hundreds of different species, checking to see whether each of these trees is fruiting, flowering, bearing young leaves, or leafless. We have also established a small herbarium. We have now cataloged more than 300 different orangutan food types, fleshed out orangutan social structure, documented the mating system, mapped foraging strategies and patterns of ranging, and charted orangutan development in the wild.

Our work represents only a good beginning. Orangutans have lived as long as 57 years in captivity, so our eight-year study merely covers a small fraction of an individual's life span. Even in that time it was five years before we actually saw tool use other

than nest building and aggressive displays. On that occasion a wild adult male broke off the end of a dead ironwood branch and used it to scratch himself for half a minute.

Ultimately, my hope is to follow infants from birth to death, not only to compile life histories for a relatively large sample of individuals but also to solve questions that still remain unanswered.

How far do orangutan males range in a lifetime? How large are the breeding populations? How many times do females actually give birth? Do they exhibit menopause? The answers will be of more than passing interest to those who, like myself, are concerned with the great apes not only for themselves but also for the light their adaptations may throw on our own evolution.

It is really hard to say how close the relationship is. However, I recall one incident that may be indicative. A workman inadvertently dumped all the rehabilitants' evening rice in one large pile rather than dividing it up into several smaller clumps as usual. Gundul, the subadult male and the most dominant rehabilitant, immediately took charge. While he was eating, he let no one else even come near the rice as frustrated smaller and younger rehabilitants crowded around.

Finally, satiated, he slowly left to make a nest for the night. Rinnie, the signing adult female, was next in line. She had been agitated and frustrated by Gundul's repeated threats in her direction. Now she was going to make her own dominant position in the rehabilitant hierarchy perfectly clear. So she picked up a stick and, as half a dozen orangutans watched every move, ate her rice grain by grain. She was like some aristocratic lady, her fork daintily poised, who shows disdain for the common masses huddled around her by slowly bringing each tiny, elegant portion to her mouth. It took her almost an hour to eat the rice she wanted!

I remember thinking at the time, "Even orangutans are all too human." □

Get this ape off my back! Child's play turns to tears when Binti at age 1 climbs into Princess' bath. The ape, in a normal infant orang reaction, grabs the boy around the chest and won't let go. Dr. Galdikas enjoyed raising the two together and comparing their varying stages of development in her continuing research into the secrets of the great orange apes of Asia.



Mississippi's Grand Reunion at the Neshoba County Fair

IT IS A MIGRATION unlike any other. Each July or August a population large enough to be a town takes off for a place in Neshoba County, Mississippi, and actually creates a town—for one week.

The migration, last year by more than 12,000 people, is triggered by an urge to join in tribal rites of fellowship, a spirit-renewing celebration of good times, a festival of friendship for families, for old and new acquaintances, even for strangers.

Most come from Neshoba's county seat, Philadelphia; the rest from all across the South. The covered wagon that once brought the residents has given way to the station wagon, camper, family car, and pickup. But the luggage tends to be the same: fried chicken, ham, beef barbecue, pecan pie, coconut cake, ambrosia—a southern marvel of whipped cream and fresh fruit—and a judicious supply of sipping bourbon.

At a rural rendezvous the travelers move into 500 cabins that, through the years, have been built especially for the brief annual habitation and are passed down from one generation to another.

This community, known as the Neshoba County Fair, is joined by an additional 70,000 day visitors. And in an age of satellite communication and supersonic travel, all take uncommon delight in a round of down-home, old-timey happenings that once made the county fair the highlight of summers across America. Band concerts, prayer services, and political speeches. A flea market and art show, antique-car parade and cakewalk, talent and beauty contests. A veterans' memorial service, a rodeo, and horse racing. Shows by such as country star Barbara Mandrell, all-night sings, and square, ballroom, and disco dances.

But the most important happenings of the fair take place in the hundreds of cabins, where, packed to the rafters with family and friends, a whole way of life finds affirmation. Here at their flag-flying cabin (*right*), the Tannehill family wraps guests in the warmth of unstinted hospitality. As for the Tannehill heir, 10-year-old Rhea, on the steps at left, his life will forever reflect what he has seen and felt on this, a summer's eve.

By CAROLYN BENNETT PATTERSON

SENIOR ASSISTANT EDITOR

Photographs by C. C. LOCKWOOD





THE CENTER of the world is in Neshoba County at a sacred mound, the Choctaw Indians believed. Horse lovers feel the same way but move the site to the fair racetrack, where every afternoon the harness racers (*above*) streak like lightning around a course thunderous with cheers. Here Claude Spann, Jr., left, and Ronnie Clayton, right, jockey with other drivers for best position amid the swirling red dust of the Magnolia State's only licensed racetrack.

From the air (*right*) peaked metal roofs of the two-level cabins pattern the ground; the blessing of shade trees has yet to come to those most

recently built. Although rustic and occupying land owned by the Neshoba County Fair Association, the cabins are so valued by fairgoers that local banks will lend money on them. The association offers available building plots to the general public with the proviso that a cabin must be built within the year or the lease is forfeited.

Cattle barns and racing stables range among the trees at far left. A carnival, at center, dangles lures of thrill rides, prizes for throwing and shooting skills, games of chance, cotton candy, and a superlative barbecue cooked on the grounds by a chef who comes from Texas.





FINEST SITTING ROOM in the South, claim admirers of leafy-roofed, sawdust-carpeted Founders' Square, where

politicians—whose portraits and posters paper the fair—address the throng from an open pavilion at its center.

On the somber side, former prisoner of



war C. Earl Derrington, Jr. (**upper right**), gathers support for his message: "Honor the veteran whose car carries this special POW tag, because he may still



be suffering from the war." On the brighter side (**above**), a young campaigner uses her head to publicize gubernatorial candidate John Arthur Eaves.





KIDS RUN FREE and safe at the fair, what with traffic mostly pedestrian, crime unknown, every door open, and every grown-up a friend. One grown-up has proven such a special friend that last year the youngsters decided to run him for president, as the sign proclaims (*below*). A. J. Yates, Jr., a retired Jackson businessman who has missed only two fairs since 1905, has for years given parties for all of the fair's children who care to come. Here at A. J.'s cabin on Founders' Square, where he usually dispenses candy, cookies, soft drinks, and balloons, the kids give him a party. In answer to the query, "You're running A. J. for president of what?" the enthusiastic answer came, "President of Everything."

After a rainstorm turned the racetrack into a red quagmire, a band of boys become the happiest warriors. One, 11-year-old Michael Partridge (*left*), demonstrates a diabolical fighting style that frightens 2-year-old Julia Barrett (*right*) not at all.







“**P**REMIER SHOWCASE for politicians,” declares Mississippi’s Governor William Winter of the Neshoba County Fair, where, as a candidate last August, he happily found a baby to dandle (*bottom*).

A veteran state office seeker and holder, Mr. Winter had spoken at every fair for twenty years when in 1976 he resolved to leave public life for the practice of law. A change of mind last year put him back into politics. And the fair, he says, “is one of the few forums left that preserves the flavor of old-time stump speaking.” For decades, governors, United States senators and representatives, and all top state, county, and town office seekers have come here to test the waters, gain support from community leaders, and win the attention of the Mississippi political press, which covers the fair in full force. As a result, fairgoers have heard almost every kind of speaker, from that prototype southern U. S. Senator, John Sharp Williams, to the thundering of Governor and U. S. Senator Theodore G. Bilbo, to the reasoned debate of Governor Winter, who was educated as a historian.

Gubernatorial candidate Jim Herring of Canton (*left*) captures interested listeners, but, alas, there is not a vote among this Florida-based contingent of the McKay-Hanna-Mitchell-Fox clan.

Evelyn Gandy (*far left*), then lieutenant governor seeking to step up to governor, entered a smiling contest with the befringed and besequined Hi-Steppers from Mississippi’s Hinds Junior College.





LIVING WITNESS to bygone days, Aunt Fannie Johnson Smith, now 100 (*above*), came to the first fair in 1889 and has returned almost every year since. She recalls the days when cabins lacked indoor plumbing and "twenty-holers" served as centers for news and gossip, when a family baked so many cakes for the fair that they had to transport them in steamer trunks, when ladies wore their best dresses on Thursday, the day the governor came to make his speech.

But no such dress code applies



nowadays, as this rollicking, spur-of-the-moment chorus line on the Williams porch attests. The two generations at play here illustrate another truth: The fair gives all ages a chance to meet and find understanding.

And all ages go to the all-night sing at the pavilion (*right*), where Mildred Jordan alternates at the piano with Margaret Hester. With unbridled fervor, the crowd belts out war songs, camp songs, college songs. "Dixie." "The Old Mill Stream." "Auld Lang Syne." The night passes with memories set free.





FINALLY, after all the singing and dancing and rocking-chair telling of long tales, the fair falls reluctantly asleep. "Sleeping is cheating," says fair booster Morris Ingram. But those who need rest may retire, often to homemade triple-decker triple beds in open-to-breezes second floors, where ten, twenty, or, as in one cabin, sixty can bed down. The rule is sleep where you can, and the first to turn in sometimes awakes in a huddle of slumbering kids, with arms and legs flaying.

Even so, the young rise first. At one cabin a sleepy little girl in a grown-up's T-shirt toddles out to pet and otherwise adore a tired old brown-and-white basset hound that is long used to watching after and entertaining his best friend.

The clip-clap of harness racers on exercise runs comes from the racetrack. Cows in the barns announce the new day with

agonizing bellows, and the 4-H youngsters who sleep with their animals yawn into wakefulness. The high-school band sounds tune-up notes from Founders' Square, and with cries of "How yawl?" the fair is off to another day. Another day of mammoth buffets offered to all who come, stranger or no; of blasting heat, made just bearable by huge electric fans. Another day of blessing the family ties that bind.

Then the grand reunion comes to an end, and it's moving-out time at the Molpus cabin (*above*), which, with the cabin next door, sheltered 25 family members from Texas, Louisiana, and Mississippi.

Before leaving, the tribe buries a mayonnaise jar of memorabilia from the 1979 fair, to be ceremoniously dug up next year. "Nothing in it but family fun," says one of the kinfolk, "but it makes sense to us who love the sounds, the smells, and the feel of the fair." □

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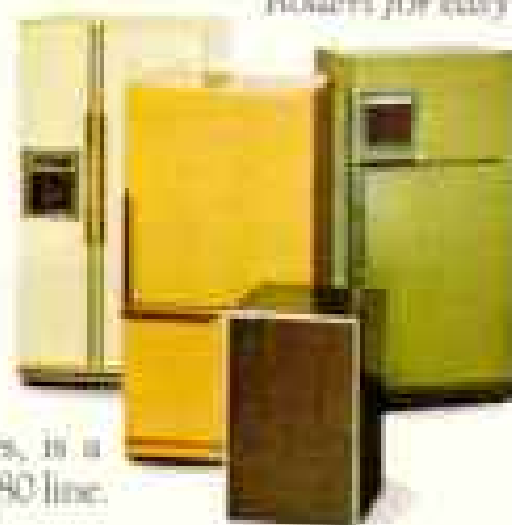
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In a city park, writer Mike Edwards (lower) displays a sketch presented to him by a young street artist. The two "big noses"—as many Chinese call Westerners—roamed China's largest city for nearly six weeks as part of the NATIONAL GEOGRAPHIC's expanding coverage of the world's most populous nation.

In next month's issue their report on Shanghai describes a notable relaxation of attitudes



MIKE SUN (ABOVE); BRUCE DALE

in this city of 11 million. For example, performers trained from childhood in the highly disciplined art of Chinese opera are back in the limelight after being denied work for ten years during the Cultural Revolution. Now that devastating era has ended, and it is permissible for the Chinese to look back at their heritage, as well as forward to their future.

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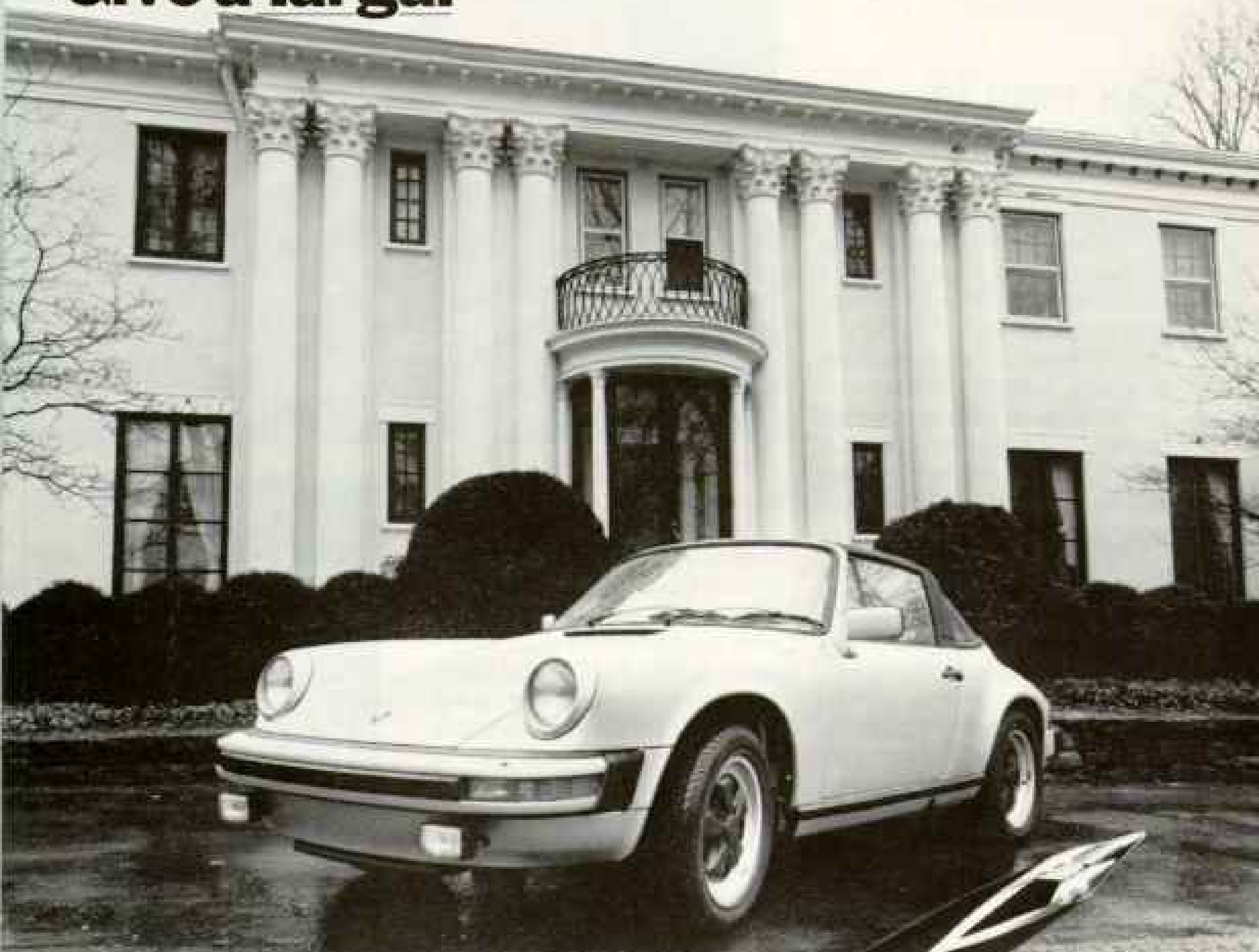
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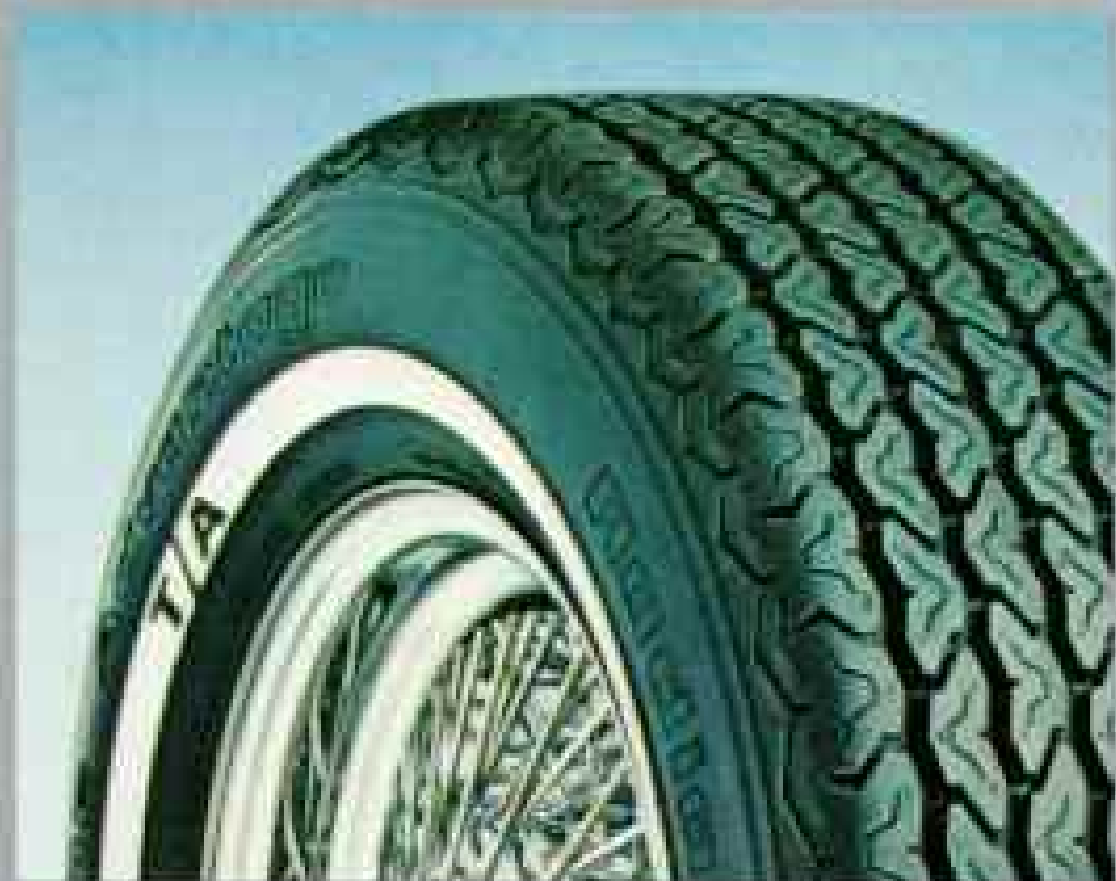
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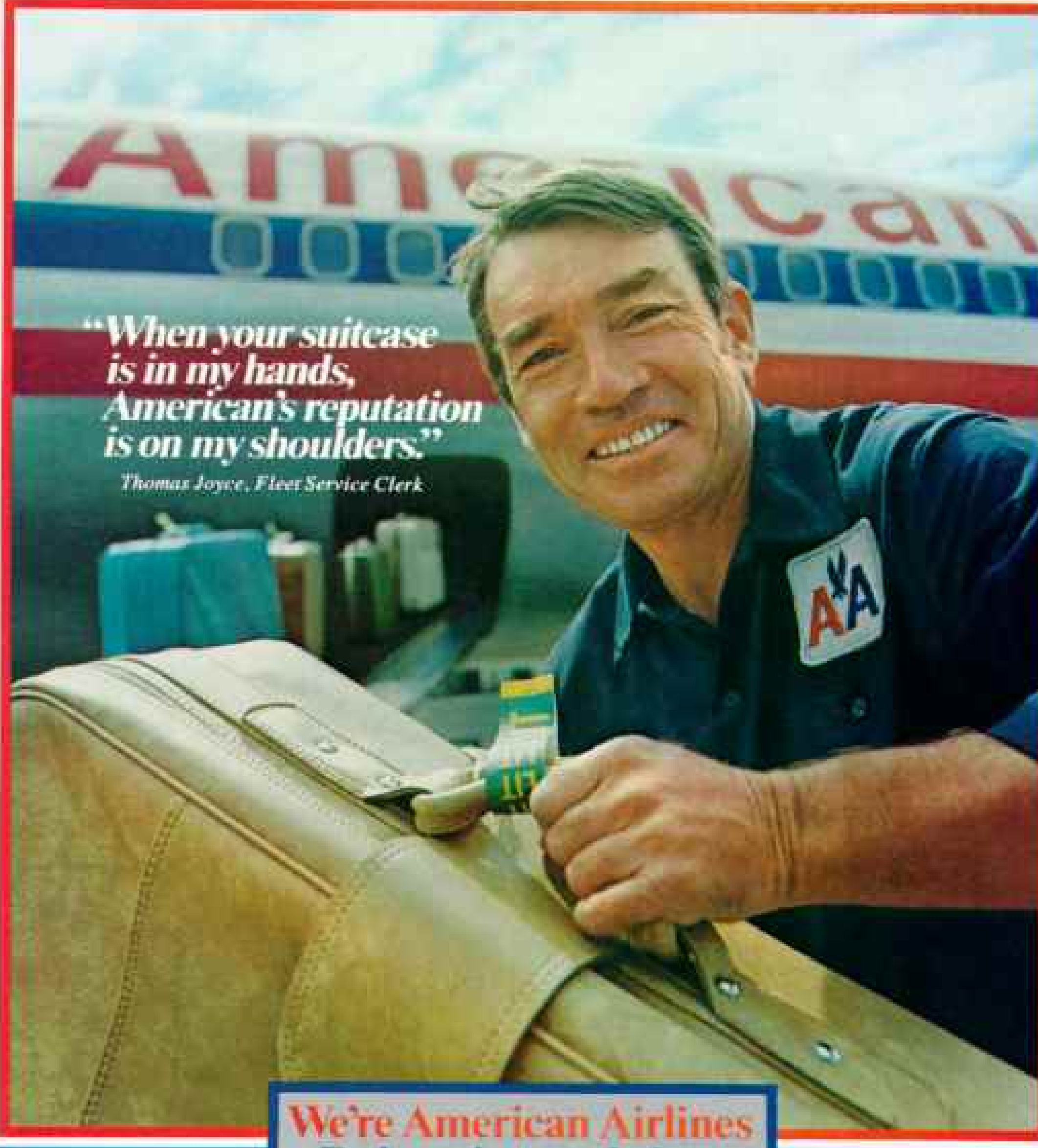
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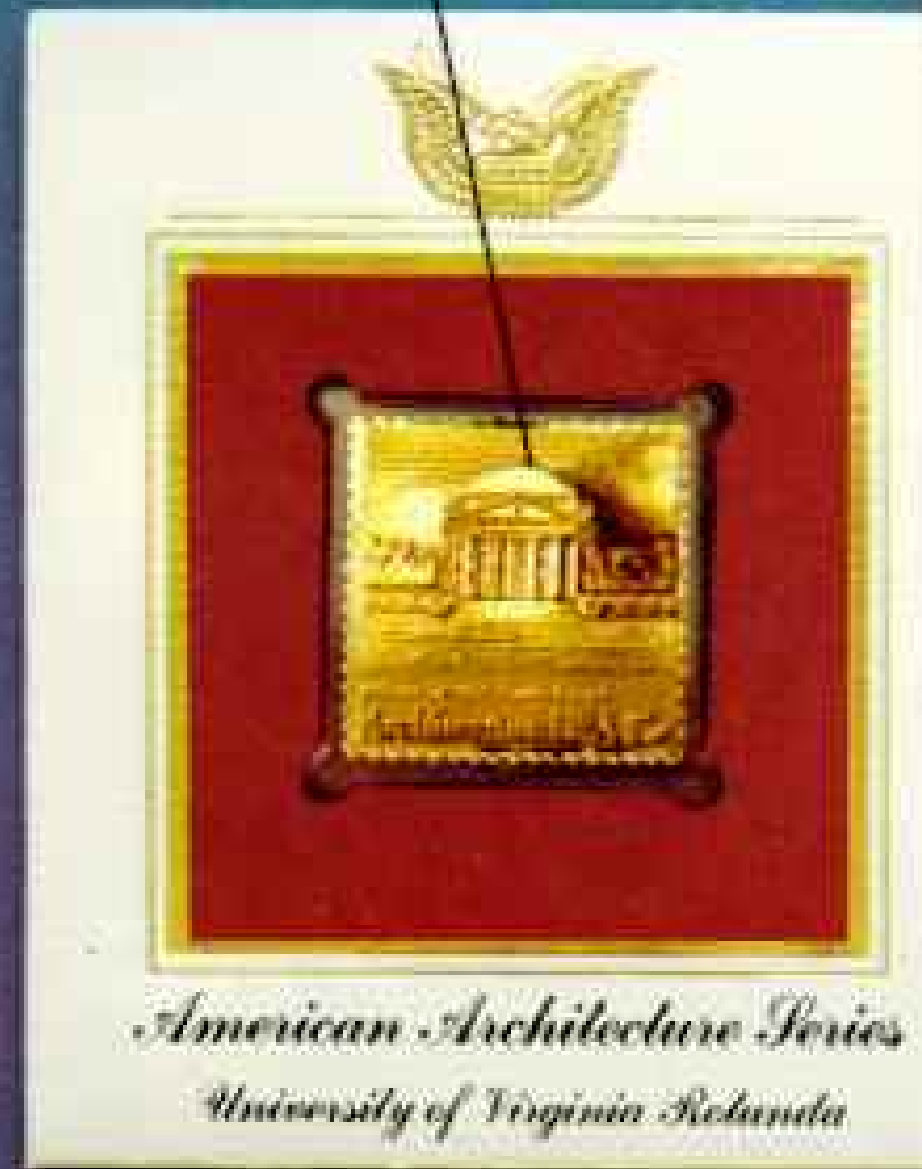
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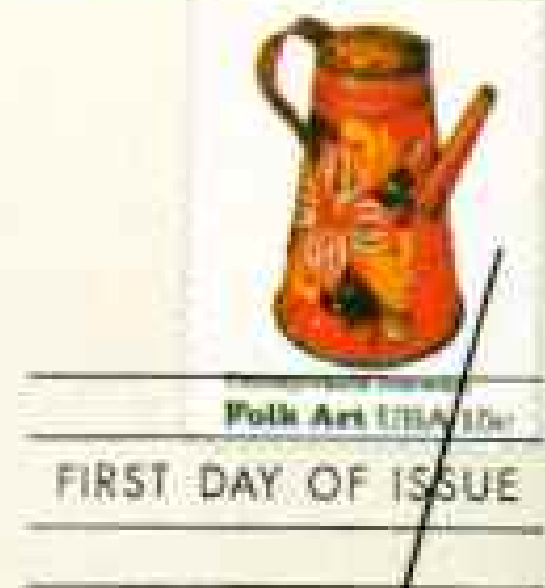
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Covers shown smaller than actual size.

NOTE: The stamps and replicas shown in this presentation are from past issues and are shown for illustrative purposes only. You will receive replicas of future U.S. Commemorative Stamps as they are issued.

Stamp Design © 1979 U.S. Postal Service

cover from its pocket for closer inspection and still not worry about the gold stamp replica itself—sealed within its own protective capsule.

Subscribe now for a favorable issue price.

By subscribing before the end of the current enrollment period, you will be enrolled at the favorable original issue price of \$5.50 per cover. This price includes the gold stamp replicas, the protectively sealed capsules, the First Day of Issue stamps, the official postmarks, the display pages with clear vinyl pockets, and your personalized collector's album. The value is all the more remarkable when one notes that other covers bearing

gold stamp replicas have been offered to collectors for more than twice the price!

No payment needed now.

You need send no money now. Simply return the application on the right before August 31, 1980. As a subscriber, you can expect to receive your covers approximately 8 to 10 times each year, depending on the Postal Service's schedule of new commemorative releases, with 3 covers per shipment. You will be billed with each shipment.

Join us for this magnificent philatelic tribute to the greatness of America—a collection that surpasses anything previously seen. A collection that you and your family will treasure for untold generations to come!

Subscription Application

22kt Gold Replicas of United States Stamps

145

Postal Commemorative Society
47 Richards Avenue
Norwalk, Conn. 06857

Guaranteed acceptance at the price quoted herein only if postmarked by August 31, 1980

Please enroll me as a subscriber to 22kt Gold Replicas of United States Stamps. I will receive a gold stamp replica for each and every new U.S. Commemorative Stamp. I can expect to receive my gold stamp replicas approximately 8 to 10 times each year (depending on the U.S. Postal Service's schedule of new commemorative stamp releases), starting in August, 1980, in sets of three each.

I will be billed \$5.50 (plus \$3.50 shipping and handling) for each gold stamp replica. I will be billed as each shipment is sent to me. A custom collector's album will be sent to me at no additional charge. I understand that either party may cancel this subscription agreement at any time.

As a convenience, I prefer to have my 22kt Gold Stamp Replicas charged, at the time of shipment, to my:

Master Charge VISA

Credit Card Number _____ Expiration Date _____

I would like my covers:

Unaddressed Personalized exactly as shown at right

Mr./Mrs./Miss _____
Address _____
City _____
State _____ Zip _____
Signature _____

Now...an exact 22kt gold replica will be created for each new U.S. Commemorative Postage Stamp!

22kt Gold Replicas of United States Stamps

Proof replicas on a gleaming surface of real gold.

Under a non-exclusive licensing agreement with the U.S. Postal Service, the Postal Commemorative Society is proud to make available an authentic replica of each new U.S. Commemorative Stamp—struck to uncompromising Proof standards with high-relief sculptured detail on a flawless surface of gleaming gold. Accompanying each mint-perfect replica is the actual stamp, cancelled with the Official First Day of Issue Postmark. The result is a collectible of unsurpassed meaning, beauty, and importance. And, if you reply promptly, you have the opportunity to start your collection at the favorable price of just \$5.50 each.

Nothing captures the grandeur and glory of this land like America's stamps. For here is where we honor the men and women who made this nation great. Where we relive the high points in our history. Where we rejoice in America's magnificent natural beauty. Where we pay tribute to our customs and folklore, institutions and ideals. Each new stamp is a patriotic treasure. And each is also an important original work of art—created by one of America's finest living artists.

Imagine the excitement, then, when each new stamp is immortalized on a gleaming surface of 22kt gold!

Each 22kt gold stamp replica is authentic down to the smallest detail.

For each new commemorative stamp that is issued, the U.S. Postal Service makes available a photograph of the original design. From this photograph, the stamp is then recreated on ribbons of 22kt gold precisely

to the original's size, shape, and official design.

First, the master engraver hand-inscribes every line and stroke of the original in raised relief upon a brass die. The die is then used to strike the 22kt gold surface in flawless Proof quality (the highest degree of minting)—just as if one were producing a magnificent medal or coin. The result is not an ingot or a medalion—but a dramatic, three-dimensional frosted sculpture standing in high relief on a mirror-surface of gleaming gold!

Much in the manner of a precious medal or coin, each Proof-finish gold replica is displayed against a rich velvety background—and preserved forever in a clear protective capsule to guard against dust, loss, or harm from fingerprints. A perfect mint specimen for your children, your grandchildren, and their children to enjoy in years to come.

The actual First Day of Issue Stamp attests to the faithfulness of the replica!

Perfectly complementing the gold stamp replica is the actual stamp—officially postmarked on the First Day of Issue to certify that these gold replica-bearing First Day Covers can never again be issued. As you examine the intricate details on both the stamp and its replica, you will see how perfectly the two correspond!

A custom-crafted collector's album will showcase your collection to best advantage.

Your name will be stamped in gold on the front cover. Inside, transparent vinyl pockets will display each cover. You may slide each

DATSUN 210
EST. 31
Hwy. 43

DATSUN 510
EST. 30
Hwy. 40

DATSUN 810
EST. 21
Hwy. 27

DATSUN: WIDEST CHOICE OF HIGH-MILEAGE WAGONS.

Datsun has more high-mileage wagons in the top ten than anybody. According to EPA gas-mileage estimates, six out of the top ten wagons sold in America belong to Datsun.

But stingy as Datsuns are with gas, they're lavish with quality. Even when the 210 Sports Luxury wagon is unloaded, it's loaded... with reclining bucket seats in front, split fold-down seats in back, elbow room all around.

Our family wagon, the freshly styled Datsun 510, boasts the exclusive new NAPS-Z engine that actually delivers better performance from less gas than last year!

Datsun's luxury wagon, the fuel-injected 810, offers all the posh and performance you'd expect in a European touring sedan for thousands less than you'd expect. Visit your Datsun Wagon station and test-drive a wagon that's built to give you more miles per gallon and more miles per wagon.

*EPA estimates for comparison. Standard transmission. Actual mileage may differ depending on speed, trip length and weather. Actual highway mileage will probably be lower than EPA estimates. California mileages lower. †Not applicable to 810 models.

DATSUN WE ARE DRIVEN

Mother Nature is lucky her products don't need labels.



All foods, even natural ones, are made up of chemicals. But natural foods don't have to list their ingredients. So it's often assumed they're chemical-free. In fact, the ordinary orange is a miniature chemical factory. And the good old potato contains arsenic among its more than 150 ingredients.

This doesn't mean natural foods are dangerous. If they were, they wouldn't be on the market. The same is true of man-made foods.

All man-made foods are tested for safety. And they often provide more nutrition, at a lower cost, than natural foods. They even use many of the same chemical ingredients.

So you see, there really isn't much difference between foods made by Mother Nature and those made by man. What's artificial is the line drawn between them.

© Monsanto Company 1980

For a free booklet explaining the risks and benefits of chemicals, mail to:
Monsanto, 800 Lindbergh Blvd., St. Louis, Mo. 63166, Dept. A3NA-NG1

Name _____

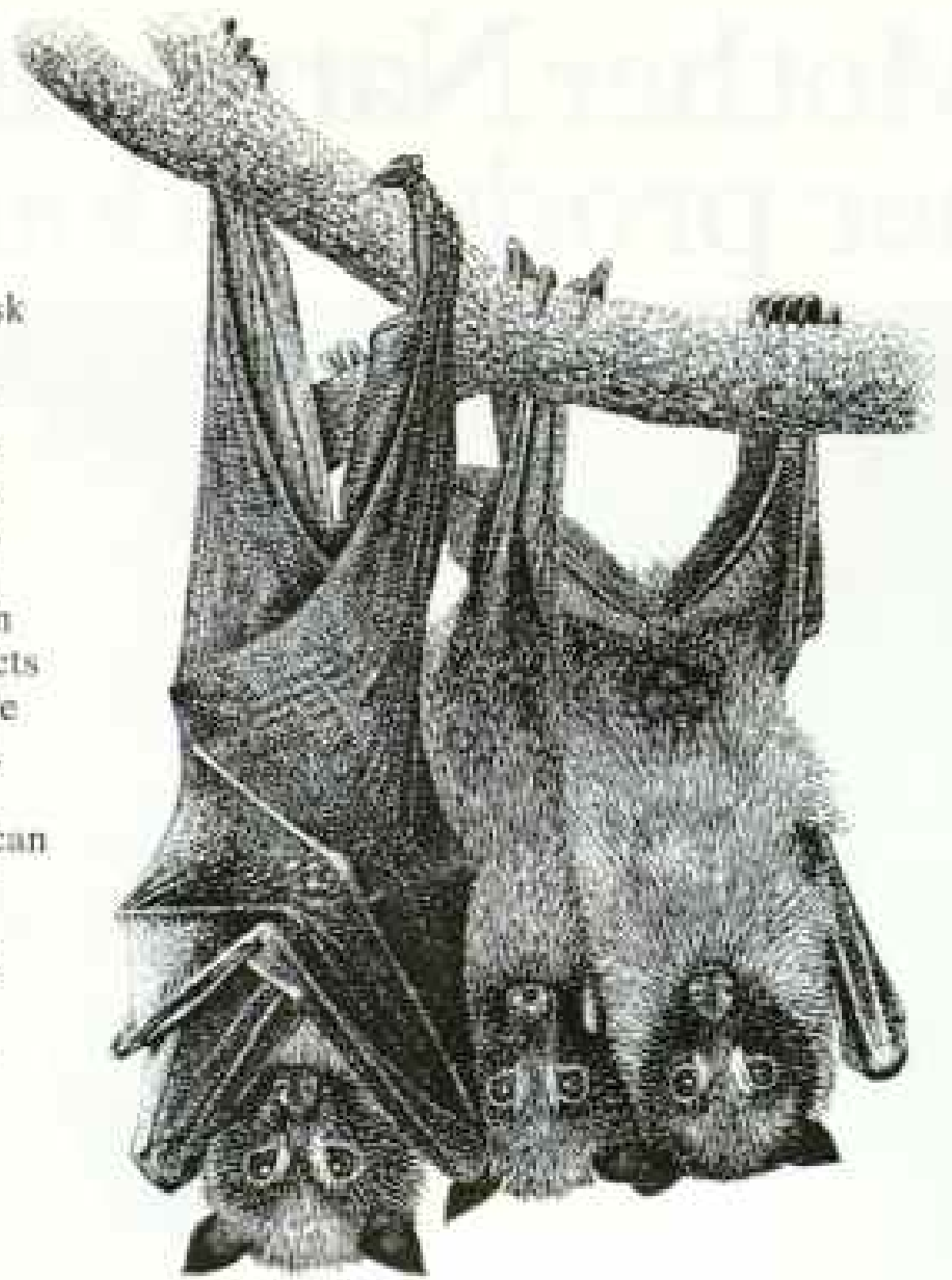
Address _____

City & state _____ Zip _____

Monsanto

Without chemicals,
life itself would be impossible.

Hanging by their toes, flying foxes await dusk to unfold their wings. Biggest of bats—the wingspan of one species reaches five feet—they thrive on tropical fruits. With eyes ten times as sensitive as man's, these fruit bats forage by sight. But sonar guides most bats. Bouncing high-frequency beeps off objects, they dart and dive for their supper. Mexican free-tailed bats snap up 20,000 tons of insects a year in Texas alone. Other members of the order Chiroptera ("hand-wing") nab lizards, gaff fish, sip nectar. Vampires drink blood. Though carriers of rabies to Central American cattle—rarely to man—vampires belie their horror-movie image. Timid, delicate, they tame quickly with skilled handling. To shed light on a nocturnal world, scientists brave eerie caves and cobwebbed attics. Readers appreciate such demanding, on-the-spot coverage. They receive it every month in the pages of NATIONAL GEOGRAPHIC.



**WHICH HAND
HAS THE PENTAX CAMERA?**

Treasures from the tomb reveal Chan Chan's past

Carbon-impregnated black ceramic vessel bears witness to an ancient kingdom as rich as a pharaoh's. Chan Chan, pre-Columbian capital of Chimor on the coastal desert of northern Peru, has yielded treasures for 500 years. Conquering Incas looted it in the 15th century. Conquistadores mined it for gold artifacts. Pedro Pizarro found a doorway slabbed with silver. *Huaqueros*—grave robbers—have been tunneling into the ruins ever since. A maze of mud-brick walls enclosed nine spacious compounds. These served successive monarchs as palaces in life,

as shrines in death. Huge adobe platforms honey-combed with chambers entombed kings, hordes of treasure, and human skeletons "stacked like cordwood"—bones of young women. They were apparently sacrificed to tend royal needs in the afterlife. Threatened by squatters, Chan Chan might have remained an enigma had not archeologists sponsored by the Society completely mapped and extensively excavated the city, puzzling out its past. Digging for facts rewards readers every month in the pages of NATIONAL GEOGRAPHIC.



The one on the right holds the Pentax Auto 110, the only 110 SLR camera with interchangeable lenses.

But, if you guessed the one on the left, you weren't far off. It holds the optional wide-angle and telephoto lenses.

The purpose of this demonstration? To show how small and convenient a high quality, SLR camera system can be.

If you've ever missed a great photograph because you didn't feel like lugging a big camera around, you now know what to do: Just get your hands on an Auto 110. **THE PENTAX AUTO 110.**



Special peppers are aged in oak barrels until the passing of years mellows them to the savory aroma and flavor of TABASCO® sauce.

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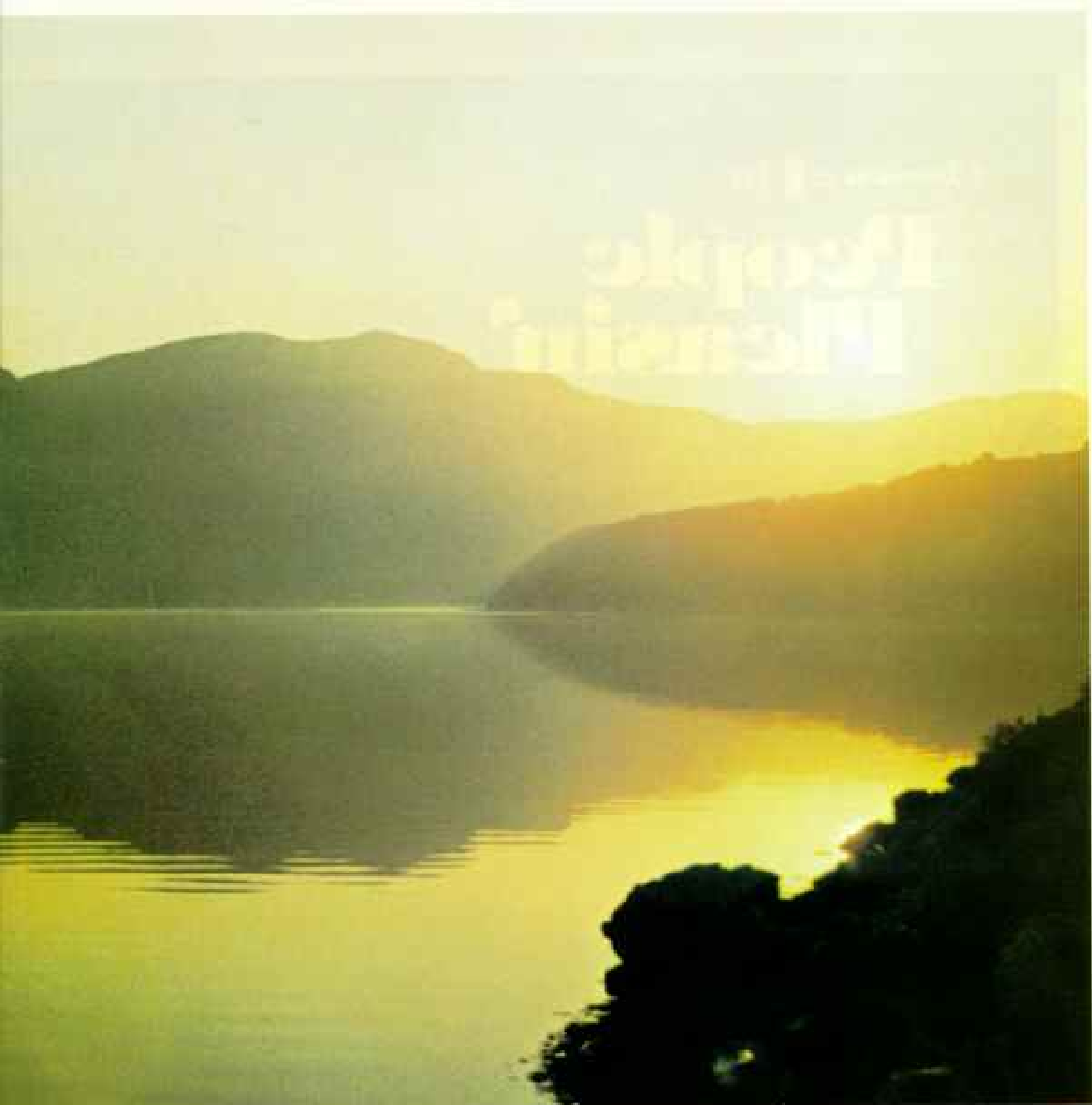
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Real quality has a way of creating its own image.

Images can be fleeting. A shadow. A rippling picture in a pond. Or they can be as lasting as a lifetime. A lifetime of hard work.

As a maker of home appliances, Whirlpool Corporation believes that a lasting quality image is simply the reflection of the people who build and stand behind the product. Special people. Motivated by pride of concept. Of craftsmanship. Of their ability to make things that last.

This is why we take pride in stocking parts for as many years as we do. Why we main-

tain a toll-free Cool-Line® service number* you can call 24 hours a day. And why we have a nationwide organization of authorized Tech-Care® service companies that are as close to you as your phone book.

You see, at Whirlpool we believe every appliance we build should create its own image of quality. And do it for one person — you.

It's our way of saying this is more than just an appliance. This is our way of life.

**Whirlpool**
Home Appliances

Chosen #1 in

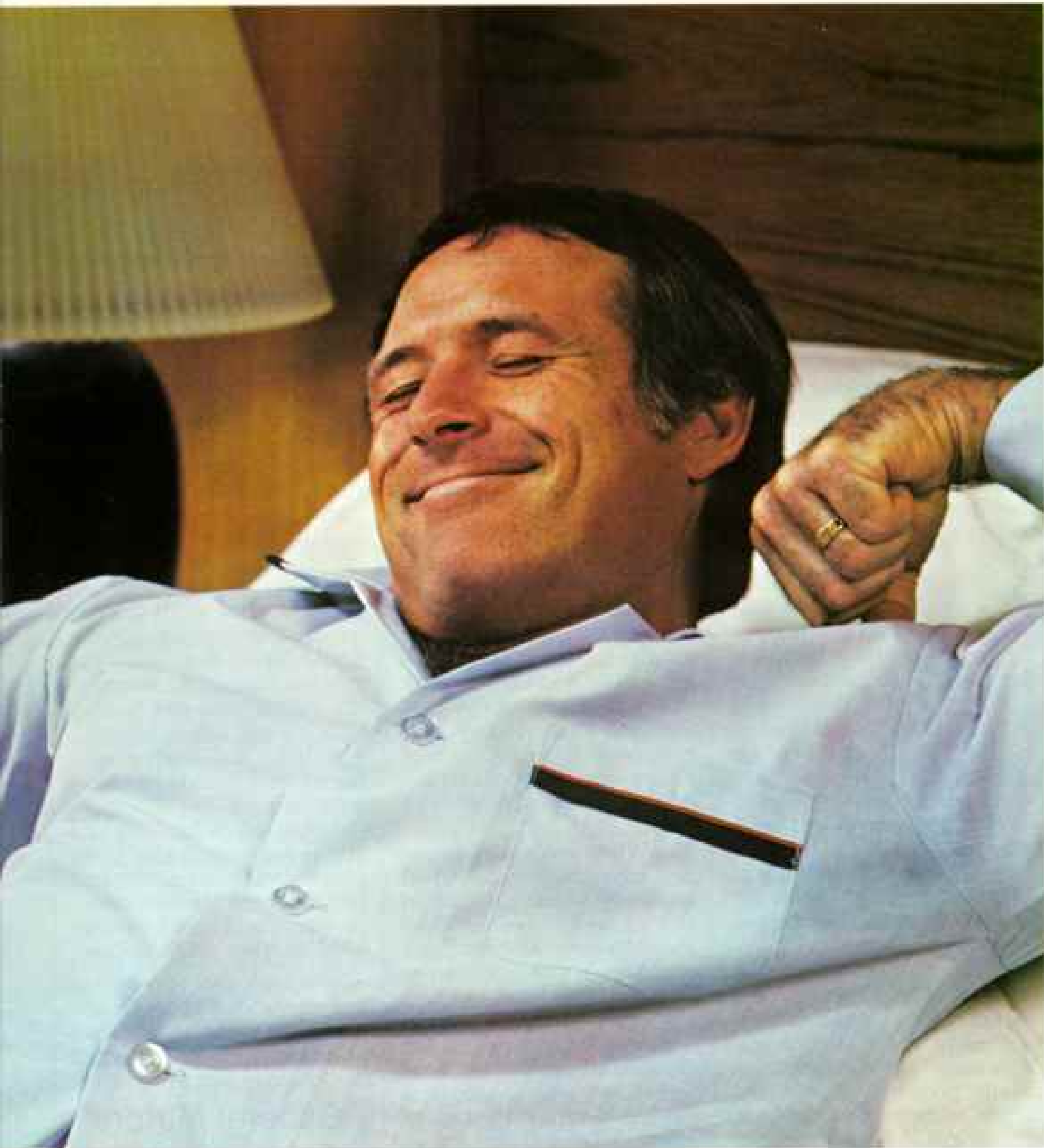
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Pleasin'™**



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At Holiday Inn, we want you
to wake up feelin' good.

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We know your best days start with a good night's sleep. And that's what our famous "no surprise"SM standards are all about. Standards for everything from mattresses to temperature controls.

Our mattresses are specified "Manufacturer's Top Of The Line," to make sure you're comfortable. And you'll find individual heating and cooling controls in every room, so you can sleep at the temperature you want.

Holiday Inn standards make sure you're comfortable. They are just some of the reasons we please more travelers than anybody else.

So, next time you travel, let us be #1 in pleasing you.



**Holiday
Inn**

HOW TO SAVE YOUR LIFE AND THE ONE NEXT TO YOU

OVERCOMING YOUR PSYCHOLOGICAL RESISTANCE TO SEAT BELTS MAY BE THE KEY.

The facts are startling. Experts estimate that about half of all automobile occupant fatalities last year might have been avoided if the people had been wearing seat belts. That's because injuries occur when the car stops abruptly and the occupants are thrown against the car's interior. Belts reduce this risk.

Many people say they know the facts, but they still don't wear belts. Their reasons range all over the lot: seat belts are troublesome to put on, they are uncomfortable, or they wrinkle your clothes. Some people even think getting hurt or killed in a car accident is a question of fate; and therefore, seat belts don't matter.

If you're one of those people who don't use belts for one reason or another, please think carefully about your motivations. Are your objections to seat belts based on the facts or on rationalizations?

Here are a few of the common rationalizations. Many people say they are afraid of being trapped in a car by a seat belt. In fact, in the vast majority of cases,

seat belts protect passengers from severe injuries, allowing them to escape more quickly. Another popular rationalization: you'll be saved by being thrown clear of the car. Here again, research has proved that to be untrue—you are almost always safer inside the car.

Some people use seat belts for highway driving, but rationalize it's not worth the trouble to buckle up for short trips. The numbers tell a different story: 80% of all automobile accidents causing injury or death involve cars traveling under 40 miles per hour. And three quarters of all collisions happen less than 25 miles from the driver's home.

When you're the driver, you have the psychological authority to convince all of the passengers that they should wear seat belts. It has been shown that in a car, the driver is considered to be an authority figure. A simple reminder from you may help save someone's life. And please remember children can be severely injured in automobile accidents, too. Make sure Child Restraint Systems are used for children who aren't old enough to use regular seat belts.

Because so many people still don't use their seat belts,

the government has directed that some form of passive restraint—one that doesn't require any action by the occupant—be built into every car by the 1984 model year. GM is offering one such restraint—a new type of automatic belt—as an option on the 1980 Chevette to gain insight into its public acceptance.

By the 1982 model year, we must begin putting passive restraints in all full-size cars and, eventually, into the entire fleet. But until you purchase one of these cars of the future, you can protect yourself and others by using seat belts and urging your family and friends to follow your example.

At GM, we're very concerned about safety. So please fasten your seat belt, because even the best driver in the world can't predict what another driver will do.

This advertisement is part of our continuing effort to give customers useful information about their cars and trucks and the company that builds them.

General Motors

People building transportation
to serve people



The Sitmar Experience

Luxury cruises to the Caribbean & South America,
Mexico, The Panama Canal, Canada & Alaska.
Consult your travel agent.

Ships of Liberian registry.

Environmental activist Jim Scherer:

“Bethlehem’s system for treating blast furnace water is so good it’s now considered the industry standard.”

Jim Scherer is one of about a thousand Bethlehem Steel people whose jobs keep them active in Bethlehem’s environmental control program.

As a senior environmental engineer at our Lackawanna, N.Y., steel plant, Jim supervises the two dozen people who operate the plant’s eight major water control systems. These eight systems cost Bethlehem \$52 million to engineer and install, plus nearly \$3.9 million each year to operate.

“We’ve spent a whale of a lot of money on our water control program here,” says Jim. “But we’ve spent it wisely and have gotten good results.

“For example, when I first became active in water control in 1961, we were only partially treating the waste waters from our blast furnaces and then discharging 100% of this water into Lake Erie. Today a complicated water

treatment system does a highly efficient job of cleaning the water and discharges only 10% back to the lake. The other 90% is recirculated back through the system.

“Bethlehem developed this pollution-control technology at our Bethlehem, Pa., plant, and now four of our plants are using it. The EPA has recognized the method as the best way to bring blast furnace gas scrubber water to within current clean-water standards.”

Bethlehem’s commitment: To do what is necessary to protect public health.

We’ve made substantial progress in controlling pollution at all our facilities and we’re planning to do more. We’ve already spent \$700 million for pollution control equipment and may have to spend several hundred million more in the years ahead.

But we believe there’s a limit. To require industry to “purify” the air and water beyond what is necessary to protect health does not make good economic or energy sense. A balance must be struck

between an absolutely pure environment and a healthy environment, so that the economy of this nation has the opportunity to thrive.

Our position is clearly explained in our *Statement on Environmental Quality Control*. If you would like a copy, write: Public Affairs Department, Rm. 476, Bethlehem Steel Corporation, Bethlehem, PA 18016.

Bethlehem 

The Lackawanna Plant’s Water Control Station No. 9 houses the controls and pumps for the blast furnace gas washer water recirculation system. Placed “on stream” in late 1979, the project cost \$4 million. Water is recirculated through the system’s 30-in.-diameter pipes and five large tanks at a rate of about 7500 gallons a minute.



Bermuda. Get away to it all!



"We bring the children to Bermuda
and we feel at peace with ourselves.
It's a great escape."

Doug and Gail Coupe on the Coupes'
fourth visit to Bermuda.

"We visited the old print shop on Featherbed
Alley in St. George's. It's a town that gives
you a feeling of history. Of things past."



"We get on the motorbikes and just
let the free spirit in us take over.
For us, the bikes are Bermuda!"



See your travel agent or write Bermuda, Dept. 714
630 Fifth Avenue, N.Y., N.Y. 10020 or Suite 1010, 44 School St., Boston, Mass. 02108
or 300 North State Street, Chicago, Ill. 60610

Now you
see him.



Now you don't.

Flash! I got the shot anyway.

Just when I wanted a second shot of my son Chris on the beach one evening, he did the great cover-up. Which, for me, created an even better shot.

Taking on-the-spot pictures is easy with my Kodak Tele-Ektralite 20 camera. Because the flash is built right in, I'm always ready in a flash to tell my family's stories in sharp, clear pictures.

And with the built-in telephoto lens, it's like getting twice as close. Kodak Tele-Ektralite 20. That's one easy, aim-and-shoot camera.

Kodak Tele-Ektralite 20 camera.

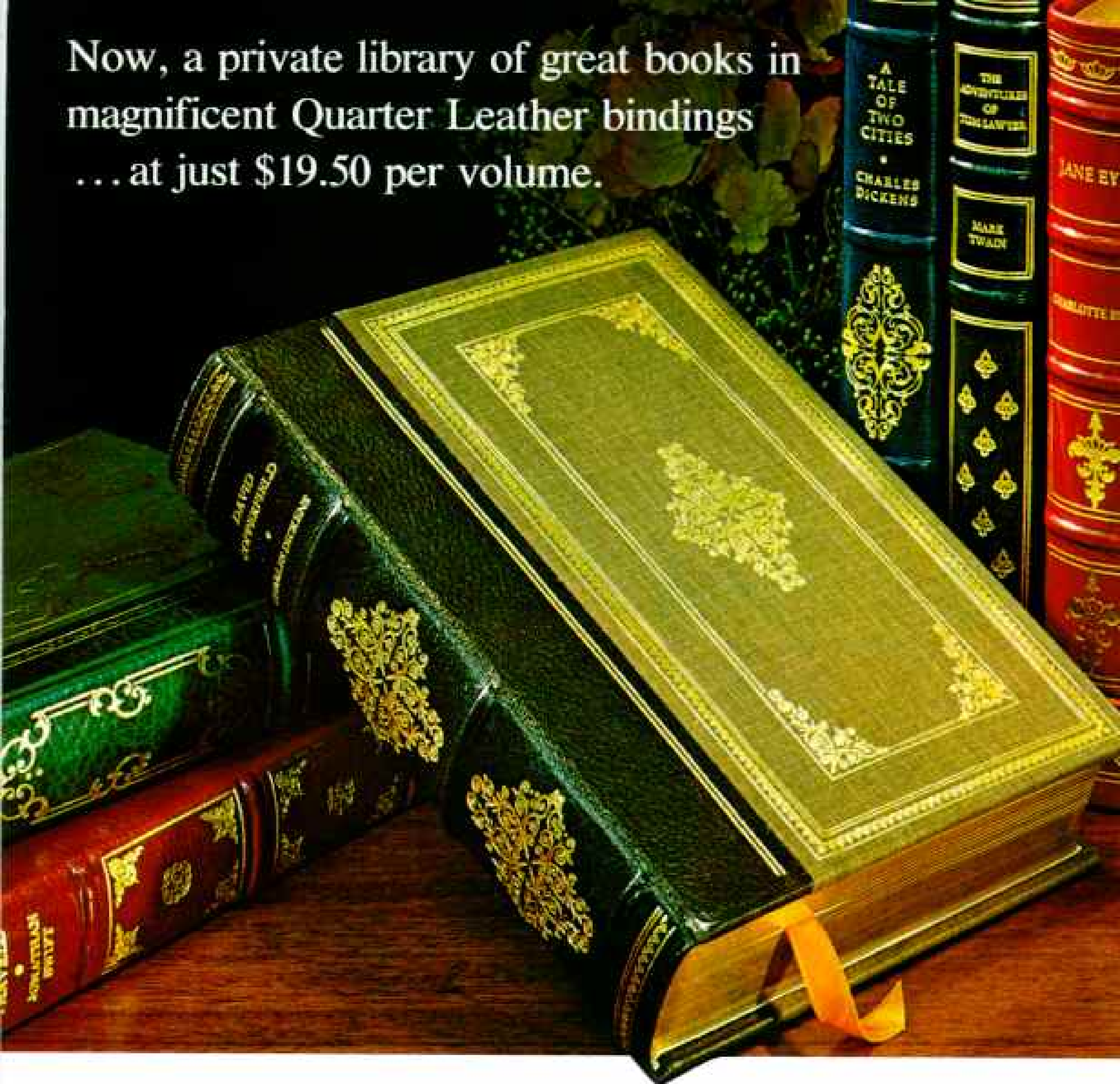
1880



1980

America's Storyteller

Now, a private library of great books in
magnificent Quarter Leather bindings
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"Books are the treasured wealth of the world," wrote Thoreau—"the fit inheritance of generations." For great books have the power to enrich the mind and the spirit. To expand our horizons. To make our lives more interesting. To make *us* more interesting.

Now, The Franklin Library brings you the fifty greatest, most readable, most memorable classics of world literature in an edition of great and enduring beauty . . . at an affordable price.

These are the *universal* classics—the very core of the cultural heritage of all mankind—specially



Books of enduring beauty

As you open each volume and turn its pages, you will discover new delights. The decorative endpapers and bound-in ribbon page marker—carefully and tastefully color-coordinated to the book's covers. The page edges, gilded with a special tarnish-free finish, adding protection as well as beauty to each volume. Magnificent illustrations, some in full color. And the bookpaper specially milled to retain its beauty for generations.

For these luxurious volumes will be crafted to *retain* their beauty. So that this private library will be a lasting heirloom. To be treasured by you and your family now, and by your children and your children's children in years to come as "the fit inheritance of generations."

Imagine the satisfaction of glancing around your living room and seeing this treasury of great literature—the fifty volumes which make up The Family Library—the rich leather of their spines enriched by 22 karat gold ornamentation.

Imagine the pleasure of anticipation, as you slide one of the volumes from its place, open it at the bound-in ribbon marker, and begin to read. Enjoying the handsomely printed text, the fine, evocative illustrations.

And imagine, too, seeing your family immerse themselves in these challenging and enduring works of literature—and reaping all the rich rewards which that entails.

Return your application postmarked by June 30, 1980.

The Family Library of the World's Great Books is being offered at this time at the attractively low price of just \$19.50 per volume. But it is available at this price *only* to those who subscribe to the complete collection.

The accompanying application assures you of the *guaranteed* price of just \$19.50 per volume for the entire Family Library. And you have the right to cancel your subscription at any time upon 30 days' notice, or return any book, for any reason, within 30 days. To be accepted, your application should be postmarked by June 30, 1980.

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As a subscriber, the first volume you will receive will be Dickens' *David Copperfield*, one of the greatest novels ever written. A novel whose story closely parallels Dickens' own life. "Of all my books," Dickens said, "I like this the best."

And each month thereafter, you will receive one additional book—its pages filled with the world's greatest writing. Each book a delight to read and reread, until its scenes and characters and insights—the *life* and *experience* within its pages—become the stuff of memory... leaving you and your family forever enriched.



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Please mail by June 30, 1980.

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Franklin Center, Pennsylvania 19091

Please enter my subscription to *The Family Library of the World's Great Books*, consisting of 50 volumes bound in genuine leather combined with fine fabrics. The books will be sent to me at the rate of one each month, and the issue price of \$19.50* per book will be guaranteed to me for the entire library. However, I have the right to cancel my subscription at any time on 30 days' written notice, or return any book within 30 days.

I need send no payment now. I will be billed for each volume, individually, in advance of shipment.

*Plus my state sales tax and \$1.95 per book for shipping and handling, subject only to postage increases.

Signature _____

ALL SUBSCRIPTIONS ARE SUBJECT TO ACCEPTANCE

Mr. _____
Mrs. _____
Miss _____

PLEASE PRINT CLEARLY

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State, Zip _____

Canadian residents will be billed for each volume in advance of shipment at \$23.50 plus \$2. for shipping and handling. (SCDN)

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Noted
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professor, critic
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writer of
perceptive and
humorous plays
and books



Ford Fiesta. It received a seven-flag salute.

The car that wowed Europe is winning the hearts of America.

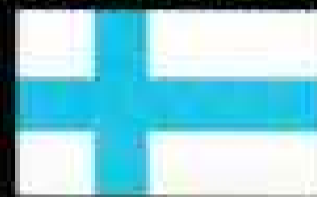
Ford Fiesta. The little front wheel drive car that comes from Germany. Applauded all over

Europe by the experts for its engineering, design and overall performance. It was voted the most significant import of the year in 1978 by readers of *Car and Driver*. And when you understand how beautifully Fiesta performs, you'll understand why it continues to get rave notices.



Germany 1976
Car that Makes the Best Sense — *Mot*

Europe by the experts for its engineering, design and overall performance. It was voted the most significant import of the year in 1978 by readers of *Car and Driver*.



Finland 1976
Car of the Year — *Tuultiesi*

Front wheel drive.



Denmark 1976
Car of the Year — *Morgen Posten*

Through rain, ice, sleet, hail and snow, Fiesta's remarkable front wheel drive traction will help you keep your appointed



Italy 1977
Most Successful Foreign Car — *Motor*

rounds. And its Michelin steel-belted radials will help you come to grips with all kinds of roads.

True German efficiency.

Americans love Fiesta's manners. It prefers sipping to guzzling. Just consider these EPA mileage figures.

26

EPA
EST
MPG

38

HWY
EST
MPG

Now compare these estimates to other German imports. Actual



Yugoslavia 1977
Car of the Year — *Automotive Writers*

mileage may differ depending on speed, weather and trip length. California estimates will be lower. Actual highway mileage will probably be lower.



Great Britain 1978
Design Council Award

Spain 1977
Car of the Year — *Criterion*

A masterpiece of European engineering.

Fiesta is assembled by Ford in Germany. And its European engineering makes it feel right at home on streets and highways of America. It's quick, nimble and maneuverable.

Ford Fiesta is sold and serviced by over 5,000 authorized Ford Dealers across America. There's even an Extended Service Plan available, providing longer protection over your car's basic warranty. So test-drive a Fiesta today. You'll discover why it's won international acclaim.

FORD FIESTA

FORD DIVISION



Fiesta. Wundercar from Germany.



Fiesta 3-Door Sport



OH
WHAT
A
FEELING!

TOYOTA

Tap the power assisted front disc brakes. Haul it down for the turn. Now, the straight beckons. Power on, the tach climbs.

The Celica GT Liftback. A unique combination of the fantastic, and the practical. What other car can inspire such feelings, yet be bought and maintained without remortgaging the house?

And this year, the new 1980

Celica comes even closer to the perfect melding of excitement and affordability.

The front end is restyled. It's longer, bolder, more suggestive of the power waiting in the 2.2-liter overhead cam engine. Outside mirrors are faired into the windshield pillar. Powerful tungsten halogen high beam headlights are standard, too.

Inside, the redesigned seats offer more side support during hard cornering. Of course, the features that have long made the Celica GT such a good value (like a 5-speed overdrive transmission, AM/FM stereo radio and full instrumentation) are still standard.

The Celica GT Liftback. It's lean and clean and a little bit mean. Make it your machine.

THE CELICA GT LIFTBACK.
LEAN, CLEAN,
AND A LITTLE BIT
MEAN.



How to fit four states into one day.

There are two words for an executive who sets up his daily schedule in four states. One's aggressive. And the other is successful.

People who would add crazy, are probably ill-informed on the advantages of the company airplane.

That's why Beech Aircraft has put together a file of cold, hard facts, case histories, and simple logic on the business aircraft.

It shows how any company, large or small, can expand its territory and profitability, without depleting its treasury, with a Beechcraft company plane.

It shows how a Beechcraft company plane can stand up to the scrutiny of cost accounting by giving you more travel for less money.

And it shows how you can make a breakfast meeting in Denver, a plant inspection in Salt Lake City, a luncheon in Pocatello, a sales banquet in Cheyenne, and be home in



Denver for the 10:00 o'clock news, if that's what it takes.

Because sometimes, that's what it takes.

**Send for your free
Management Guide to Business
Aviation in the '80's and give new
meaning to "a day's work."**

Write us on your company letterhead, and we'll send you everything you need to decide whether your company can profitably use a Beechcraft. And which Beechcraft suits you best. Write to: Beech Aircraft Corporation, Dept. A4, Wichita, Kansas 67201, and please mention if you're a pilot. If you'd rather call, call collect and ask for Dick Schowalter, Jr. (316) 681-7072.



Member of General Aviation Manufacturers Association

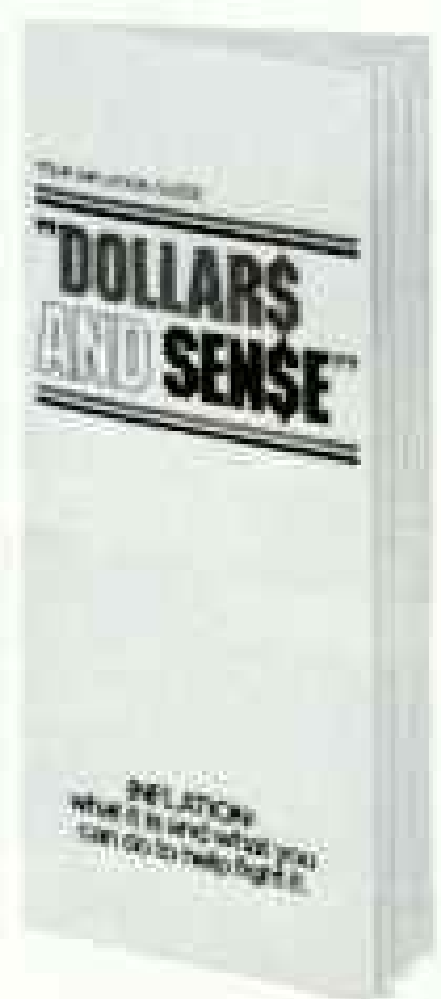
The Pressurized Beechcraft Baron 58P. A hard working business airplane that can carry 6 people in pressurized comfort at up to 300 mph.



**“Everything
you’ve always
wanted to know
about inflation,
but didn’t know
who to ask...”**

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A public service message of The Advertising Council and The U.S. Departments of Agriculture, Commerce, Labor and Treasury. Presented by this magazine.





Buick LeSabre. The more logical we made it, the better looking it got.

Without changing its character as an elegant, 6-passenger automobile, we've done some very logical things to the 1980 LeSabre. For instance, compared with last year's model, its tires are designed to roll more freely. The entire car is lighter. And it has been reshaped, millimeter by millimeter, to deal more decisively with wind resistance.

There's impressive logic under the hoods of our LeSabres, too. The even-firing 3.8 liter V-6 is standard, and generates **18** EPA-estimated mpg and 24 mpg on the highway. The LeSabre Sport Coupe's standard power comes from a turbocharged version of the 3.8. And the 4.1 liter V-6 is available

EPA EST MPG	EST HWY	EST DRIVING RANGE	EST HWY RANGE
18	24	450	600

The 1980 LeSabre. We made it more logical. And it got better looking along the way. Talk to your Buick dealer about buying or leasing one.

Remember: Compare the boxed estimates to the estimated mpg of other cars. You may get different mileage and range depending on your speed, trip length and

weather. Estimated mileage and range will be less in heavy city traffic. Your actual highway mileage and range will probably be less than the highway estimates. Estimated driving range based on EPA-estimated mpg rating and highway estimates. These range estimates are obtained by multiplying LeSabre's fuel tank capacity of 25 gallons by the EPA and highway estimates. Estimates higher in California.

Buicks are equipped with GM-built engines supplied by various divisions. See your dealer for details.

The 4.1 liter V-6 and the V-6 Electra are not available in California.



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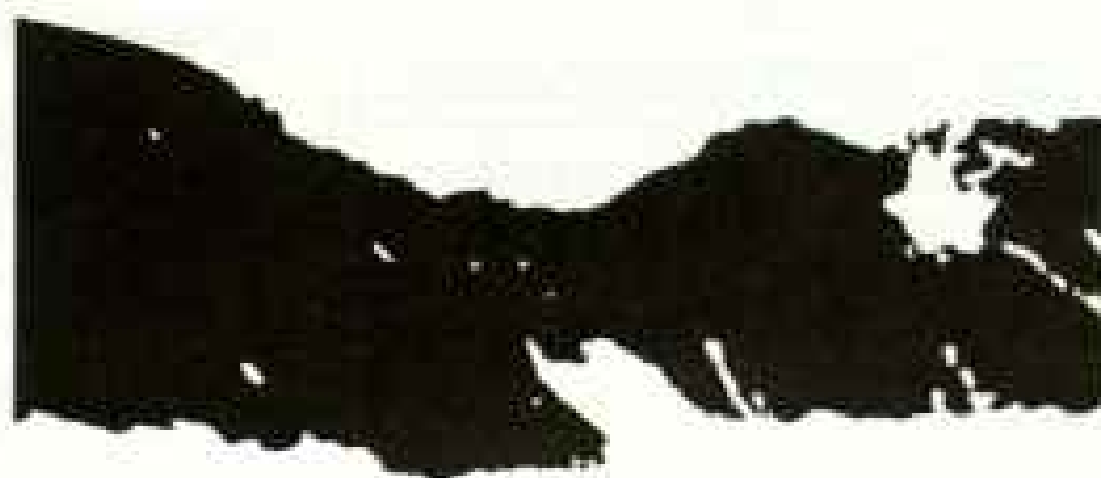
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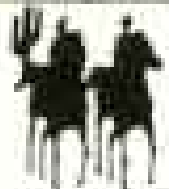
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A close-up photograph of a man's hand holding a diamond bracelet. The hand is positioned in the center of the frame, with the fingers gently gripping the bracelet. The bracelet is made of a gold-colored metal and features a series of small, round-cut diamonds set in a channel. The background is a dark, textured fabric, possibly a suit jacket, with a belt buckle visible in the upper right. The lighting is soft, highlighting the texture of the skin and the facets of the diamonds.

She always tells me to trust my instincts.

A diamond is forever.

The bracelet shown is available for about \$2,700. The price may change substantially due to differences in diamond quality and market conditions. Your jeweler can show you other diamond jewelry starting at about \$350.

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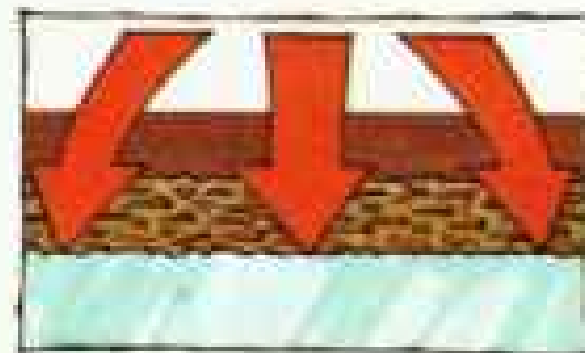
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