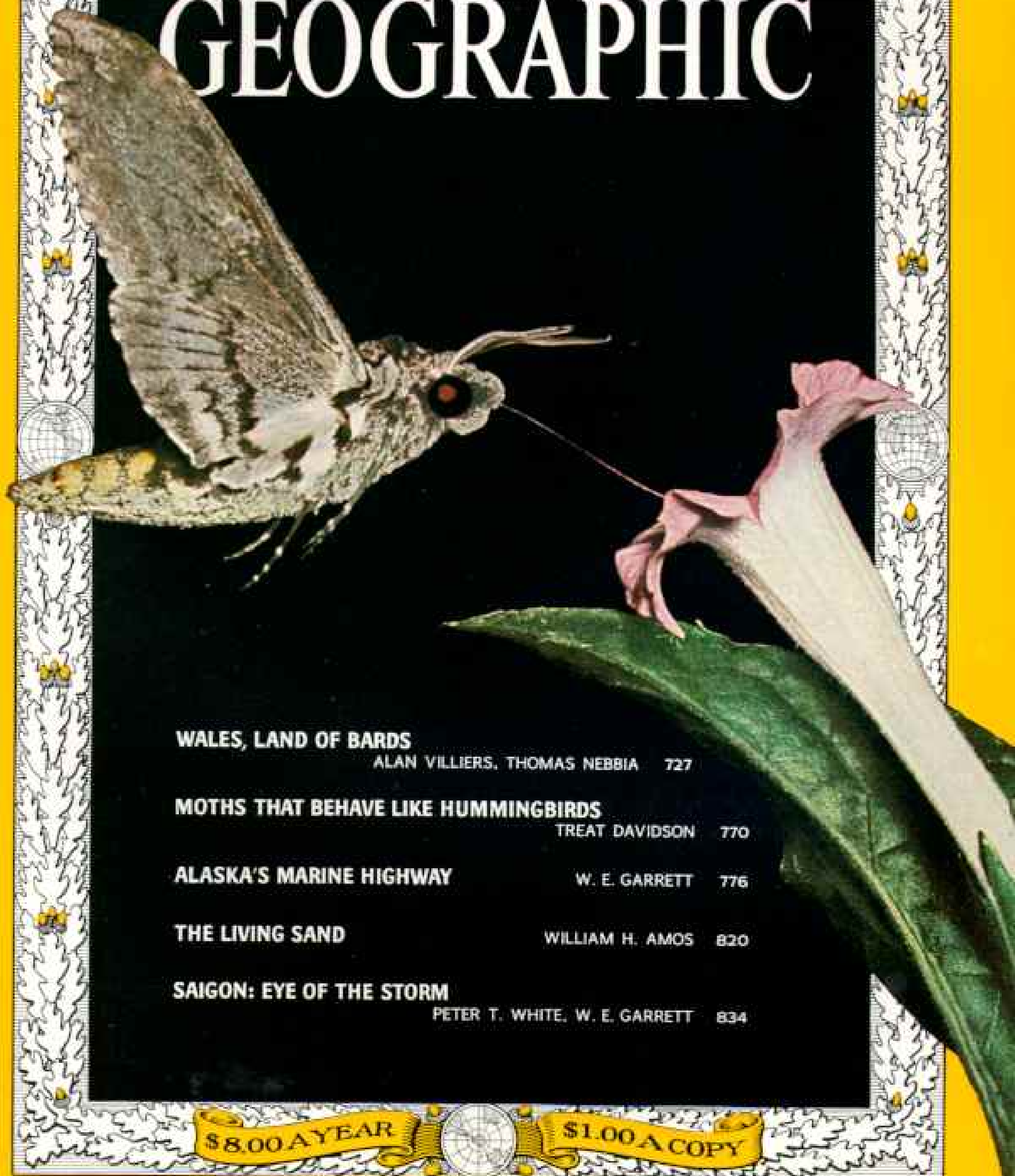


VOL. 127, NO. 6

JUNE, 1965

NATIONAL GEOGRAPHIC



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◀ COVER: Camera's electronic flash captures a sphinx moth sipping nectar from a tobacco blossom (page 770).

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Then, one night last January, a couple of archeologists spun us a tale of a mountaintop city built by the Incas 500 years before the Conquistadores.

The place is Machu Picchu and it wasn't long before we were flying down to South America to find it.

A Panagra Jet took us to Lima, and from there we flew to Cuzco, where we embarked on a three-hour zigzag by bus-train along the rushing Urubamba River and 2000 feet up to Machu Picchu.

A majestic city walled in by kings, Machu Picchu bears no sign of strife. You can stand at the perimeter of the city and conjure up images of sharp-eyed Inca warriors peering down at the Conquistadores scurrying below for gold, never dreaming the prize of Machu Picchu lay high above them.

Machu Picchu was never captured, never plundered, yet some time after the Conquistadores, everyone in the city

disappeared. For us, this is the most spectacular (and mysterious) sight in all the Western Hemisphere. And, if there are any challengers to that statement, they're in South America, too.

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Budapest revealed

FOG OVER THE CAPITAL of Communist Hungary—both real and official—lifted recently for Franc Shor, NATIONAL GEOGRAPHIC Associate Editor. Seeking aerial views of Budapest, he half-jokingly asked the Foreign Ministry for a Hungarian Air Force helicopter. Surprisingly, red tape snapped, and the editor took to the air over the Parliament Building and Danube River—one of few Western journalists to photograph a Communist country from its own military aircraft. Earlier, he had spent several weeks exploring the millenniums-old city on foot.

Mr. Shor's revealing report, in a later issue, typifies on-the-spot NATIONAL GEOGRAPHIC coverage. Enable friends to enjoy this and other features; give them membership in the Society or nominate them on the form below.



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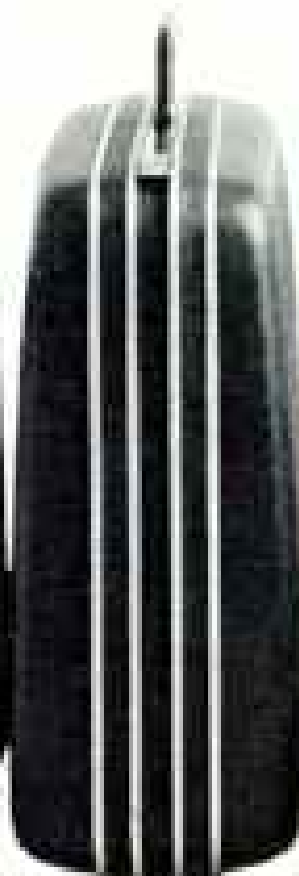
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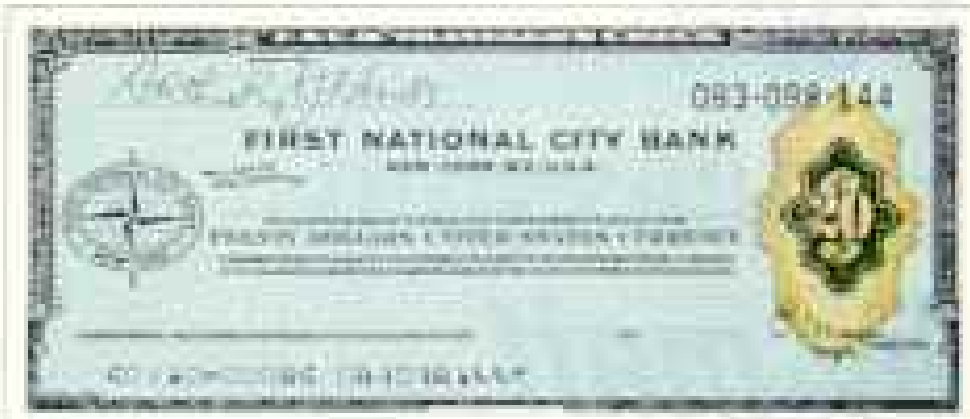
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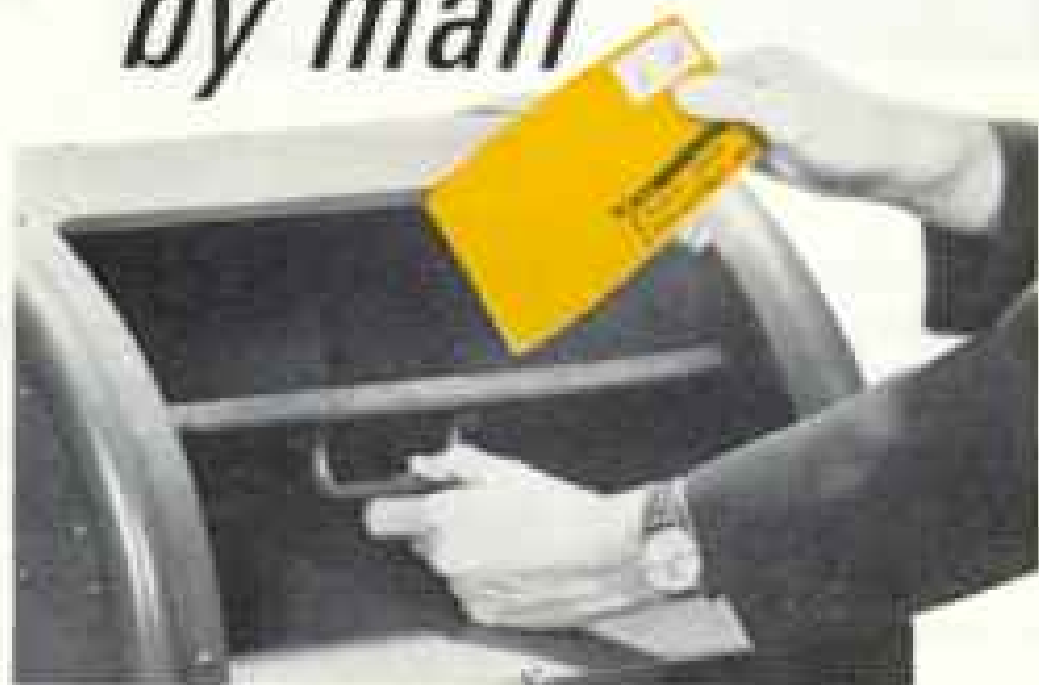
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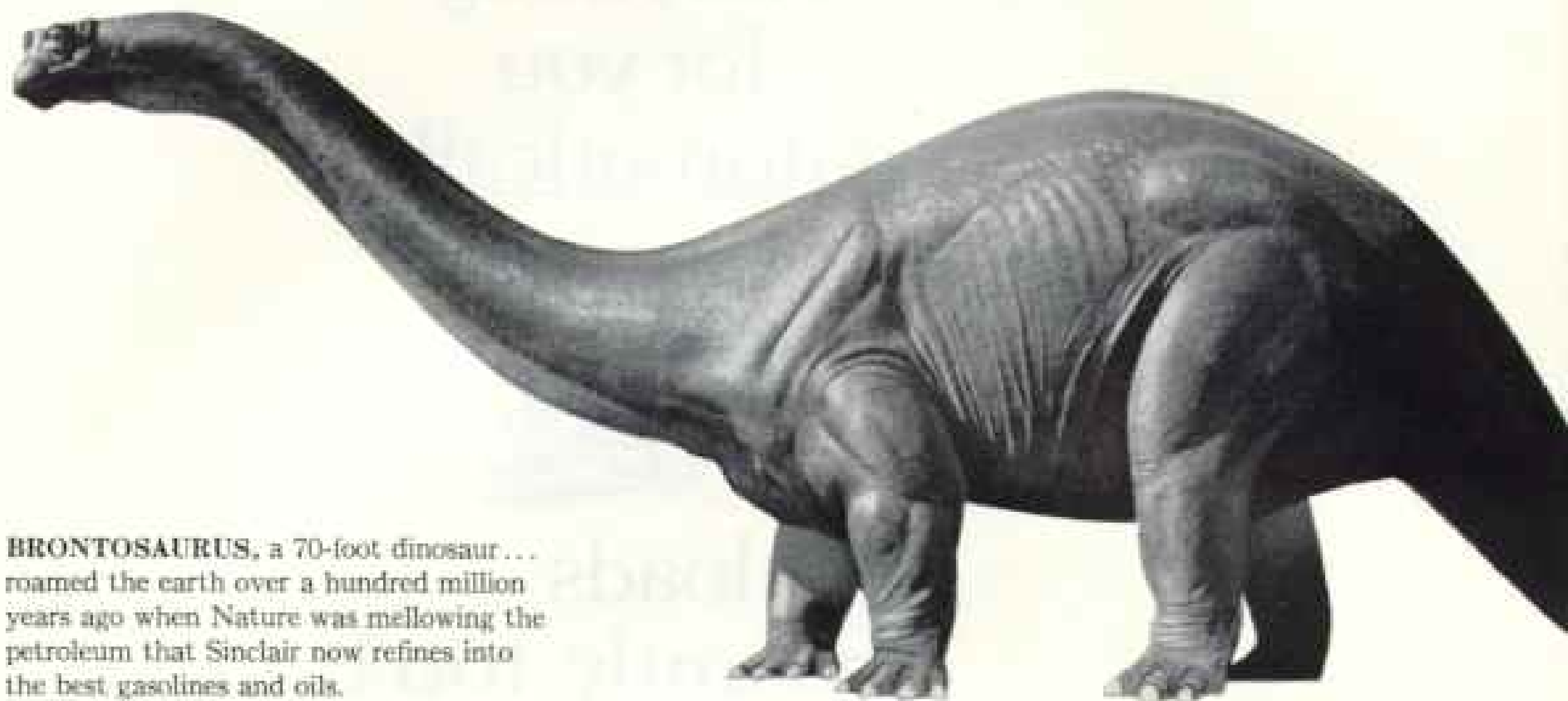


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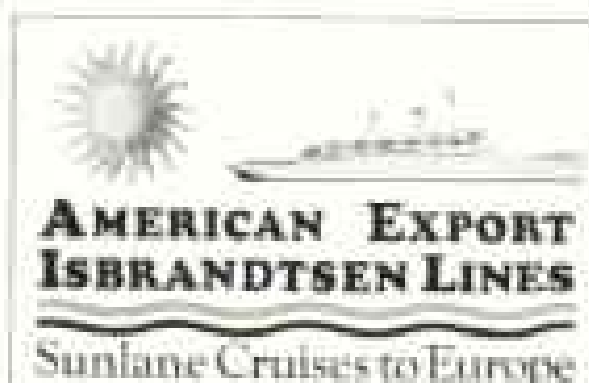
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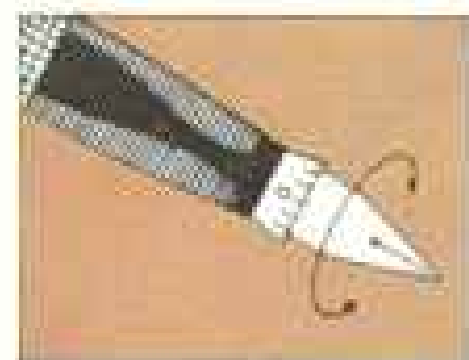
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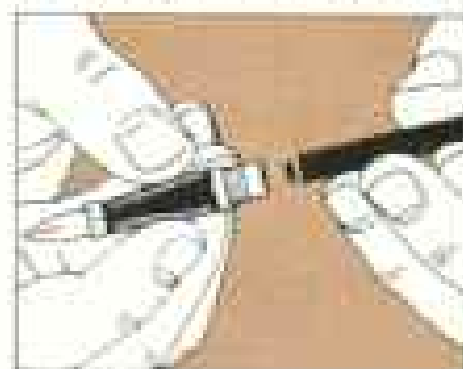
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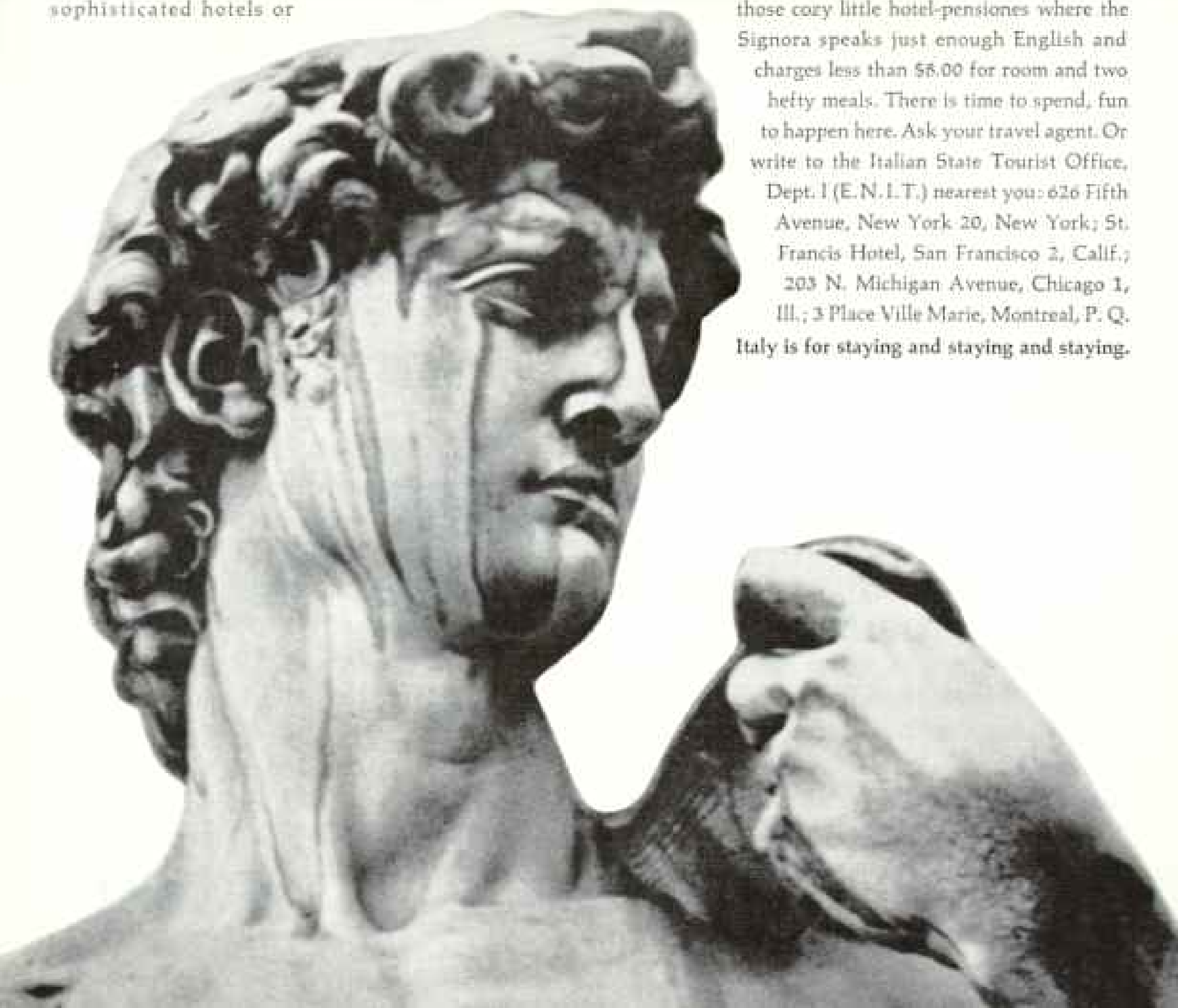
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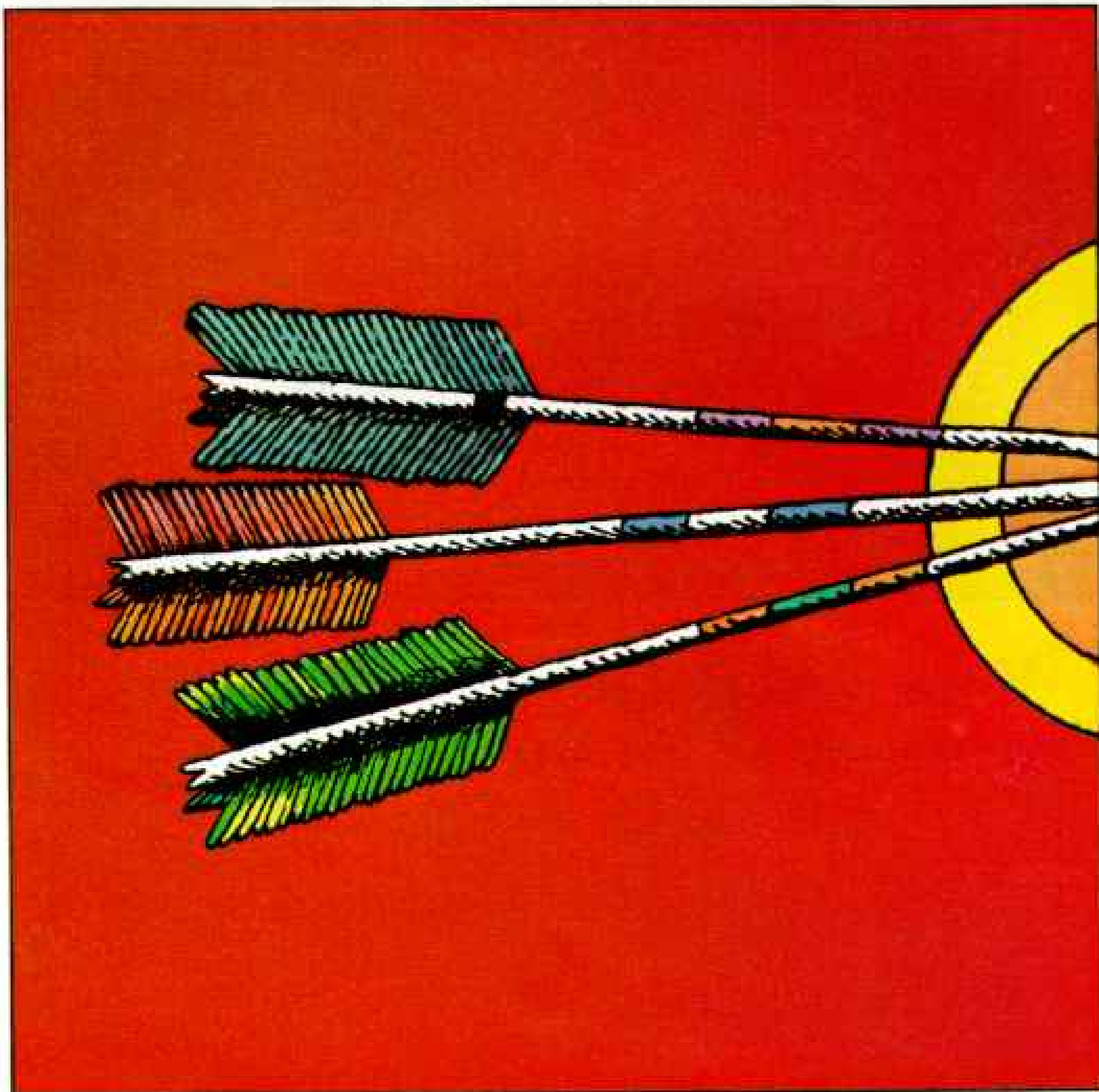
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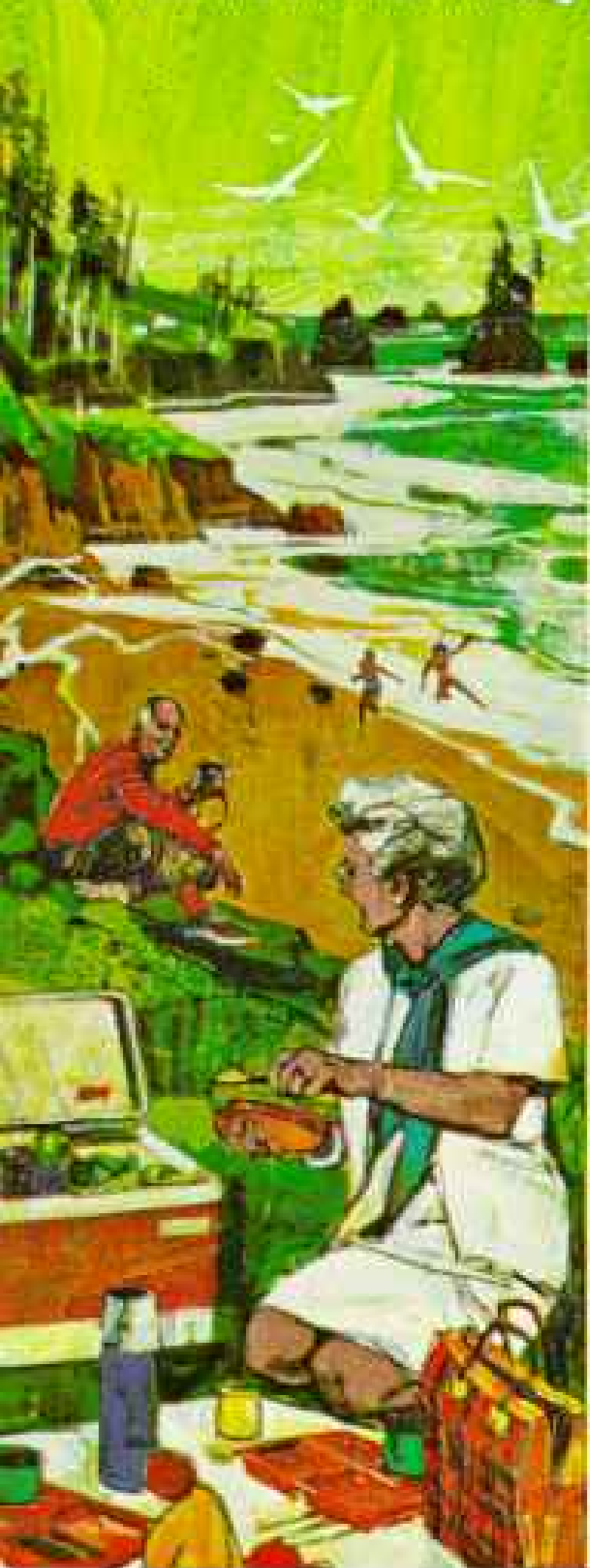
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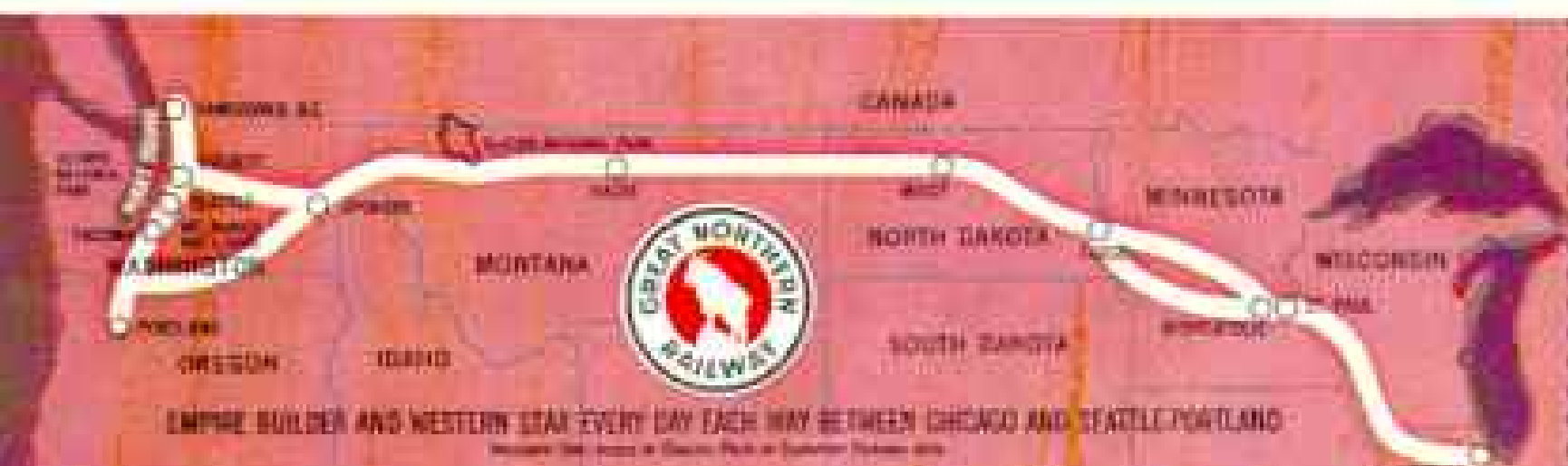
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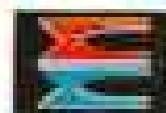
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HAUNTING MUSIC of the harp, the uplifted song of fierce bards crying the glories of a wild and beautiful land—these have been the unquenchable voices of Wales, singing through the centuries of a will to live in freedom.

Today Wales still sings and still is free. It is a proud and highly individualistic unit of the United Kingdom, a principality of Britain. The heir apparent to the British throne traditionally receives the title of Prince of Wales, and the Welsh send members to represent them in the British House of Commons and nobles to sit in the House of Lords.

Part of Britain though it be, Wales is still Wales and the Welsh are the Welsh: unique, different, a race of lithe and handsome men—Celtic, strong-featured—and fine-looking women. The Welsh cling to their own outlook and spirit, their own lilting speech, many of them still using their own ancient language—older than English in England.

The Welsh are above all a poetic people, and much of the unconquerable spirit of their warrior past, the grandeur of their mountains, and the serenity of their lovely valleys finds expression in their poetry and song.

Who Will Be Named Bard of Wales?

No event symbolizes more vividly the poetic soul of the Welsh and the unyielding pride and integrity that accompany it than the ceremony of the Charing of the Bard. This is the high point of the annual National Eisteddfod (pronounced *eyes-teth-fod*), a week of speeches, songs, pageants, and poetry competitions, all conducted in Welsh. With 20,000 Welshmen, I traveled in August to Llandudno, a coastal resort in North Wales, to see the successful poet chosen.

The large stage of an enormous prefabricated pavilion was banked with robed bardic dignitaries, and the television lights stabbed at them like searchlights. The 60 press chairs were filled, for the Bard of Wales makes national headlines. There was a hum of excitement—then suddenly a trumpet call and a hush. The big doors opened.

Music boomed. Marching with stately grace came the Archdruid Cynan. He wore a crown and long golden robes and carried a scepter. Heralds, former archdruids, and a sword-bearer accompanied him. The sword-bearer,

Dark-eyed Welsh beauty in stovepipe hat and lace kerchief graces a song-and-dance fest—the International Musical Eisteddfod at Llangollen.



June
1965

NATIONAL GEOGRAPHIC

THE NATIONAL GEOGRAPHIC MAGAZINE VOL. 127, NO. 6
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Wales LAND OF BARDS

By ALAN VILLIERS

*Illustrations by
National Geographic photographer
THOMAS NEBBIA*



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*Wave of windows and doors,
spiky with chimneys, rolls over a
hill in Tylorstown, a mining village
in the Rhondda Valley. From here in
the industrial south to the farming
island of Anglesey, Wales keeps
bright its flame of individuality.
Welshmen still speak the language
of ancient Britons and nurture a
fierce pride in their national
heritage. Every man of this land
aspires to poetry and raises
his voice in song.*

REPRODUCED BY THOMAS NELSON © N.A.S.

728







Great broadsword, weighing 60 pounds, rides on the belt of Dillwyn Miles, or Cemaes, his bardic name, at the 1963 National Eisteddfod in Llandudno. Gauntlets bear the red dragon, heraldic symbol of Wales.

a fine figure of a man well over six feet, carried his huge sword effortlessly, the point of its long sheath resting on his belt (left). It must have weighed at least half a hundredweight.

As the officials reached the stage, the harps took over, garlanded little girls danced, and the long blue oxhorn—the Hirlas Horn—was presented to the archdruid as a ceremonial token of welcome.

The bardic chair stood empty in the center. Who would be seated there?

Giant Sword Bars the Chair

Now, I thought, I shall see one of these hill farmers, or perhaps a parson or a schoolmaster, a miner or a steelworker—for in Wales any man may be a poet—come forward for his great occasion.

Archdruid Cynan (who in daily life is the Reverend Dr. Albert Evans-Jones, C.B.E., D. Litt., of the island of Anglesey) stood up, stern and solemn. Dillwyn Cemaes, the sword-bearer, moved close to him.

In his wonderfully strong and melodious voice, the archdruid announced something in Welsh, very briefly.

A spontaneous roar of the most intensely felt emotion arose from the whole crowd. It was a moaning roar of heartfelt disappointment, with overtones almost of despair.

“No bard! No bard!” said the gentleman beside me.

Dillwyn Cemaes advanced, holding the great sword horizontally. Slightly unsheathing it, a few inches of steel protruding, he placed sword and sheath across the chair.

The archdruid spoke again in the tongue of the ancient Britons. No poem submitted was deemed worthy, he said, the ritual Chaining of the Bard would not take place.

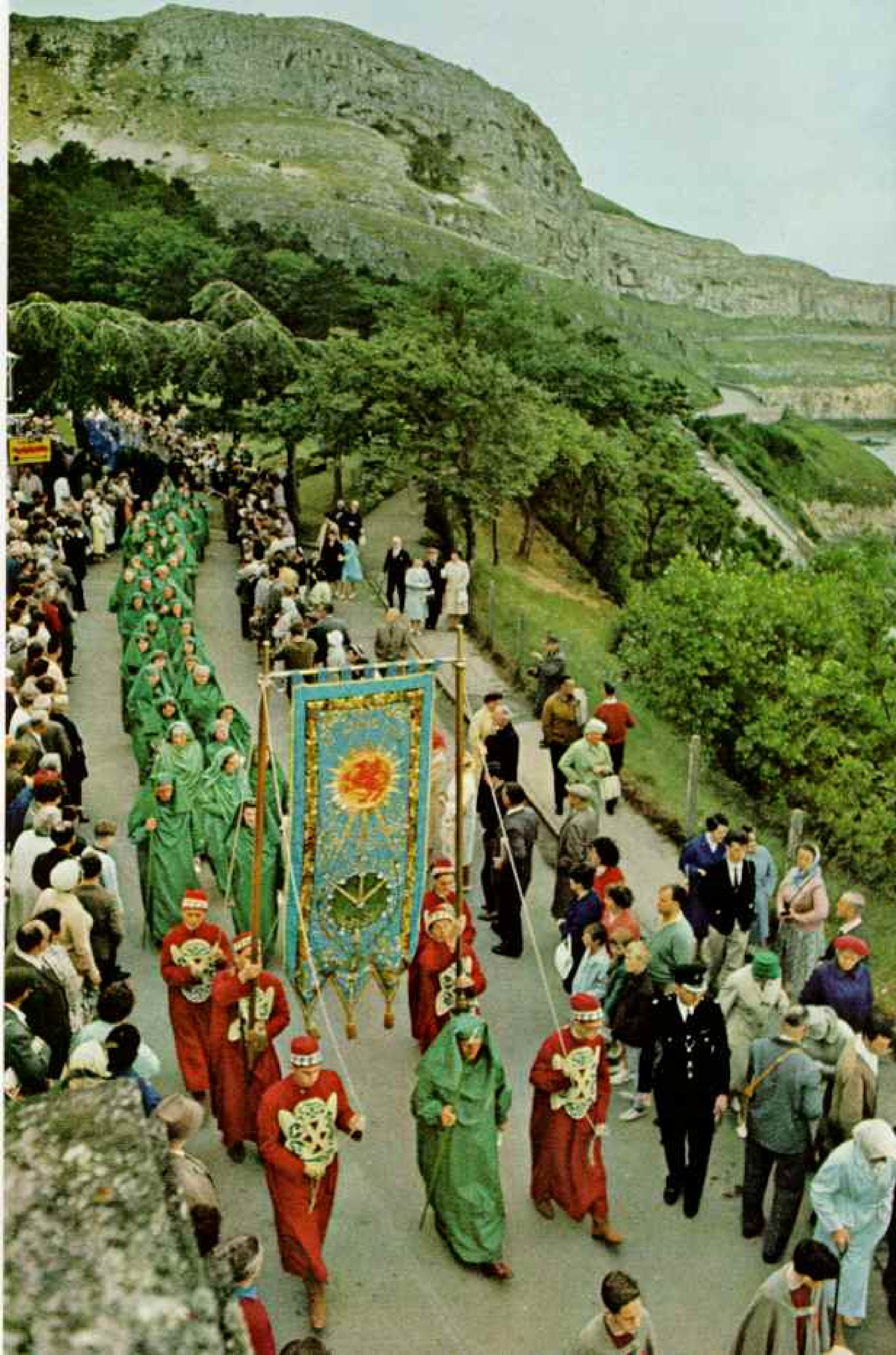
Another cry of disappointment.

Again the resonant voice: Merit before ritual—no ritual for its own sake! The chair



Vibrant Welsh harp sings under fluttering fingers. Harpists of old enjoyed great privilege; insulting a royal harpist brought a fine of six cows and 120 silver pennies.

Procession out of the past: the Gorsedd, or Society of Welsh Bards, follows its banner to the stage in Llandudno for the National Eisteddfod. Standard-bearers wear red; green robes denote ovates, or recent initiates into the society; bards, musicians, and literati wear blue. The Eisteddfod, a competitive festival of the arts, dates from the Middle Ages, with trappings from the 18th century.







Exuberant Polish dancers cavort at Llangollen. Here each July come singers, dancers, and instrumentalists from more than twenty nations to share the international language of music. Folk costumes brighten Eisteddfod grounds during the six-day festival. Trophies proclaim, "Blessed is a world that sings; gentle are its songs."

Festive lights sparkle on the promenade at Llandudno, host for the National Eisteddfod in August, 1963. This popular resort, astride a peninsula that juts into the Irish Sea, welcomed 20,000 daily to the week-long, all-Welsh ceremonies that are held alternately in North and South Wales. Great Orme's Head thrusts a floodlit flank against a darkening sky. Church of St. Tudno, from which the town derived its name, tops the promontory.

No one worthy! The huge sword bars the chair as Archdruid Cynan, wearing gilded gorget and bronze oak-leaf crown, announces there will be no Charing of the Bard. Groan of disappointment erupts with his statement. For the fourth time in 25 years, no poem submitted met the standards. Cynan, the Reverend Dr. Albert Evans-Jones, won the chair in 1914. At the 1964 Eisteddfod in Swansea, R. Bryn Williams of Aberystwyth won the coveted award for a poem on the Welsh settlement of Patagonia a century ago.





EXTRACTS FROM THE LIFE OF THOMAS DILLWYN CEMAES BY THOMAS DILLWYN CEMAES © 1911

Rainbow arching from luminous meadow . . . mist-haunted castle on the heights—thus Wales weaves its magic. The 14th-century fortress of Chirk, seat of the Myddelton family since 1595, overlooks the Vale of Ceiriog and the English border. Nearby runs Offa's Dyke, an eighth-century ditch separating Anglo-Saxons and Welsh.

Prancing pony rears under the hand of Col. Rosser John at the Royal Welsh Agricultural Show, held each year at Builth Wells in Brecknockshire. This young show-off will compete in a special class for pedigreed Welsh mountain ponies. Horses, cattle, sheep, pigs—all the best in rural Wales—come to the agricultural show, the "Eisteddfod of animals."

would stay empty. The lights beat upon the naked steel of the partly drawn sword. Mustachioed Dillwyn Cemaes, his strong face grim and his six-feet-plus looking like eight, glared at the 8,000 in the audience.

For a moment—intense silence. Then harps began to sing again as skillful fingers plucked vibrant strings.

The little girls, the three Orders of the Gorsedd (as the body of bards is called), the whole company, filed slowly from the stage and up the long aisle, the archdruid and sword-bearer leading them. Doors opened, and they passed out into the gray day. But the 8,000 still sat there in the huge pavilion, as if they had been stunned. Where else, I thought, would a people feel so intensely about poetry?

Welsh Spirit Sets Apart the "Fellow Countrymen"

I was staying at Bryn Mor, a cottage near the Eisteddfod ground. At the cottage I met farmer Trevor Owen.

When we discussed the ceremony that evening, Trevor said: "Perhaps the subject was too difficult. This year it was a poem based on the theme 'Genesis.' I didn't dare to try it myself at all. It's a disappointment to us not to see the chair awarded. We love to see a good man honored. We feel we're all honored, too, by just being there. There is a wonderful *llyfyr* about it all." He pronounced it "hoo-ill."

WALES

MOUNTAINOUS, bardic, ruggedly beautiful Wales, whose English-created princes have been the heirs apparent to the British throne since the 14th century, is only a little larger than New Jersey. The Cambrian Mountains occupy two-thirds of the land, offering steep pastures and rising to 3,560 feet at Snowdon, highest point in Wales and England. Four-fifths of the principality's population



crowds its coal, steel, and factory cities. Though Wales was conquered by King Edward I in 1284 and officially incorporated with England in 1536, the Welsh remain Celtic; one in a hundred speaks only Welsh.

OFFICIAL NAME: Principality of Wales, but Cymru (fellow countrymen) to the Welsh. **AREA:** 8,016 sq. mi. (including Monmouthshire). **POPULATION:** 2,660,000. **LANGUAGE:** English (official); Welsh. **RELIGION:** Protestant—mainly Methodist. **ECONOMY:** Agriculture: cattle, sheep,

barley, oats, potatoes, wheat. Minerals: coal, iron, copper, stone quarries. Industry: metal processing, aircraft, chemicals. **MAJOR CITIES:** Cardiff (pop. 260,640), capital, port; Swansea (170,390), port. **CLIMATE:** January average, 40° F.; July, 60° F.; 50-80 inches average annual rainfall.



"Hwyl? What's that?"

"It's untranslatable—the spirit of Wales. Part of the spirit, anyway."

Perhaps this hwyl alone explains how so small a land and so few people have managed to retain their own vivid character through the centuries. I suspect the sheltering mountains have also played a part.

Whatever the causes, the Welsh, with the Cornish, the western Scots, and the Manx—the people of the Isle of Man—are considered the only true Britons left in Britain. And yet Wales means "foreign," deriving from *Waelisc*, a word applied by the invading Anglo-Saxons and perpetuated by the Normans. To the Welsh, in their own language, Wales is Cymru, which means "fellow countrymen."

Sailors From Mountainous Wales Roam the World

To me, an Australian living in England, the Welsh are both foreigners and comrades—and more the latter than the former. I have sailed with Welsh seamen in peace and war, in big sailing ships round the Horn and in smaller ships, out of picturesque ports like Fishguard, Aberdovey, and Port Dinorwic on the Menai Strait. I have brought Australian grain to the Bristol Channel ports of Cardiff and Barry, and loaded coal there for the ends of the earth. I feel close to these courageous and gifted people.

Covering little more than 8,000 square miles between England, the Bristol Channel, and the Irish Sea, Wales is largely a land of mountains (map, right). It rises at Snowdon to 3,560 feet, higher than any peak in England.

COUNTIES OF WALES WITH THEIR ABBREVIATIONS

Anglesey	Ang
Brecknockshire	Brec
Carmarthenshire	Carnt
Cardiganshire	Card
Carmarthenshire	Carnt
Denbighshire	Denb
Flintshire	Flint
Glamorganshire	Glam
Merionethshire	Mers
Monmouthshire	Mon
Montgomeryshire	Mont
Pembrokeshire	Pemb
Radiantshire	Rad



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Swift streams slash through country dotted with lakes and divided by wooded, beautiful valleys. The whole area is guarded by ruins of ancient castles, abbeys, and fortifications.

Recently I set off to re-explore Wales, to search out that untranslatable *hwyl* that sets it apart from the rest of Britain. Crossing the rich farmlands of England's Shropshire, I came on the Welsh border castle of Chirk, sitting like a big squat stone bull on its fat round hill (pages 734-5). It is still lived in, and black sheep were grazing on the hill.

"The black sheep used to provide wool for monks' habits," explained a friendly local.

Offa's Dyke, a deep ditch steep on the

Welsh side, shelving gently on the English, cut across the bottom of the hill. I jumped in. It was more than six feet deep, and difficult to scramble out of again on the Welsh side.

"That was deliberate, possibly to stop raiding Welshmen from bringing fat English cattle back into Wales," our friend said. "Offa was a king in eighth-century Anglo-Saxon England. He had trouble along the border, so he built this dyke from the River Dee to the Severn. He built it so well a lot survives, but he still had plenty of trouble."

"Plenty of trouble" was what all foreign rulers had with the Welsh, long before and long after Offa. The history of Wales in antiquity and the Middle Ages was turbulent. When the Romans came in the 1st century A.D., the Welsh resisted stoutly even after their leader, Prince Caradoc—the Romans called him Caratacus—fell into enemy hands and was carried off to Rome in chains. The Romans put in roads, worked the copper, lead, and gold, and introduced Christianity. But they did not really pacify Wales.

Fortresses Tell of Past Conflict

Fiercely independent princes led equally fierce fighters against the invaders. The Norman conquerors, after their coming in the 11th century, erected great stronghold castles against the Welsh (page 754). Not until 1485, when the Welsh-descended Henry Tudor defeated the English Richard III at Bosworth Field, to become himself King Henry VII of England, did the proud Welsh begin to live peacefully alongside the realm of England.

Inside the well-kept 14th-century castle of Chirk, I saw the dungeon, the servants' hall, the great state rooms. In the entrance hall hung weapons of the time of Oliver Cromwell, when Chirk briefly sheltered King Charles I against the Roundheads.

"The English dictator Cromwell was Welsh by origin. His great-great-grandfather was named Morgan Williams," said my local friend. "Williams is one of the well-known Welsh family names, like Jones, Jenkins, Morgan, Hughes, Evans, Lewis, Lloyd, Rhys, Phillips, Price, and Powell."

When I came to Wrexham, 10 miles to the north, I wondered with some surprise whether the name Yale should have been part of that roster. Old Glory hung proudly in the nave of Wrexham's distinguished church. A tablet recorded that the porch had been restored by the graduates of Yale "on the 200th

PHOTOGRAPH BY THOMAS NEEDLE © NATIONAL GEOGRAPHIC SOCIETY



Up from the pits, a miner of the Lady Windsor Colliery in *Ynys-y-bwl* (pronounced *unis-e-bool*) grins in anticipation of a bath. Seven hours underground encrusted Raymond Stobbart's face with coal dust. In the evenings, many miners in *Ynys-y-bwl* lift voices in a noted choral group.

anniversary of Yale College, which received its name in 1718 in recognition of the bounty of the Honorable Elihu Yale, former resident of this parish."

On his tomb in the churchyard, the name is spelled ELIUGH YALE. Looking at this were two young men dressed in obviously American-style clothes. They were members of the Yale Glee Club, they told me, and they were visiting at a place called Llangollen, close by on the River Dee, to sing in competition at Llangollen's Eisteddfod. This, I learned, was not an all-Welsh Eisteddfod, as at Llandudno, but an international festival.

"Come to Llangollen," they said. "You mustn't miss that!"

So off I went in the morning with Isaac Jones, former Wrexham blacksmith, in his taxi. It was raining "like in the days of Noah," said Isaac. We went the long way round to give the rain a chance to stop, and dropped in at Bryneglwys (pronounced brin-na-gluw-is) over the moor.

The guidebooks said this was the ancestral home of the Yales. Isaac didn't know—"I never did hear of any Yales around these parts, except Yale locks, and I was born here. Let's look, but I guess they're gone."

We found no Yales, though Elihu's ancestors were indeed from Bryneglwys. He himself lived his last years near Wrexham, but was born in Boston, in the Massachusetts Bay Colony. It was that association which led to his gift of books and East India goods to the struggling young American university.

Miners Sing in Traffic Jam

At Llangollen, flags of at least 20 nations flew over the railway station beside the Dee. The streets were a babel of tongues, the pavements bright with European costumes. But there was a great deal of Welsh, too.

In a traffic jam by Llangollen's ancient bridge, a coach came to a halt as I crossed. The 40 men inside burst into blood-warming, imagination-firing song. They had on cloth caps and business suits, and they sang in Welsh. They were a choir of miners from Ebbw (ebb-oo) Vale in South Wales, and their singing bewitched the bustling streets. I stopped, enthralled, and was sorry when a busy policeman waved them on. Still singing, they turned on the road for Ruabon. The waters of the Dee splashed and gurgled merrily on the stones beneath the ancient bridge, as if eager to be in the singing too.

"The singing's in their throats like seeing's in their eyes," said the policeman, still flailing his efficient arms.

Later, on the flower-heaped stage on the Eisteddfod field—the marquee seats 10,000, and it was full—I saw the policeman himself, off duty now, singing in a choir.

After the performance, while walking across the same ancient bridge, I met my friends from the Yale Glee Club, eating fish and chips out of small packets of newspaper, as the locals did. Protruding from one's pocket was a small book, *How to Speak Welsh in Ten Easy Lessons*.

"It ought to be 'A Hundred Very Difficult

PHOTOGRAPH BY THOMAS REEHER © NATIONAL GEOGRAPHIC SOCIETY



Butter-colored blooms of bird's-foot clover frame the freckled face of Ann Lewis at the Welsh Plant Breeding Station in Aberystwyth. A research department of the University College of Wales, the station develops varieties of grass and clover for Welsh farms.

Lessons,'” he said with a laugh. “But it helps me make friends.”

In a cafe that evening three cheerful young girls from a place called Machynlleth (page 748) helped us with the language lessons.

“Speaking Welsh is easy,” said Megan Hughes, a student schoolteacher. “You just have to learn how to pronounce the letters. The sounds are always the same, not like in English, where you have to know each word.”

She made English sound a beautiful language with her singing voice. And Welsh, too.

“Llangollen now—that’s ‘Hlan-go-‘hlen.” She spelled it out. “In Welsh, ‘w’ is ‘oo,’ ‘dd’ is ‘th’ as in ‘smooth,’ and double ‘l’ is ‘hl.’ The apostrophe means you put your tongue lightly between your teeth and do this.” She made a sort of trilling sound. “Just learn those few simple things and practice a bit, and you’ve got it.”

But it was beyond me. It was also beyond the Yale boys. The one with the book said: “I heard about a Frenchman who was determined to learn Welsh. But the pronunciation



got him, too. He tried and tried. Then one day he saw a big notice outside a theater. 'UNIGRWYDD,' it spelled, and went on, 'Pronounced Success.' The Frenchman gave up."

"Why, 'Unigrwydd' is one of our plays! Of course it's a success," exclaimed Megan.

The Moods of Snowdon

What the language and the Eisteddfods are to the spirit of Wales, Snowdon is to its geography—symbol of the rugged majesty of a mountain land. I went there, choosing a

fine day to travel by the north coast, but by the time my bus reached the vicinity of Snowdon, the weather had turned bad.

We splashed along, sometimes just fitting between the low stone walls on either side of the road. The view was all rocks, tumbling water, wet sheep sheltering behind rocks, wetter campers trying vainly to do the same. Once a shepherd passed, plodding down the road with his black-and-white dog. The shepherd was in sea boots and oilskins, but his dog took the rain as it came.

Ruins of a 13th-century castle spike the point; halls of the University College rise beside it.

741

STYLING: JANE BROWN © NATIONAL GEOGRAPHIC SOCIETY



I found a room in an inn at Llanberis, near the station of the cog-tracked railway that sends little one-car, one-engine trains grinding up to the summit of Snowdon, weather permitting (page 746).

What a difference next morning! The sun beamed, the sky was blue, the rocky pass shone dry in the sunshine as if it never had been wet. Campers' tents stood everywhere.

I went up in one of the trains pushed by a small green engine named Enid, which clanked, jerked, and coughed sparks all along the single track.

In places the fields were so steep that the sheep grazed with their forelegs bent, on their knees. Others stood sideways, with the lay of the land, until I wondered whether by

evolution they might develop shorter legs for the high side. High up, the old stone farmhouses were in ruins, but the driver told me some were being restored as youth hostels.

"We need them," he said. "When a mist comes down, people can easily get lost on Snowdon. There's a permanent Mountain Rescue Post down on the lower slopes. Its volunteer climbers are often called out."

Antique Trains Delight Visitors

From Portmadoc on the other side of Snowdon I traveled to Blaenau Ffestiniog (*blye-naw fes-tin-yog*), where the mountain slopes are blanketed with the waste of slate mines, giving the effect of an enormous gray temple spreading over the foothills for miles.



I looked for the old railroad that used to carry slates down to Portmadoc for shipment to America. It was there, but the rails were rusty, the station derelict. I found part of it still in service at Tan-y-Bwlch (*tanny-bool'h*), however, carrying not slates but holidayers.

Railroad enthusiasts have come along and formed societies to keep some of the old lines running. Students and other buffs help with the maintenance work on a weekend volunteer basis.

The Festiniog is the daddy of all these little lines. "This is the oldest narrow-gauge public railway in the world," said Francis Wayne, secretary of the Festiniog Railway Company, when I saw him later at the ninth annual meeting of the railway buffs at Portmadoc.

Five hundred of them came up by special train from London alone, all eager for work. "The line was opened in 1836 to bring slates down to the sailing ships. The loaded trucks ran down on gravity; horses pulled them back again.

"We clung to our horses longer than most—they were cheap—and steam locomotives didn't come here till a hundred years ago. Prince, one of the original engines, is still puffing away on the lighter trains. We carried 144,000 passengers last year."

At Portmadoc a huge crane was lifting pieces of heavily shielded boilers and other machinery out of a motor coaster for the nuclear power station at nearby Trawsfynydd (*traus-fyn-eth*). But the old schooners that



EXTREMES (LEFT) BY DEAN CORNER, RODACHROME BY TERRENCE LE GRUBIN © N.S.S.



New officer of the Welch Regiment follows tradition on St. David's Day, March 1. Foot on table, he eats a raw leek and quaffs a pint of ale in one draught.

Sovereign of the land, Elizabeth II with Prince Philip (center) leaves Caernarvon Castle. On the steps, Princess Margaret talks with her husband, Lord Snowdon, who serves as the castle's constable. Birthplace of Edward II, first English Prince of Wales, Caernarvon one day will see Prince Charles formally invested with the title.



used to fill the harbor are all gone. It is sad to see the romance go out of a port from which or thereabouts, it is said, a Welsh prince sailed to America 300 years before Columbus. His name was Madoc or Madog ap (son of) Owen Gwynedd.

It is hard to check on these things. I got hold of a cabbie, this one named Bill Jones, on the principle that if you want to know anything about a small town, see the oldest taxi driver there.

Mr. Jones would allow no doubts. The famous Welsh prince sailed to America in the 1170's, he averred. He sailed with ten ships, but he never returned.

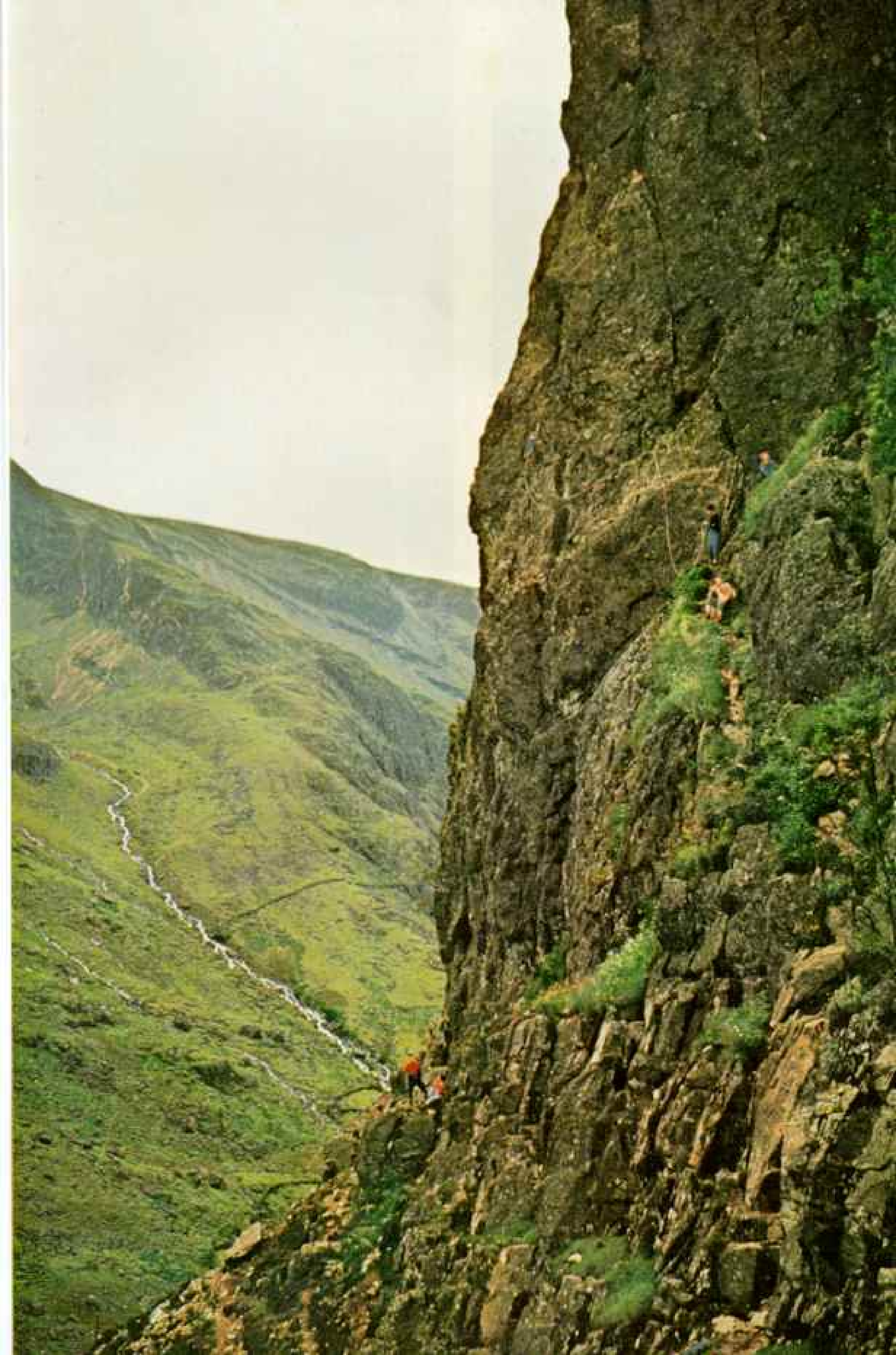
"How can you be so sure?" I asked.

"Peculiar things have been found in America. I have read that there are Welsh-speaking Indians someplace, going back before the white men came. It's away up the Missouri River. They call them White Indians. It says in the book I read that they fish with coracles, and they pull the little skin-covered coracle with one oar, like a spade. That's just what we do here in Wales to this day.

"Prince Madoc came in by the Gulf of Mexico and sailed up the Mississippi River. That was his

"An immense skein of silk," wrote the Englishman George Borrow of Pistyll Rhaiadr, "agitated and disturbed by tempestuous blasts." The cascade, one of the seven wonders of Wales, tumbles 240 feet over a precipice, under a natural arch, and into a quiet pool.

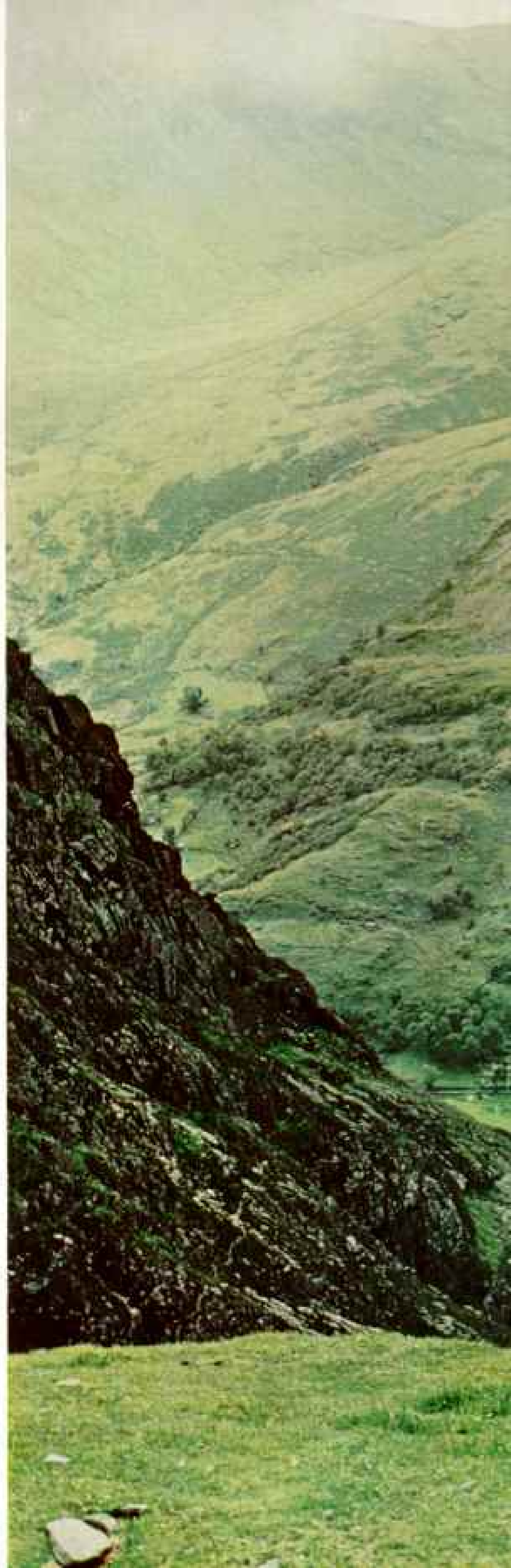
Sheer cliff of Carreg Wastad, or Flat Crag, training ground for Mount Everest, tests the most skillful of rock climbers. High above the Llanberis Pass, mountaineers work their way up the wall. Members of the British Everest Expedition practiced here before their triumphal ascent in 1953, recounted in NATIONAL GEOGRAPHIC, July, 1954.





Lazy way to the top: the Snowdon Mountain Railway from Llanberis to the summit of Wales. Here two of its little rack-and-pinion locomotives, made in Switzerland, chuff downward with single cars behind. The trains journey up or down the 3,560-foot mountain in an hour. The Snowdon line, only cog railway in Great Britain, opened in 1896.

Green grow the mountains of Snowdonia, largest national park in Wales. Crowning the park, Snowdon soars into clouds (left) above Llanberis Pass. Legend says the peak, Y Wyddfa, holds the grave of an ogre slain by King Arthur, and knights of the Round Table sleep in a cave in the mountain fastness, awaiting Arthur's call to arms. Antony Armstrong-Jones, husband of Princess Margaret, became the first Earl of Snowdon, a title selected by Queen Elizabeth II in deference to his family association with Wales.







LESCHEMERE © NATIONAL GEOGRAPHIC SOCIETY

Spired clock tower adds a look of age to Machynlleth, although it rose less than a century ago. A Welsh hero, Owen Glendower, held a parliament here in 1404 during his unsuccessful bid for independence. Town's name, one of the most unpronounceable in Wales, might be managed with a slight catch in the throat—"Ma-huŵr-'hleth."

second trip there. The first time he had one ship. Then he came back for ten others, and colonists."

Well, maybe. I have never heard of anyone finding coracle-using Indians.

Though Madoc's saga lies in the twilight of legend, the Welsh have indeed left their impress on America. The pioneers who settled Jamestown, Virginia, in 1607 included "twenty Welsh gentlemen," and the *Mayflower*—commanded by a Welshman named Jones—brought several more to Plymouth Rock in 1620.

In the 1680's they came by the hundreds—mostly farmers; but some of wealth and education—stirred by William Penn's advertisements of "Pennsylvania . . . a fit place for Younger Brothers, and Men of Small Estates . . . The Air is generally clear and sweet . . . corn produceth four hundred fold."

They spread along the Schuylkill River, fired with the dream of a self-governing barony. Though a New Wales never materialized, the names of the towns they settled—Bryn Mawr, Gwynedd, Merion, Bala-Cynwyd—still ring with their Celtic sound.

While searching for descendants of the legendary Madoc, a young Welshman named John Evans explored the wilds of the upper Missouri River, almost ten years before the Lewis and Clark Expedition.

In the 19th century, tens of thousands of Welsh immigrants poured into America. Settling in New York, Pennsylvania, Ohio, and Illinois, they brought needed skills from the mines and mills of Wales. Their descendants have graced the United States Senate and the Supreme Court.

Geese Fitted With Pitch Shoes

Taximan Jones took me in hand on still another day. He showed me the place by the old Church of St. Beuno outside Tremadoc, near Portmadoc, where the drovers used to muster their cattle for the trek to England, 50 miles and more over the rough roads.

"They shod the cattle or they'd never have made it," he said. "They shod the geese, too. Made them walk through a pool of pitch, then trimmed the cooled stuff to the shape of each goose's feet."

Mr. Jones drove me to a small village with the big name of Llanystumdwy ('hlan-is-tum-dewey). "Llan means 'church,'" he explained, "and 'dwy' at the end refers to a river. The other part means 'at the bend of.' So it's the

church at the bend of the Dwy [Dwyfor] River. It isn't just a name. It's a description. You know where you are with these sensible names we have in Wales."

In a beautiful spot above the River Dwyfor lies the grave of Britain's famed Prime Minister of World War I—David Lloyd George, Earl of Dwyfor. The tumbling, singing waters of the little Dwyfor are the companions of his spirit as they hurry ardently toward the sea—the sea that in Wales is never far away.

"He wasn't one to make himself big," said Mr. Jones. "But he had something that drew the people when he was speaking. . . . When he came down we all used to shout 'Lloyd George *am byth!*' You know, 'Lloyd George forever!' That was just how we felt."

Industry Expands in South Wales

North Wales cannot live by loveliness and legend alone. In recent years manufacturers have been attracted there. Plants employ thousands in the making of nylon and other synthetics, of jet aircraft, and of a special plastic-coated steel sheet. The coal and steel industries do well. But it is in South Wales, in the valleys and along the Bristol Channel coast, that big industry has really leaped ahead.

I headed south, along the road around Cardigan Bay, toward Pembrokeshire. In the square at Fishguard, I glimpsed a familiar figure. He was more than six feet tall, lean and stalwart, and his strong face was fiercely black-mustachioed. I took a second look. It was indeed the sword-bearer, Dillwyn Cemaes from the Gorsedd of Bards.

I took a closer look. He was also my friend Dillwyn Miles, mayor of Newport when I was sailing out of Fishguard in the 1950's, and now sheriff of Haverfordwest.

I spent a fascinating week with him. We met archeologists and builders of huge oil refineries. We visited romantic inns kept like museums, with erudite part-time barmen down from the universities. We talked with trawlermen and tanker captains from Milford Haven, Pembrokeshire's wonderful port. In the mid-19th century Isambard Kingdom Brunel, designer of the *Great Eastern*, largest steamship of her day, planned unsuccessfully to make Milford Haven chief British terminal for the passenger trade to Australia.

"Pembrokeshire has everything," Dillwyn said. "Bronze Age barrows, ancient stone and earthen forts, dolmens, menhirs, myths of saints and giants, great warriors, Roman



Placidly determined, donkeys trot off—to the delight of riders and consternation of tenders. Llandudno, a favored spot for a beach holiday, keeps a herd of donkeys for youngsters who tire of sand castles.

Sartorially correct, a young horseman peers from beneath his velvet riding cap, hoping for a blue ribbon as he awaits the judge's decision in the ring at the Royal Welsh Agricultural Show.

Fleet-footed handler puts his Welsh mountain pony through its paces at the agricultural show. The breed has been maintained in Wales since early Saxon times.



Boating in a basket, four contestants in a ladies' coracle race on the River Teifi at Cilgerran struggle toward the finish line. The coracle, boat of the ancient Britons at the time of the Roman conquest, consists of a wicker frame covered now with pitched calico. Tradition-minded fishermen prize special licenses for use of the craft on the rivers of Wales.

camps, King Arthur—the lot. Some of the stones of Stonehenge came from our Prescelly Mountains; they were transported to Stonehenge probably because of their association with sacred rites. Similar circles of rocks still stand here.”*

We visited Milford Haven. Admiral Lord Nelson had been there, and much of the land in the area belonged to the husband of his mistress, Lady Hamilton.

“The Hamilton family tried to make a Welsh Nantucket out of Milford Haven more than 150 years ago,” said Dillwyn. “They brought over some Nantucket men to get whaling established—Starbucks and Folgers. The whaling’s gone now, but they’re still here—in the graveyard.”

Behind the Quaker meetinghouse, Nantucket names, mostly of women, appear on the headstones. Many of the men sleep in the sea.

Milford Haven is coming into its own today as an oil refinery center and great tanker port. As we left, I saw an enormous oil tanker named the *Esso Pembrokehire* backing away from the mooring dolphins and turning slowly toward the sea. She looked about twice the

size of the liner *United States*; she had been in port some 20 hours, discharging 80,000 tons of oil.

Despite the industrial boom, much of Wales is still agricultural, though all of Wales is in a stormy region well north of 50 degrees of latitude. The farms lie open to gales from the North Atlantic on the west and cold easterly winds from Europe, whistling around exposed places everywhere.

One Family's Farm for 400 Years

I spent some days on a 200-acre farm in the Vale of Glamorgan, near Cowbridge, which has beautiful views of the distant mountains and, to the south, the sea.

“My family has had this land for at least 400 years,” farmer Holford Morgan told me. “We run about 100 black Aberdeen Angus beef cattle. We grow some wheat, as well as barley for malting. And we have a registered flock of 50 pedigreed Suffolk sheep. So we are mighty busy. Rhys, my son, runs the place now. He’s 18; he knows what he is doing.”

*See “Stonehenge—New Light on an Old Riddle,” by Harold E. Edgerton, NATIONAL GEOGRAPHIC, June, 1960.

STITCHED BY THOMAS HERRICK © K.S.L.



Young Rhys (Reece) took me with him during one of his typically busy days. "We work all the daylight hours—into the night too, at times, if the hay gets behind, or something," he told me. He was a cheerful young man, sturdily built and full of energy.

We stopped to look at some of his sheep. They were fine animals, fluffy white, with long curved black noses. They all looked the same to me, but Rhys knew each of his flock as an individual.

"All these ewes have different faces," he said, "when you get to know them. I watch the lambs carefully, because we keep the best for our pedigreed flock. We have to look after the sheep all the time, especially when they're lambing. We only have pasture five months of the year. We have to get the best out of it."

60,000 Singing Welshmen

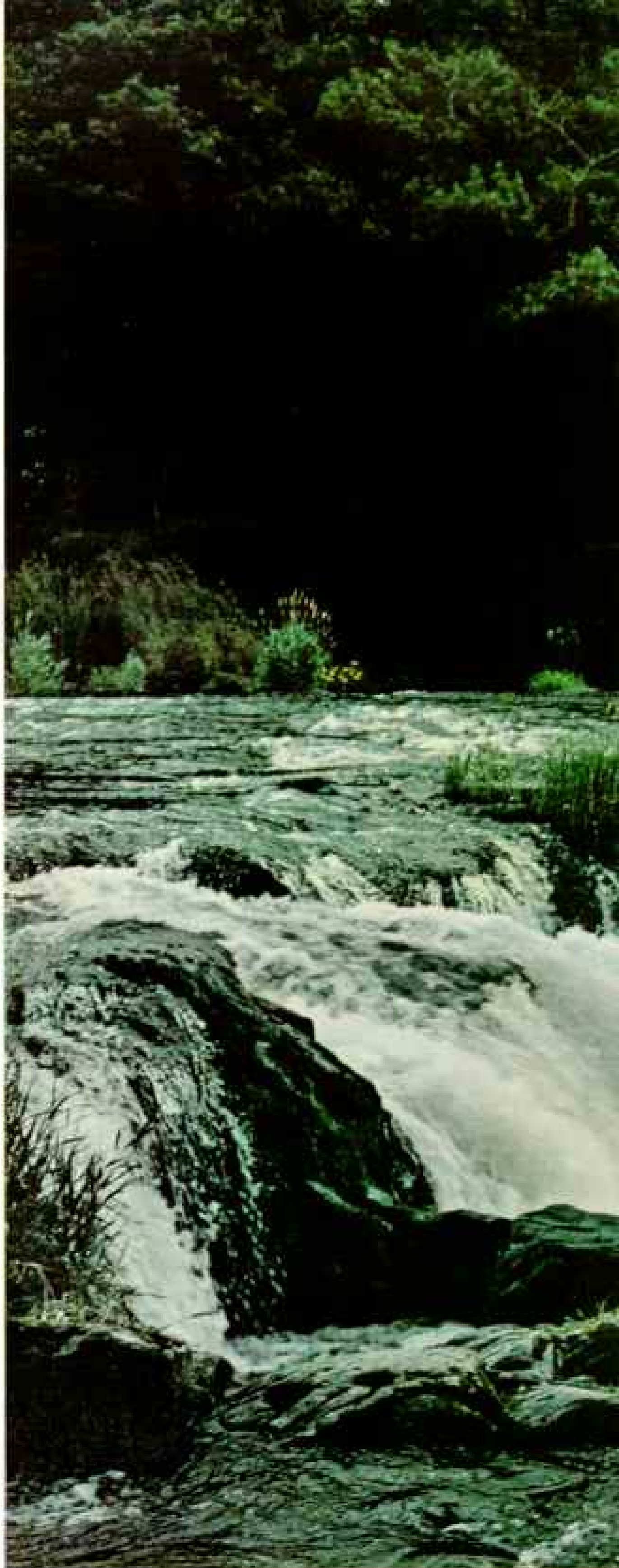
"Get three Englishmen together and they form a club. Get three Welshmen and they form a choir," Rhys told me.

Three or 30,000, they pour out their souls in harmony in chapel, at a football field, or on a farm. One day in Cardiff, thriving capital of Wales, I suddenly heard the wonderful, tremendous sound of what seemed like a hundred thousand people singing. It was coming from a huge arena, right in town. Deeply moved, I stopped in my tracks.

"What goes on?" I asked a passerby. "All Blacks and Barbarians," he replied, astonished that I did not know. "They're Rugby teams—the best in the world. We Welshmen always sing at international Rugby games."

I made for the arena. It was packed, but I found a place in a window of a building nearby where I could see and hear. The crowd was singing hymns. No cheerleaders—no organization at all. They all just sang perfectly together, as if they had been practicing since birth—60,000 men, mostly in cloth caps, from mine and steel-rolling mill, office, shop, and farm, from university and technological college.

I felt I was listening to the spirit of



Frothing falls on the River Teifi attract an angler. Casting into the swirling pool, he hopes to hook a fast brown trout or silvery salmon. Sea trout,



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known locally as sewin, and grayling also dart through the waters of Welsh rivers and streams, famous among fishermen around the world. Rough-stone mill on the opposite bank uses the torrent's force to grind grain into flour.



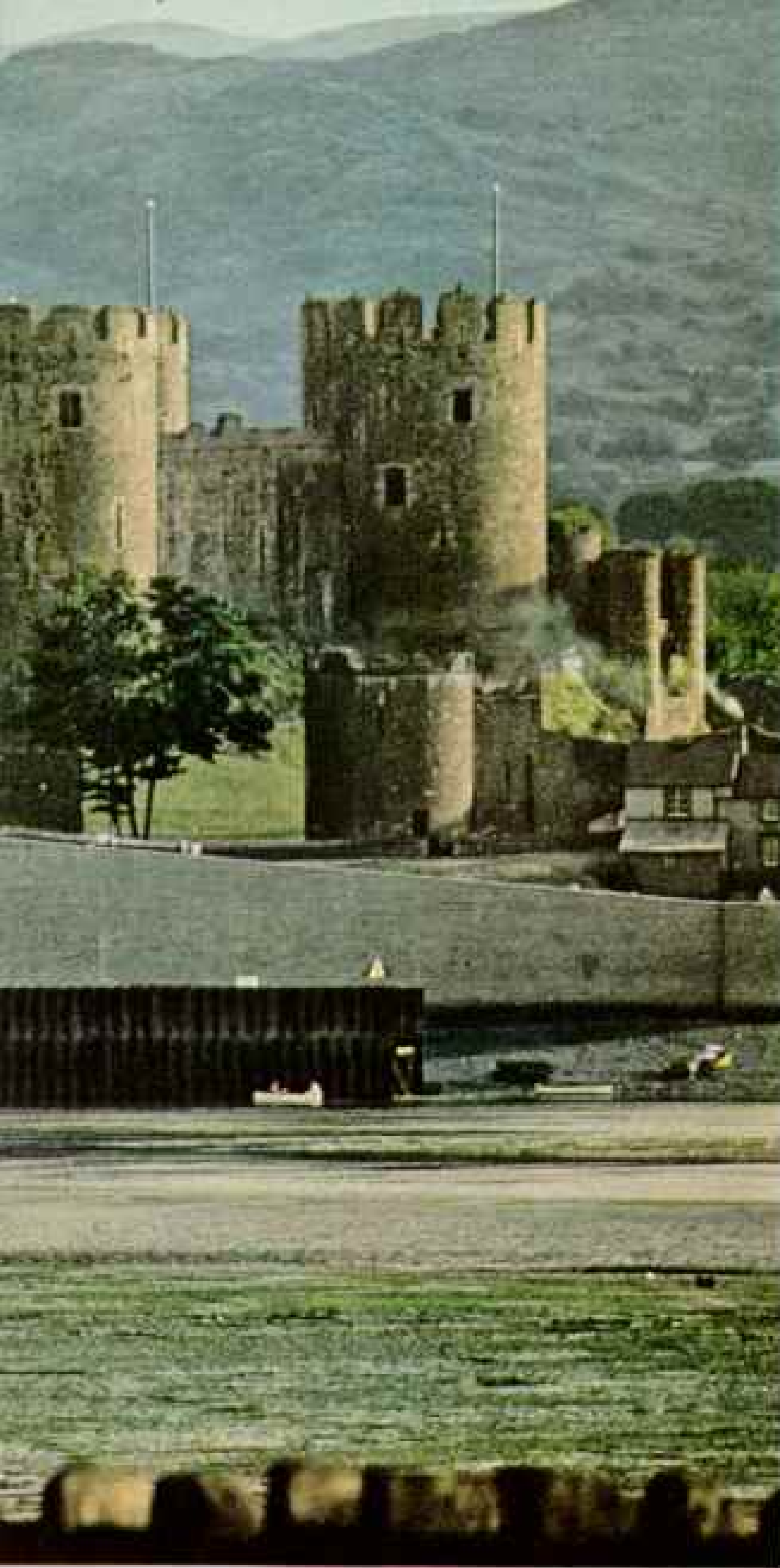
Wales, the Wales that the heroes Llywelyn the Great and Owen Glendower knew so long ago. Here was a real people, with real roots, a background, a character, and a soul of their own, which they have achieved over the centuries and will maintain.

The All Blacks, it transpired, were New Zealanders; they were not black. The Barbarians were British, and they were not barbarians. On that arena 30 men, masters of the fast and dangerous game of Rugby, showed amazing competence, courage, and expertness. Again and again the crowd roared its delighted admiration.

From the Rugby field to the bottom of a mine is often no distance at all in Wales, especially in the southern valleys made by the Ebbw, the Taff, the Rhymney, and the Rhondda rivers on their way to the sea.

Wales Weathers Depression

Coal-mining records there go back to the 13th century. Annual production, early in the 20th century, ran a steady 50 million tons, of which 30 million were exported. Welsh steam coal was known at the ends of the earth, and the Bristol Channel ports provided cargoes for a thousand tramp steamships a year.



Turreted towers of Conway Castle stand guard above the River Conway. Edward I of England built this fortress and seven others to consolidate his conquest of Wales in the 1280's. Modern single-span bridge arches the river beside an older suspension bridge, whose crenelated towers match the castle's.

Welsh "witch's hat" caps one of the young bucket brigade at Llandudno.

ESTABLISHED (BELOW) AND FORBACHOME © N.A.S.



I've loaded coal in a tramp in the Cardiff docks, where big elevators lifted the dusty stuff by the carload straight from the coal trains and tipped it noisily into the holds at a thousand tons an hour. We loaded 7,000 tons in a night and were out on the tide in the morning, with a dozen other big steamships, bound for somewhere east of Suez.

But in the great depression of the 1930's close to half a million men and women had to leave Wales to seek work elsewhere. Soup kitchens operated in the valleys. Miners sang for pennies in the London gutters.

Even the end of the depression did not

help coal. At the end of World War II, output figures were back where they'd been in 1880; export trade was little better than two million tons. Many industries had learned to do without coal, and navies and merchant ships had switched to oil.

Then came nationalization. The National Coal Board took over and began to mechanize the mines—and proved that coal economically produced will always find a market. By 1964, output of deep-mined coal was running at the rate of 19 million tons a year.

I visited the Rhondda Valley and Ebbw Vale, where the transformation has been



Carpet of charlock spreads across a field in Cardiganshire, suffusing a gray Welsh day with the gold of sunlight. Through the blossoms a farm boy carefully



ADORNMENT BY THOMAS WEBER © NATIONAL GEOGRAPHIC SOCIETY

approaches his flock of sheep; any sudden movement will send them bolting. Like fluffs of cotton, other sheep dot the lush green pasture of the far hillsides.



astonishing. The Marine Colliery in Ebbw Vale is a mechanized mine. I went down with the afternoon shift, dressed in rubber boots, overalls, and steel helmet with miner's lamp. I was frisked twice at the pithead for matches.

We met the day shift coming up, a group of stocky, sturdy fellows, very black of countenance and looking tired. They were headed for the changing rooms and showers. It was 2:15 p.m., and they had been underground since 7 a.m.

My guide was mine manager Harold Edwards, a cheerful young man in a Navy blazer. ("I was in the Navy out East, during the war. What branch? Submarines, of course. I didn't want to be blinded by the sunshine.") We had a look at the winding engines which lowered and raised the cages a thousand feet or so at breathtaking speed.

"Nice engines," said Mr. Edwards. "They're well run in. We got them secondhand in

1884; they're supposedly old ships' engines.

"Hold on to your hats! Down we go!"

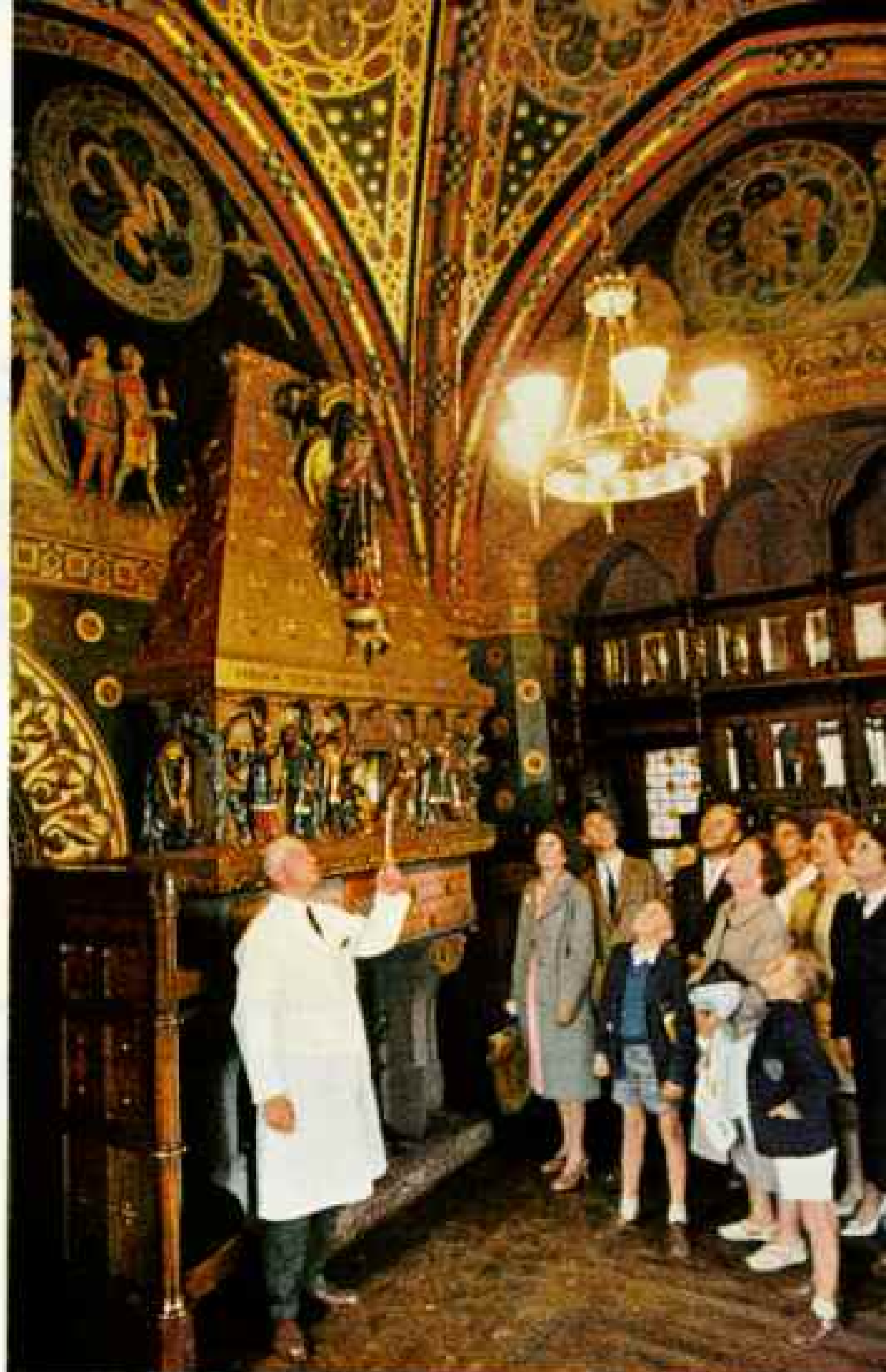
The cage shot like a greased stone down through blackness. A slight easement in the rate of fall presaged a smooth landing.

Mechanical Plows Work 1,000 Feet Down

We found ourselves in a world of tunnels, supported by steel arches and wooden pit-props, with little trains hauled along their tracks by endless cables. Round points of electric light on miners' hats made the gloom seem dustier.

"We mix stone dust into the coal and coal dust to keep the explosive content down," Mr. Edwards explained.

I thought we walked for miles. The going was often rough and uneven, and as we advanced the din increased. It was hot and dirty. A sort of large disk plow bit into a rich seam of coal, tearing it away at the rate of



EDWARDSONE (LEFT) AND ENTICHPONE BY THOMAS WEDDIA © N.A.L.

four tons a minute and pitching it onto a conveyor belt. Above the noisy coal-cutting machine was a fantastic affair, a sort of walking roof-supporter.

"It works by hydraulics," Mr. Edwards said. "The aircraft industry developed it for us, applying principles used in the hydraulic undercarriages for the big planes. The makers call it a 'self-advancing Roofmaster.' It holds up the roof while the coal is cut."

Instead of large numbers of sweaty men crouched in small corners, flailing at the face with picks, a few skilled men were handling all the machinery.

"We'll be getting the stuff out untouched by human hand one of these days," said manager Edwards.

Under-manager Dick Denham, underground since he was 14—26 years ago—spoke of the old days. "In some mines we used to get coal out of galleries so low even the rats

Signs of the zodiac decorate the Winter Smoking Room at Cardiff Castle, a stronghold that grew with the history of Wales. A Latin motto from Virgil, carved in the stone mantel above a row of figures, translates: "Love conquers all; let us also yield to love." It was from Cardiff, local legend says, that Lancelot fled an enraged Arthur after his dalliance with Queen Guinevere.

Martial music floats over the green of Cardiff Castle during the biennial Cardiff Searchlight Tattoo. A band of the Brigade of Guards awaits the baton's signal. Life Guards of the Queen's Household Cavalry sit their horses in front of the castle's Banqueting Hall. Spectators watch the pageantry from the top of the 12th-century Norman keep (right), built on the site of a Roman fort of the 1st century A.D. The Tattoo will take place again in the late summer of 1966.



Start young for Rugby. A small boy practices his kick on the beach at Harlech. A towel wards off the chill of sea air.

got howlegged in them. There used to be a lot of rats underground. The pit ponies were stabled here. Now they work only in a few galleries where you can't get the cutter in."

Canaries Warn of Deadly Gas

For all its mechanization, the mine was still equipped with the traditional canaries to detect mine gas (page 763). A couple of reassuringly healthy little birds chirped in a cage near the pithead.

"Their names are Pick and Shovel," said Dick. "We've got all the latest gimmicks for detecting gas, but the canary is still best. He gives the fastest warning. While the instruments are still making up their minds, the canary flaps his wings and wobbles a bit. We get our canaries from the Mine Rescue Station over at Dinas, in the Rhondda Valley."

I went across to visit this Mine Rescue Station, to see what it had besides canaries.

"We're a Class-A place," said superintendent Jack Perry, a former mining engineer



with 35 years in mines and rescue work. "That means we're fully manned with trained men, keep constant radio watch, and can go out any time. Every mine has its own volunteer rescue team as well. We train them here [next page]. We go ourselves when there are any fires or explosions.

"Our staff never leaves the station, except on a rescue job or on holiday. They have their homes here, wives and families, everything. We prefer married men. They don't mind staying here. They even cut each other's hair, so as not to be away from the job."

An exercise for volunteers was in progress. Flames crackled through mock-up mine galleries, and smoke swirled about. Roof falls were simulated with real rock. Through the smoke and over the rocks came the rescuers, respirators on, steel helmets, first-aid kits—more than 50 pounds of gear each. They carried heavy stretchers and dragged out "victims"—some dummy, some live—through holes and passages. They fought fires and

restored damaged roofs while the temperature soared. This went on for two hours.

"It's a tough job," Mr. Perry said. "We have full-scale rescue exercises every week and medical checkups regularly. A miner can join us at 22; he's retired from active rescue operations at 45. Then he can go back to other work around the mines."

Steel Plant $4\frac{1}{2}$ Miles Long

The courage and competence of the Welsh miner are matched by the Welsh steelworker. Wales has long had good coking coal, limestone, and iron ore. The steel industry prospered. Today it operates some of the largest and most modern plants in Europe.

At the melting shop of the $4\frac{1}{2}$ -mile-long Steel Company of Wales's plant at Port Talbot, I watched furnacemen at work. Some fed oxygen into the huge furnaces where new steel was "cooking," white-hot, sizzling and bubbling. Some operated large machines like bulldozers, handling mechanical shovels to

in a Rugby scrummage, trying to kick the ball out to teammates.

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KODACHROME © NATIONAL GEOGRAPHIC SOCIETY





build up banks of broken limestone inside the furnace doors. Others sat or stood at control panels, watching dials, manipulating small handles that resembled streetcar controls.

Now and again the glare from an opened furnace door shone on their intent, handsome faces, and I thought that a Hollywood casting director would find good material here. I remembered that actor Richard Burton comes from near Port Talbot.

The furnacemen were all dressed in gray short-sleeved flannel shirts. Instead of collars they had clean white sweat rags wrapped around their necks.

"The flannel keeps the heat out," old-timer Dai (David) Lloyd explained, "and the sweat rags stop the sweat pouring off our faces and down inside our shirts. We wear long flannel underpants too, tied at the knee. Flannel's the best for this job."

At the nearby docks of Port Talbot, ore-carriers from Narvik in Norway, Bilbao in Spain, and Bell Island in Newfoundland feed more than 60,000 tons of iron ore each week into the furnaces. (Most ore used in Wales is now imported, some of it also from North Africa and Venezuela.) The Steel Company of Wales's Abbey Works gobbles it up, standing

like a fantastic dream on its 1,000-acre site, filling the horizon, clanging with a thousand noises, belching brown smoke and red flames from a hundred stacks.

To achieve its annual production of three million tons of cold steel in sheets and tin plate, more than 17,000 men keep those mills, shops, and furnaces at Port Talbot going around the clock.

Basket Boats Survive the Centuries

In Pembrokeshire, near the western shore, the old Welsh ways go on as if never a steel mill had been heard of.

"Put your right foot in carefully on the withies there. That's it. Now carefully with the left foot too. Watch she doesn't topple over. Now the paddle—like this. Dig in and pull the coracle along, thick end first."

Old seaman David (Teddy) James of Cilgerran was showing me how to get into a coracle from the banks of the River Teifi. Welsh coracles are among the oldest forms of water transport still in everyday working use. They are, I soon discovered, also among the awkwardest. Since a coracle has neither bow nor stern and no stability to speak of, you sit on a thin thwart across a frail basket almost in the



RETRICHORE (UPPER RIGHT) AND RETRICHORE (LOWER) BY EDUARDO SPILL © N.S.S.

Mine rescue men, perfecting techniques at Dinas in the Rhondda Valley, practice sawing timbers for shoring cave-ins. They wear miners' hats and self-contained oxygen units.

RETRICHORE BY ALAN VILLIERS AND RETRICHORE (RIGHT) BY THOMAS REBBE © N.S.S.



Bird in hand may save lives of many. Although collieries have up-to-date gas-detectors, pits still keep canaries. The birds react quickly to deadly methane.



Underground conference: author Alan Villiers (left) listens to an explanation of modern coal mining methods from Dick Denham, under-manager of the Marine Colliery in Ebbw Vale.

In the inky vault of a coal mine, a workman pierces the coal face with a pneumatic pick. Miners use the pick to break off slabs of coal after blasting. Steel beams support the roof.

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Cold bath before the clipping: Sheep take a dunking in the rolling waters of the River Teifi. Two or three trips back and forth cleanse the wool for shearing. A coracle fisherman lends a hand by seeing that the animals swim safely across the stream. Wales raises between four and five million sheep, chiefly on small hill farms.





KODACHROME BY P. WARD AND ESTACHRIE (BELOW) BY THOMAS BERRIA © M.A.S.

Shepherd's pride, a border collie divides the flock at the Royal Welsh Sheep Dog Trials at Aberystwyth. Cutting across the green, the dog responds to his master's whistles.



water, with a sheet of pitched calico and only inches of freeboard between you and a ducking. Neither rowlocks nor tholepins are provided (pages 751 and opposite). The ancient Britons must have gotten along without such things, and the modern Welsh still do.

I went out with the coracle men, fishing by night.

"I work all day restoring Cilgerran Castle," said Teddy. "We fish with a towed net at night, when the salmon can't see us. They are clever fish. I've seen them catch sight of the top of our net at the last moment in the moonlight and leap over it. Often we don't catch any."

Fishermen Cling to Ancient Ways

We tramped along the sides of the gorge through which the Teifi runs swiftly beneath the ruins of the castle—Teddy James, his mate Mr. Morgan, and his son Gareth, each lumping the 35 pounds of a coracle upended on his back. From behind, in the moonlight, they looked like large bloated beetles going along on sea-booted legs.

"When it's dark enough to count seven stars, we launch," said Teddy.

I counted seven stars. We launched.

Morgan and Gareth set off downstream, each in his own coracle, spreading apart swiftly with the net between them. The net was about 20 feet long and stained dark. Morgan kept on the left-hand (inshore) side, Gareth to the other side.

"Left-hand man is boss. He handles the net and sings out to the other man what to do. If they get a fish, Gareth lets go. Morgan hauls in. They know if they get a fish all right. Mostly they come in like a torpedo. We've had 'em here up to 29 pounds."

Fascinated, I watched these direct descendants of the ancient Britons fishing in their ancient ways, along the dark river in the moonlight—black baskets afloat on the black stream, silent except when the men spoke quietly together in a tongue as old as their craft.

"Morgan works days as an engine driver with British Railways," Teddy told me.

How typical of the Welsh—driving a locomotive by day, and using a coracle by night like an ancient Briton!

We made two runs that night—but there were no fish.

I planned to take a bit of a trip on the Teifi by coracle. It seemed the ideal way to see the valley and its hinterland, from Lampeter past half of Cardiganshire, all the way down to the mouth of the river (map, page 737).

"Take a canoe," was one expert's advice. "A coracle isn't much for cruising. It's slow. It steers bad. It's wet. It's hard to handle in rapids. And it busts up easily on rocks."

I found out what he meant, though you can dry your coracle easily enough by the simple means of paddling to the bank, jumping up, pulling out the coracle, and upending it like a basin to pour the water out. But you can't keep up any speed, and you are very close to the water.

Coracles Drift Toward Oblivion

The valley of the Teifi has some of the most beautiful scenery in Wales, but you would need a month to see it all by coracle. The best way, it appeared, was to take my coracle up by road as far as the good water, and then drift down with the current.

Cilgerran men knew every bit of the river in the area they were licensed for (all fishing coracles must be licensed), from Cardigan bridge near the mouth as far up as Llechryd bridge. Cenarth men had the same sort of knowledge from the bridge to Cenarth Falls. Beyond that, nobody had any local knowledge. There were no more coracles.

"There'll be none at Cenarth, either, one of these days," Gof (meaning "blacksmith") Jones told me there. "They are taking away the licenses as we die out. There are only four left at Cenarth now."

It will be sad to see the coracles go. Yes, they are awkward, but to drift with the aid now and then of a few lazy paddle strokes, silently on the little river, to glide slowly past the lovely wooded hills and pretty villages in a quietude so profound you can almost hear the primroses opening their petals to the morning sun—this is a wonderful experience. Here and there ruins of castles or of abbeys stand gaunt on strategic hilltops. In the fields the lambs watch, and fat black-and-white cows, drinking from a sandspit by a bend of the river, stare with their big soft eyes as you float by.

At St. Dogmaels, on the Teifi estuary, I found a wonderful old seafarer—Capt. David

Williams, 89 years old now, but, like so many Welsh seamen, once master of famous big sailing ships.

Through a fascinating evening we yarned of long-forgotten Cape Horn gales and breathless moments in big windjammers. He had served in such ships since 1892, until he retired at the end of World War II.

"My father was lost at sea in a Swansea copper-ore bark before I was two," said the old captain—a slight, kindly man, like the verger of a cathedral, soft-spoken, not at all resembling the popular image of a Cape Horn shipmaster. "My mother had to bring us up. I don't know how she did it."

Captain Davey lived in an old stone house, just doors away from two similar houses his great-grandfather had built from the earnings of a brigantine he owned.

"I used to go aloft," said the captain, "if something was wrong with the roof of my house. But the neighbors got alarmed. They don't know what it means to go aloft in a sailing ship. A house stays still."

From the street outside came the cries of happy children on their way to the beach. St. Dogmaels is a seaside resort now, and its topside schooners, barks, and brigantines—or seagoing ships of any kind—are no more.

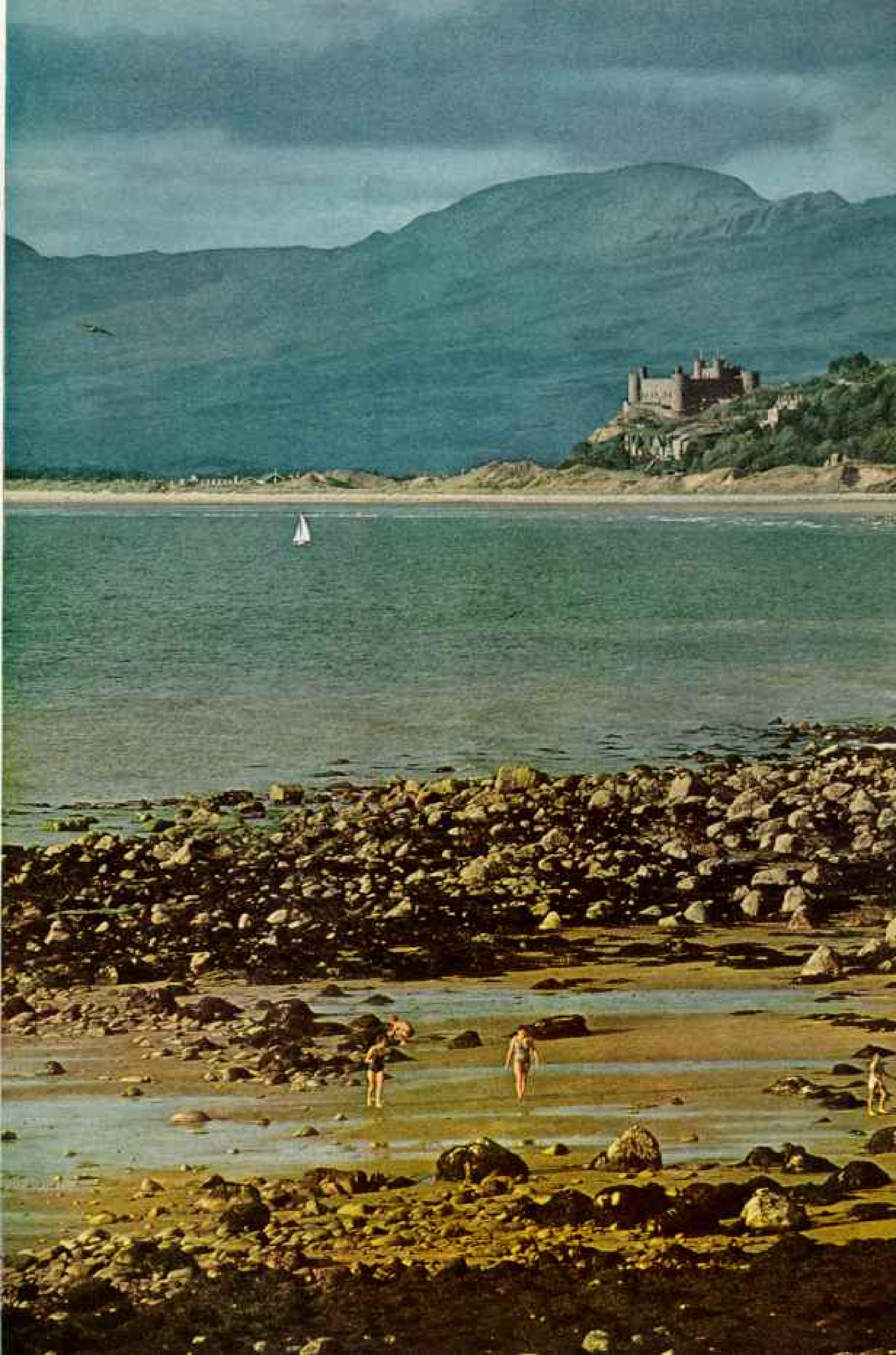
Latter-day Industrial Revolution

Back in the Welsh capital of Cardiff, I called on Lord Brecon, then Minister of State for Welsh Affairs, one of the two ministers the British Government appoints to look after Welsh matters. Lord Brecon sits in the House of Lords. Sir Keith S. Joseph, the other minister at the time, sat in the House of Commons and was a member of the British Cabinet, looking after all housing and local government, not only Wales.

"A latter-day industrial revolution has rejuvenated the old coal and steel industries and introduced a wide range of new industries," Lord Brecon told me.

"Modern Wales is among the most exciting and efficient countries in the world. The Welsh economy is now liberally equipped

Splash of sail on quiet waters, barefoot ramble of beachcombers on sandy strand, the brooding pile of Harlech Castle commanding rocky ramparts—all belie the bloody history of this shore. Here during the Wars of the Roses, desperate men offered desperate resistance. "War cries rend her hills and valleys," ring the English words to John Ceiriog Hughes's stirring "Men of Harlech." Among the last of the Royalist strongholds, Harlech fell to Oliver Cromwell's Roundheads in 1647.





with industries with a high potential rate of growth. For example, American firms are among those helping to establish Milford Haven as Britain's leading oil port. More than thirty American firms have established factories in Wales.

"Wales is a beautiful country, richly endowed with nature's graces, and at the same time a thriving modern country, playing an indispensable role in the economy of Britain."

Life's Too Short to Know Wales

Outside the windows of the minister's office, the flowering trees were blossoming in Cathays Park (pronounced *cath-ice*), the heart of Cardiff's Civic Center. Here it was

quiet. The bustle of the busy city, though it pressed all about, was kept at bay.

I dropped into a seat on a park bench. Beside me sat a Welshman about 70 years old, neatly dressed in a well-kept suit, the inevitable cloth cap on his gray head.

"Take a bit of beating," he said, gesturing toward the towers and domes of the Civic Center with obvious approval. "I helped build it."

I asked him how he found the times in Wales. He reflected a moment.

"The only trouble," he said, "is that life's too short. We Welshmen ought to live to be a hundred to know and enjoy our country properly!"

THE END



STUDIOS/PHOTOS BY THOMAS BOBERTA © NATIONAL GEOGRAPHIC SOCIETY

Capital of Wales, Cardiff keeps a green heart for its public buildings. Cathays Park (lower left), purchased from the Marquess of Bute in 1898, holds the Law Courts, City Hall, and the National Museum of Wales. Walled Cardiff Castle stands amid trees at the edge of its grounds (above).

An industrial center, the city has increased its population 140 times since 1800. This was one of the ports used by Americans for the 1944 invasion of Normandy. River Taff (right) flows into the mouth of the Severn, a mantle of blue in the background.

Sun and sonnets brighten the afternoon repose of an elderly Welshman.



Moths That Behave Like Hummingbirds

Photographs by TREAT DAVIDSON

YOU NEVER KNOW what's going to come out of the camera. I wanted pictures of hummingbirds hovering over flowers in the yard of my home in Warren, Pennsylvania. So one spring evening I set up my camera with its "electronic self-taker," the gear I devised to photograph automatically small wildlife in action. But the film, when developed, revealed that I had captured not only hummingbirds, but a strange interloper as well.

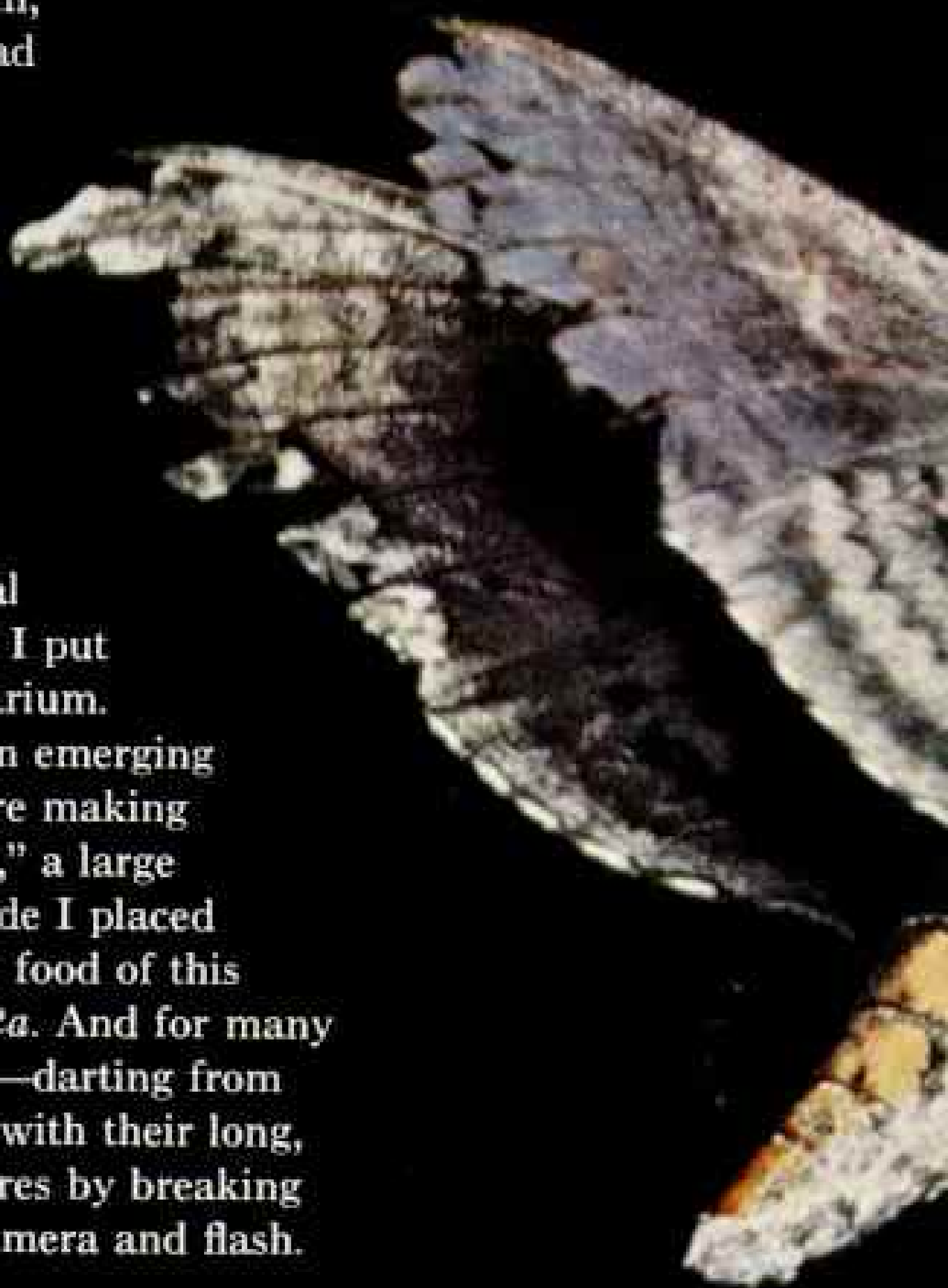
This was my introduction to the sphinx moths, many of which bear amazing resemblance to hummingbirds in their flight and feeding methods. I decided to become better acquainted.

Shortly afterward, I acquired a hundred pupae from an agricultural research station in North Carolina. I put them in an empty dirt-floored aquarium.

A month later the sphinxes began emerging from the pupal stage, and soon were making nightly flights in their "moth motel," a large screened cage I built for them. Inside I placed flowering tobacco plants, a favorite food of this night-flying species, *Protoparce sexta*. And for many warm, clear evenings the flutterers—darting from bloom to bloom to suck the nectar with their long, thin tongues—took their own pictures by breaking a light beam and thus triggering camera and flash.

Eyes glow red as sphinx moths, caught by flash after dark, sip the sweet juice of tobacco blossoms.

1 1/2 TIMES LIFE-SIZE!
ENTACHROME © M.G.S.







FEMALE lays eggs on a tobacco leaf (far left). Within a week, quarter-inch-long baby caterpillars gnaw holes in the eggs and crawl out (below). Full-grown, three-inch caterpillar rests on a tomato plant (right). A tobacco pest, the larva devours as much as two leaves a day; it also relishes tomato foliage. Hornlike tail serves no known function.

In northern climates the creature burrows into the ground at summer's end, spending the winter as a pupa. In spring it emerges as a moth (left), leaving behind the dry pupal case. The moth climbs onto a twig and rests, while wings grow to full size in less than an hour. The sphinx must also fit together the grooved halves of its long tongue into a strawlike tube, which it then rolls up. Should the halves not fit precisely, the moth could not suck nectar and would soon die of starvation.

Life cycle of a sphinx moth



EXTRAORDINARY (TOP) LIFE-SIZE AND (LOWER LEFT) 4-TIME LIFE-SIZE © N.W.A.



Budding entomologist, the author's year-old great-granddaughter Susan admires a specimen of *Sphinx kalmiae*, one of hundreds of species of sphinx moths. Also called hawk moths because of their strong flight, sphinxes inhabit much of the globe. They vary from bumblebee-size to giants with eight-inch wingspread. The name derives from a characteristic resting position of the caterpillar, with forepart reared up and head tucked in, it resembles the Egyptian Sphinx.



(EXAGGERATED LIFE-SIZE ABOVE AND RIGHT); SLIGHTLY SMALLER THAN LIFE-SIZE



Whirring wings of both the ruby-throated hummingbird (left) and sphinx moth (above) appear as a blur, except when stopped by the high-speed camera. Sphinxes rival hummingbirds in rapidity of wingbeat—25 to 45 times a second, versus a rubythroat's 50. They look most unmothlike in flight, and observers often mistake them for "hummingbirds with long tongues." Bird and moth are about the same size.

To freeze the motion of the moths and this young hummingbird, Mr. Davidson used an electronic flash of only $1/200000$ th of a second, triggered by a photocell.

With tongue longer than its body, a hovering moth dines from a deep-throated tobacco blossom. After the meal, *Protoparce sexta* will coil up its thread-thin proboscis like a watch spring. The species owes its name *sexta* to six orange-yellow spots on either side of the body. During daylight it sits in a state of torpor, eyes masked by forelegs, antennae folded under wings. At dusk it stirs, flies, and feeds. Sap-sucking aphids, barely bigger than pinheads, speckle the tobacco flowers. Mr. Davidson did not spray them for fear of killing the moths, which even so lived scarcely a week.

Wings near top of their beat, body superbly poised, a moth drains a bloom. Hummingbirds favor red flowers, but nocturnal sphinxes prefer white or pale colors, perhaps because they see light objects better in the dark. Some sphinxes fly by day as well.



(LOWER LEFT) © A.C.S.





Alaska's



Article and photographs by W. E. GARRETT
National Geographic Staff

Marine Highway

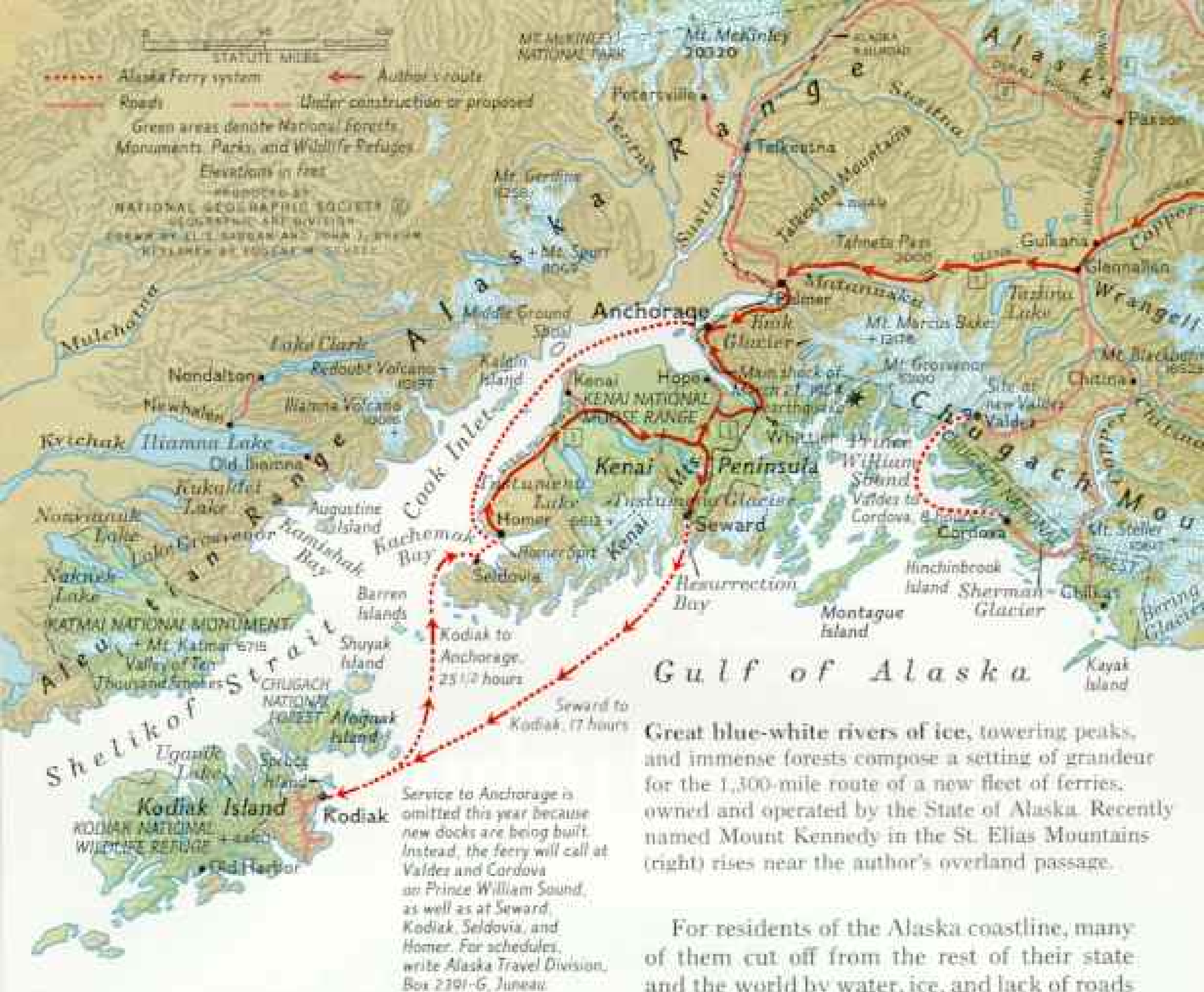
FERRY ROUTE TO THE NORTH

FOR DECADES, gold from the Klondike and Alaska diggings flowed down the Inside Passage to the United States—the “Outside” or the “South 48,” as Alaskans say. Then, no longer profitable, the gold workings closed.

Now the 49th State has moved to reverse the flow of wealth with a fleet of fast, far-ranging ferries to entice tourists and trade and make the Inside Passage a marine thoroughway to the north. Three new vessels, each bearing the name of an Alaskan glacier, have opened seven towns and 1,500 miles of coastline to cars and trucks. In their first two years of service, the ferries have carried 187,000 Alaskans and outsiders.

Not since the gold rush of '98 has southeastern Alaska seen so many strangers. But today they come with their cars and their truck-campers, in search not of the pot of gold, but of the rainbow itself—the scenic beauty of Alaska.

MOUNTAIN-CROWNED WATERWAY—Alaska's winding Inside Passage—unfolds majestic vistas of the 49th State's panhandle. Here the luxurious new ferry M.V. Malaspina heads toward the once isolated town of Wrangell.



Gulf of Alaska

Great blue-white rivers of ice, towering peaks, and immense forests compose a setting of grandeur for the 1,300-mile route of a new fleet of ferries, owned and operated by the State of Alaska. Recently named Mount Kennedy in the St. Elias Mountains (right) rises near the author's overland passage.

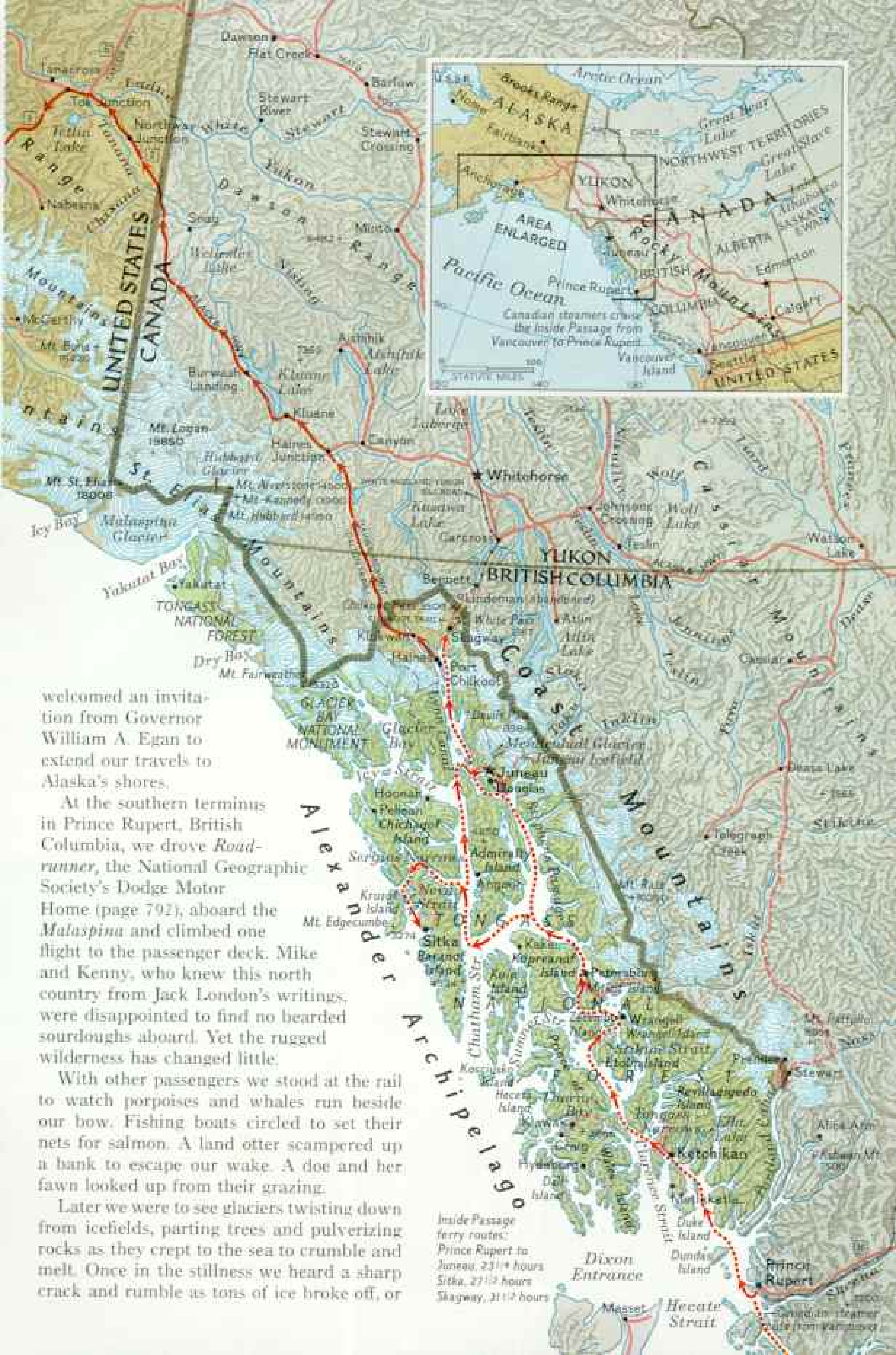
For residents of the Alaska coastline, many of them cut off from the rest of their state and the world by water, ice, and lack of roads or rails, the new year-round ferries—added to long-established service by tour ships, freighters, and planes—have brought a virtual end to isolation. *The Malaspina, Taku, and Matanuska* each transport 108 cars and 500 passengers at 17 knots. Since 1963 they have run regularly through Alaska's Florida-size panhandle, connecting Canadian Highway 16 on the south and the Haines Highway on the north and saving motorists driving to central Alaska 650 miles of gravel road.

Last summer the *Tustumena*—58 cars and 200 passengers—opened service to Kodiak Island from Seward, Seldovia, Homer, and Anchorage (above). Each of the four ships has private staterooms and a fine dining room.

My wife Lucille, our sons Michael, 12, and Kenneth, 11, and I have covered most of the coastline of the South 48 and Canada. We

Button-banded robe of a Tlingit Indian reflects the rich culture of Alaska's past. Deborah Harry, a member of the Chilkat Dancers, wears the blanket and a wooden hat decorated with totemic crests of her clan. She carries ceremonial fish-shaped wands.





welcomed an invitation from Governor William A. Egan to extend our travels to Alaska's shores.

At the southern terminus in Prince Rupert, British Columbia, we drove *Road-runner*, the National Geographic Society's Dodge Motor Home (page 792), aboard the *Malaspina* and climbed one flight to the passenger deck. Mike and Kenny, who knew this north country from Jack London's writings, were disappointed to find no bearded sourdoughs aboard. Yet the rugged wilderness has changed little.

With other passengers we stood at the rail to watch porpoises and whales run beside our bow. Fishing boats circled to set their nets for salmon. A land otter scampered up a bank to escape our wake. A doe and her fawn looked up from their grazing.

Later we were to see glaciers twisting down from icefields, parting trees and pulverizing rocks as they crept to the sea to crumble and melt. Once in the stillness we heard a sharp crack and rumble as tons of ice broke off, or

Inside Passage ferry routes:
 Prince Rupert to Juneau, 23 1/2 hours
 Sitka, 27 1/2 hours
 Skagway, 31 1/2 hours

Dixon Entrance

Hecate Strait

Canadian steamer from Vancouver



TOPPLING FROM THE SKY, the crown of a giant Sitka spruce plummets earthward at Thorne Bay. At the very moment, a ferry churns its way past the logging camp. Standing trunk will serve as a support for a log-moving rig. Agile tree-topper Jack Moriarty (left) clears the 140-footer of limbs on his way up. The author rode a bucket by highline to the top of a nearby tree to make these pictures.

EXTREMESIDE LEFT: PHIL BIRNBAUM
© NATIONAL GEOGRAPHIC SOCIETY







"calved," into the salt-water channel, leaving cobalt-blue scars on the glacier's white face. Swirling mists, ponderous fog banks, and brilliant patches of sunshine mingled in a slowly churning kaleidoscopic sky.

Many Coastal Towns Not Linked by Roads

Southeast Alaska hangs under the main body of the state like the tail of a treed raccoon (map, pages 778-9). Sitka, Ketchikan, Wrangell, and Petersburg are on islands in the Alexander Archipelago, while Haines, Skagway, and Juneau are backed up against mountains and glaciers. No roads lead to any of these towns except Haines, which has a 160-mile link to the Alaska Highway.

Near the first stop, Ketchikan, a fellow passenger asked in a friendly drawl if I was Mr. Garrett of NATIONAL GEOGRAPHIC. "I'm Bill Boardman," he said. "I've been on a trip outside. Heard you were aboard."

I had written to Bill, manager of the Ketchikan Chamber of Commerce, for information. Like many Alaskans we were to meet, he and his wife Flossie became our good friends. Their help was of the personal "we're-proud-

of-our-state" kind we received everywhere. Alaska is two and a quarter times as big as Texas, and Alaskans seem that much prouder. Maybe it's because their state is so new.*

Bill offered his home on Tongass Narrows as our night's campsite. We drove off the ferry in a rain which was contributing to the 150 inches a year that make Ketchikan the wettest town in the continental United States.

To set up camp, we had only to park our motorized home. The living and dining rooms are up front, right behind the driver. Lucille, my copilot, navigator, cook, and housekeeper, need go only a few steps to reach her kitchen with its hot and cold running water and gas stove and refrigerator. In the rear of the 26-foot bus are four bunks, a toilet, shower, and storage space. A 110-volt generator supplies electric power.

We had no need for our kitchen on this first evening on Alaskan soil. The rain stopped, and a glowing sunset reddened the sky and water. Chickens broiled on Bill's outdoor grill. We interrupted a game of horseshoes

*See "Alaska's Warmer Side," by Elsie May Bell Grosvener, NATIONAL GEOGRAPHIC, June, 1956.



Roadrunner, the author's home on wheels, leads a parade of traffic emerging from the side of the *Malaspina* at Ketchikan. Fourth vehicle is a truck-camper, popular for such a trip.



Ever-changing shores and seascapes fascinate the ferry traveler to Alaska. Passengers in *Malaspina's* forward lounge watch three purse seiners pass through a channel off Admiralty Island.



Snug stateroom on the *Taku* holds comfortable double-deck bunks, easy chairs, and a compact but completely equipped bath.

Dining aboard ship, Mr. Garrett and his family—Kenneth (left), Lucille, and Michael—order the restaurant's specialty, fish caught in Alaska waters.





EDUCATION © NATIONAL GEOGRAPHIC SOCIETY

"The sunshiny woods all athrill," wrote Canadian poet Robert W. Service, and his model could easily have been this sun-dappled campsite. Flying provides the easiest access to the cabin on Ella Lake, maintained by the U. S. Forest Service and offered free to visitors in Tongass National Forest. Largest in the United States, Tongass covers three-quarters of southeastern Alaska. Pilot Pete Cessnun (left) helps the Garrett family set up camp.

to drink a toast to another of the ferries as it passed us southbound.

Until a grand jury reformed it, Ketchikan was as wide open as a frontier town. In 1957 it was named an All-America City in recognition of its cleanup and progress.

The town stretches along a narrow strip of land squeezed between the water and the mountains of Revillagigedo Island. A few old board streets and docks built on pilings steal precious space from the channel. On the occasional dry day they rattle under car wheels like a toneless xylophone. Wood pulp has lately become Ketchikan's biggest industry, but the town still calls itself "Salmon Capital of the World."

In addition to its salmon, Ketchikan has trout in hundreds of lakes within minutes of town—minutes by bush plane, that is. We decided to sample Alaska's lake fishing in Tongass National Forest, whose 16 million acres cover 75 percent of southeastern Alaska. The 68 cabins and 60 boats on the lakes are free to all comers.

We loaded our gear into one of charter pilot Pete Cessnum's single-engine floatplanes.

Twenty minutes east of town, Pete landed near the only cabin on Ella Lake (opposite).

He was in a hurry to get away. Just before we had left Ketchikan, word had come that a logger named Rex Strong and his nephew were overdue from a goat-hunting trip.

"My pilots are all searching now," Pete said. "Rescue Squad thinks the plane must be down north and east of here."

Freak Wind Brings Tragedy

Pete accepted my offer to ride along as observer. We circled high into the coastal range, spotting dozens of mountain goats as we skimmed like a hunting hawk along the slopes and dipped down to check each lake.

"You won't see the plane," Pete told me. "Just look for a patch of ground or woods that's different from the rest."

The high snow slopes took twilight colors and the lakes became black patches as the sun settled under our wings. We saw no sign of the missing aircraft. Pete left me at Ella Lake and went home for the night.

When I awoke next morning, Kenny already had two trout for breakfast. They were

Prickly weed abounds in Alaska's woodlands. Its English and Latin names—devil's club (*Oplopanax horridus*)—show the low esteem both layman and botanist hold for the nettlesome plant.

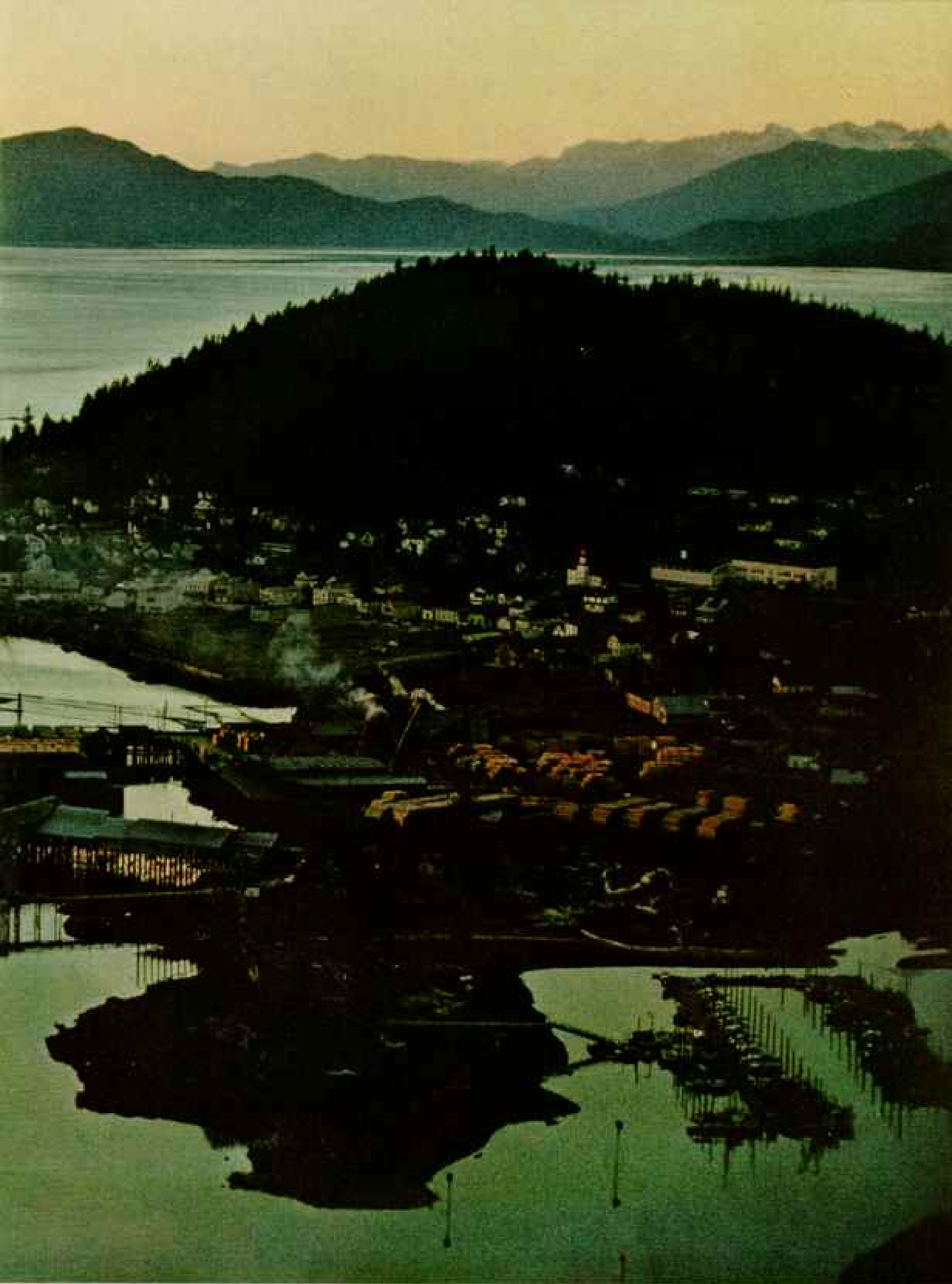


Luscious salmonberry (*Rubus spectabilis*) resembles a cluster of salmon roe. Another variety of this fruit in the Kodiak area of Alaska is popularly known as the Russianberry.





Evening casts a pewter patina on mountain-bemmed Stikine Strait as the ferry *Malaspina* approaches Wrangell's pier-fringed harbor. Docked at the Japanese-owned Wrangell Lumber Company's sawmill, largest in Alaska, the freighter *Azakiyuan Maru* waits



EDUCATION BY W. L. BARRITT © NATIONAL GEOGRAPHIC SOCIETY

to load a cargo of lumber for Japan. From Alaskan ports, Tokyo lies closer for shipping than does the United States east coast, and Alaskans look increasingly to the Orient for trade. Japanese interests also own a pulp mill at Sitka.



Curtain of fog shrouds steep hillsides along Icy Strait, here fished by the salmon seiner *Gypsy Queen* of Hoonah. Fully extended, the huge purse nets trail more than a quarter of a mile in an arc behind the boats. Commercial fishing leads Alaska's industries; lumbering and mining follow closely. Oil resources promise additional wealth.

the sweetest fish to come out of a frying pan. For one lovely day we had the world to ourselves. We loafed and fished lazily. The boys swam in shallow pools warmed by the sun.

That evening Pete returned for us. The search for Rex Strong had ended. During the night a Coast Guard plane had spotted a flashlight signal from a remote lake shore. It was from Rex Strong's nephew. He had been left ashore to be picked up later, while his uncle attempted to take off with a heavy load of goat carcasses. A freak gust had flipped the plane over. Mr. Strong was dead.

Dick Borch, who heads the Ketchikan Volunteer Rescue Squad, told me that all local pilots had stopped work and flown a total of 13,700 miles in the search. I asked if Mr. Strong had been well-known.

"Everybody knew Rex," Dick answered, "but that didn't make any difference. You give it your best. Next time it might be you."

Later, Pete flew us to Thorne Bay to see the logging camp Rex Strong had bossed. Dutch Andriesen, Strong's successor, met us.

"You're on Prince of Wales Island, the largest in the panhandle," he told us. "We've got more all-weather roads than all the rest of southeast Alaska put together. Now—what do you want to see?"

Beheading a Forest Monarch

I said I wanted most to photograph a tree-topping, an operation in which the brushy topknot of a forest giant is lopped off, while the bole is left standing to serve as a support for a log-moving rig.

To get the picture I wanted, I would have to shoot from the top of the tallest nearby tree. That seemed sensible—until the rigging crew began talking about fitting me with a pair of climbing spurs. But soon they stopped kidding and attached a pulley in the high



DETACHED (ABOVE AND BELOW, LEFT), AND BUSHNIRENE © N. J. J.

Savory salmon goes into cans on a production line in Ketchikan. The seasonal industry booms when the fish head for fresh-water streams to spawn in late spring and summer.



Tlingit Indian skipper, Joe White, owns the salmon boat *Karen Jean*.





branches with which to winch me to the top. Before I was really ready, I was upward bound, dangling and turning on the end of a thin steel cable.

It took Jack Moriarty, the topper, only minutes to skin his way up a 140-foot tree, lopping off branches with a chain saw as he came. When he reached the top, I called across to ask him if he had ever been afraid of heights. He looked back at me and grinned. "The first time I climbed, I was so scared my knees stripped the bark off the tree."

Our treetops swayed in unison in the rising wind. I remembered that logging has one of the highest accident rates of any industry.

"This should be the best-paying job in the woods," I said reverently.

Jack shook his head. "Not at all. The bushelers, the guys who fall the trees, can make as much as \$20,000 a year. Their rate was established in the days of the misery whip—the old crosscut saw."

His chain saw whined as he severed the bole just above his safety rope. The heavy top balanced precariously for a moment, then tilted away from Jack, fell free, and crashed to the forest floor (pages 780-81).

Back in Ketchikan, we watched logs from Thorne Bay go through the pulp mill, where they were barked, chipped, digested, bleached, and rolled into sheets of blotterlike pulp from which rayon and cellophane would be made.

"Before long we may be using balloons to harvest logs from the woods," said Art Brooks, timber boss for the mill. "In the future we may make our chips in the woods and pipe them to barges or even to the mill."

Alaska Turns to Asia's Markets

We took the next ferry north to Wrangell (pages 786-7) and looked up the lady mayor of this small lumber and fishing town. Mrs. Doris Barnes had decided not to run again in 1963, but won anyway on write-in votes—a tribute to her popularity and to the prosperity a new Japanese-owned sawmill brought to the town during her term in office.

She introduced us to Mr. Maas Iwakami, vice president of the Wrangell Lumber Company. He was proud that this first Japanese factory in the U.S. had won President Kennedy's "E" Award for export trade in 1962.

As we toured the mill, a Japanese freighter loaded Sitka spruce and hemlock. Later, I



Juneau's golden glitter recalls the day when Dick Harris and Joe Juneau struck pay dirt here in 1880. Miners took more than \$150,000,000 in gold from the Juneau mines before they closed, the last in 1944. Lack of level space limits the spread of Alaska's small capital city, whose inhabitants now number about 7,000.

Ice-scoured outcroppings provides a perch for the Forest Service's Visitor Center overlooking the face of Mendenhall Glacier, 12 miles north of Juneau. Named after Thomas C. Mendenhall, a noted physicist who served as a National Geographic Society Trustee from 1890 to 1894, the glacier flows from the 1,200-square-mile Juneau Icefield.



EXTREMITY (LEFT) AND BODILINESS BY W. L. BARRETT © N.S.I.

heard complaints that the Japanese were getting in peace what they failed to get by war. In Juneau, I asked economist George Rogers how Japan fitted into Alaska's future.

"We must look to Asia, particularly to Japan," he said. "Japan's resources are limited, but it has labor, factories, and markets. We have the raw materials. And it's easier to get to Tokyo than to New York."

The ferry *Taku* carried us on to a transplanted bit of Scandinavia. Petersburg, settled by Norwegian fishermen, harbors 160 fishing boats and processes 16 to 20 million pounds of seafood a year. The crisp little local shrimp are so hard to stop eating that Alaskans call them "Petersburg peanuts." Not so small was the world's record king salmon caught near here—126½ pounds.

"If a fisherman is poor in this town, it's his own fault," said Norwegian-born banker Ed Locken. "People here make good money, and they save it."

He told me that deposits then were averaging about \$3,000 per person. That's high by any standard.

The conservative Mr. Locken is one of many who did not favor increasing the state's

indebtedness by \$20,000,000 to build a ferry system. He is one of the few still unconvinced.

"The ferry doesn't bring us any business," he told me. "The tourist brings his family and his camping equipment with him. He comes in here with a \$10 bill and the Ten Commandments and doesn't break either."

Lew Williams, Jr., owner of the *Petersburg Press*, saw it another way:

"The lumber mill just had its best year because it could ship out on the ferry. We even have a parking problem now; thanks to the ferry, we can afford to bring in cars."

Three times a week the ferries turn from their regular route and thread their way through the Sergius Narrows and Neva Strait to Sitka, former capital of Russian America. There they lie over for two and a half hours, and passengers can visit the historic town.

We climbed Castle Hill, where America's two-cents-an-acre purchase of Alaska for \$7,200,000 was formalized on October 18, 1867. Tsar Alexander II, reluctant to take over the failing Russian trading company, had instructed his minister to accept as little as one and a half cents if necessary.

From Castle Hill we watched a freighter



Flowers and ice surround *Roadrunner* at Mendenhall Lake, formed by melt from the glacier. The ice here visible on the Mendenhall's terminal cascade fell as snow some 200 years ago on the huge Juneau Icefield to the north.

Proud angler Kenny Garrett shows off the biggest fish he ever caught, a 13-pound silver salmon. With great reluctance he yielded his prize to his mother, who soon brought sizzling salmon steaks to the table in *Roadrunner's* living room.





KOSACHPOWET © NATIONAL GEOGRAPHIC SOCIETY

pulling away from the Japanese pulp mill at Silver Bay. The plant had cost 60 million dollars to build—enough to buy eight Alaskas at Seward's purchase price.

"You know," Mike said, "I'll bet the Japanese built here because it reminded them of home." He was looking toward Kruzof Island to the west, where snow-capped Mount Edgecumbe rose from the Pacific mists like a mirage of Mount Fuji.

The *Taku* worked its way back to the Inside Passage and headed north for Juneau, the state capital.

Here, where Joe Juneau's gold strike founded a town in 1880, small clapboard houses crowd between the water and steep, tree-clad slopes. Narrow, winding roads give way in places to stairways. Built by a population which was usually either poor or transient, Juneau's older sections boast little beauty beyond the loveliness of their setting (page 790). Gold miners made poor city planners.

The mines that produced \$150,000,000 in gold are silent, closed these 20 years by high

costs. The only traffic in the tunnels is a daily tourist trip in the old ore train. On the mine tailings, an expanse of crushed quartz where no grass grows, local golfers built southeast Alaska's only course. The fairways contain flecks of gold that filtered through the extractors and gave the place its name: "Million-dollar Golf Course."

We camped north of town on the edge of the lake where Mendenhall Glacier terminates (left). From inside a handsome wide-windowed Visitor Center (page 791), we watched the face of the glacier glow in the evening light. A Forest Service naturalist told us that 25 years ago the ice had covered the ground where we stood. In another 70 years it could advance again and crush this building. Mike and Kenny promised to bring me back to witness the event.

Copter Climbs to Icefield Station

For a few days Juneau became a base of operations from which we struck out by air and by sea. I went first 25 miles eastward by helicopter, landing near the middle of the 1,200-square-mile Juneau Icefield, where scientists and students of the Summer Institute of Glaciological Sciences had set up camp. The group's leader, Dr. Maynard M. Miller, had been in charge of glacial studies on the National Geographic Society-supported American Mount Everest Expedition (October, 1963, *GEOGRAPHIC*). Now he was working under another Society research grant to complete a classic study of Alaskan ice.*

Here, only minutes away from the mild climate of Juneau, I found myself in an arctic environment. Dr. Miller explained the abrupt temperature change.

"This icefield ranges in altitude from sea level, where the glaciers melt, to 8,600 feet. Every 1,000 feet of elevation is the equivalent of 300 northward miles, which gives the highest parts of the field a near-polar climate. A thermometer left here registered 86° below zero Fahrenheit one winter.

"The ice you're standing on is less than 100 years old," Dr. Miller continued. "It will reach the sea in another 80 years. Our studies over the past 18 years indicate that we're entering a period of lower temperatures and generally heavier snowfall in the Northern Hemisphere.

*Dr. Miller is updating a monumental reference work on Alaska's glaciers, published in 1914 by Ralph S. Tarr and Lawrence Martin with support from the Society. In addition to his glacier research, Dr. Miller has headed numerous expeditions in Alaska, one of which he described in "First American Ascent of Mount St. Elias," *NATIONAL GEOGRAPHIC*, February, 1948.



Tortured ice pinnacles 60 to 100 feet high dwarf visitors at the face of the Mendenhall, a glacier that melts faster than it moves forward. Scientists predict that the face may begin advancing again toward the end of the 20th century. By then, as their study of



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climatic cycles indicates, colder temperatures and heavier snowfalls will have replaced the relatively warm and snow-scant winters now prevailing along the Alaska coast. Mendenhall Lake, 115 feet deep near the glacier, did not exist when this century began.

Geologist Maynard M. Miller lectures to students at Michigan State University's Summer Institute of Glaciological Sciences on the Juneau Icefield. The National Science Foundation and the Foundation for Glacier Research of Seattle sponsor the institute.

Ice walls of a crevasse, photographed from its depths, reveal a glacier's age. Each horizontal streak of pollen and dust represents a year. Holes at right yielded samples for scientific analysis. Ice bridge at top could collapse under a man's weight without warning.



Alaska Governor William A. Egan tours the Juneau Icefield with Barry W. Prather, right, assistant to Maynard Miller. Both Dr. Miller and Mr. Prather were members of the 1963 American Mount Everest Expedition, supported by the National Geographic Society.



Two winters ago 120 feet of snow fell at one of our camps. Such snowfalls and increasing cold will enlarge the coastal glaciers and cause many of them to advance again."

Dr. Miller had given me a look into the future of the great glaciers. Now the wiry professor offered me a glance into their past via a twisting cable ladder that dangled deep in a crevasse (opposite).

Fifty feet down, I reached 1950's snowfall. I was surprised to find that summer melting and the weight of subsequent snows had compressed many feet to a few inches. Each year's deposit was separated from the next by a faint gray-brown layer of dust and pollen that had fallen on the icefield during the summer. The pollen layer is as sure a measure of the years as are the rings of a tree.

I traveled over the icefield with graduate students as they made gravity and seismic measurements, checked ice density, took pollen samples, and made other tests. A few years ago one student met his most surprising



ENRICHMENT © NATIONAL GEOGRAPHIC SOCIETY

discovery in the camp outhouse. He found it occupied by a porcupine.

"We still don't know how it got there, miles from the nearest forest," Dr. Miller said. "The next morning it was gone."

I flew back to Juneau on the next mail-running helicopter. Before we left the area, Alaska's Senator Ernest Gruening, Dr. Miller, and I scouted the superb Taku River country by bush plane. The Senator wanted Dr. Miller's opinion on a proposed route for a road from Juneau to the Canadian highways.

We flew low up the valley, surprising moose grazing in the flats, over lakes stair-stepped in the flanks of the mountains. We circled the Devils Paw, a rocky column jutting 4,000 feet above the icefield. Pilot Ken Loken treated us to a symphony of wild scenery.

Senator Gruening, Alaska's former Governor, knows and loves the wilderness.* He's walked or flown over most of it.

"Mr. Garrett," he said, "this piece of country we're looking at is one of the Nation's

most valuable resources. With our population expanding and its leisure time increasing, the need for outdoor recreation will triple during the next 30 years. And here, in this new state with only one percent of America's people, are two-thirds of her public domain, one-third of her national park lands, and one-fifth of her total forest acreage. The pressure of civilization will drive men to the wilderness we offer."

Salmon Run in Icy Strait

We found old friends of the NATIONAL GEOGRAPHIC in Juneau: Amos Burg and his wife Carolyn. Amos, who has written 9 articles for the GEOGRAPHIC, is now with the Alaska Department of Fish and Game. He told us that despite a general depletion of salmon in past years, there was a record run then going on in Icy Strait. He arranged for me to join a commercial fishing boat.

*The Senator wrote of his state in NATIONAL GEOGRAPHIC: "Alaska Proudly Joins the Union," July, 1959, and "Lonely Wonders of Katmai," June, 1963.

Lucille and the boys flew to the Indian village of Hoonah with me and stayed there while I sailed with the *Karen Jean*—the “high boat of Hoonah.”

Tlingit Indians from the little village are respected salmon fishermen. To be “high boat” means making the largest catch, and Hoonah’s high boat is always among the top fishing vessels in all southeast Alaska.

I rode out to Icy Strait with a cannery boat,

boarded the *Karen Jean*, and climbed to the flying bridge to meet the captain-owner, Joe White (page 789).

The old Indian acknowledged my wordy thanks for his hospitality with a deep grunt and continued to scan the waters with eyes squinted from 45 years of searching for salmon. The surface seemed inscrutable to me, but soon the skipper turned and nodded slightly. His son Jerry jerked a line. The skiff



tied to one end of the huge purse seine dropped away astern.

Joe eased the throttle forward. The mound of nylon net jumped and tumbled over the stern rail until its full 1,500-foot length was strung in an arc. Then he circled back to the skiff. The crew fed the nylon drawstring through the power winch, closing the bottom of the purse.

As the net was hauled, Joe pointed to sal-

mon thrashing within the shrinking circle.

"Maybe hundred humpies," he said.

Humpies, I learned, mean humpbacked pink salmon. Joe continued: "One set I got 12,000." Twelve thousand fish in one haul!

I missed hearing details of that epic catch in the creaking of the hoist and the noise of the wind, but I did learn that he had once netted 20,000 fish in a single day. In a good season *Karen Jean* boats about 120,000 salmon, worth roughly \$48,000. Joe takes a third of that for himself and his boat. The eight-man crew divides the rest.

With the day's catch of some 2,000 delivered to the cannery boat, we headed home to Hoonah for the weekend, proudly flying a broom to tell all that Joe's boat had been the first to pass the 100,000 mark that season.

Family Relies on Boats, Not Cars

I walked along the dusty main street paralleling the water to the unpainted two-story frame hotel. There Mike and Kenny told me how two Indian friends had taught them to jig herring under the cannery docks. While we swapped fishing stories, the proprietor fried a skilletful of fresh crab meat.

Frank See, Joe White's nephew, joined us for a cup of coffee. The husky Indian is mayor of Hoonah, a member of the State Legislature, a master guide, a hunting lodge operator, and proprietor of one of the town's three general stores. Instead of family cars, Frank has a cabin cruiser and a 16-foot "compact" outboard for his wife.

When he heard we were from Washington, D. C., he told us he had been there the previous winter and jokingly complained that it had been 15 degrees colder there than back home in Hoonah.

"You'd be surprised what some Washingtonians think about us," Frank said. "They asked if we lived in igloos. Someone at the hotel asked me if I'd ever tasted ice cream. On an average summer day we sell 30 gallons of it in our ice-cream parlor. On the Fourth of July my wrist aches from scooping cones."

Before the Russians arrived, the Tlingits

Rattle-shaking shaman, or Indian doctor, dances to rid a patient of illness by calling up the powers of the spirit world. Walleys and toothy totems decorate the stage at Port Chilkoot. The Chilkat Dancers, formed in 1957, revive Indian arts and traditions. One of the most warlike of the Tlingit tribes, the Chilkats once ranged from the Yukon as far south as Vancouver Island.

PHOTOGRAPHY © NATIONAL GEOGRAPHIC SOCIETY





had one of the highest Indian cultures in western North America. Today many are on relief and are said to be shiftless. I asked Frank how this reputation developed.

"Because it is true of many of our people," he answered. "Missionaries and early government officials tried to destroy our culture. I got many a whipping for speaking Tlingit on the school grounds. Our people lost their initiative. We had no leadership. We were not allowed to be responsible for our own lives. Now the Bureau of Indian Affairs people are encouraging us to save our language and revive our handicrafts.

"But it's still impossible for us to get clear title to our lands. We can generally sell only to other Indians. The community can't tax Indian property, either. So, to make extra money for the school and finance a youth pro-

gram, we're opening a community liquor store."

The Tlingits have always been known for their valor. Russians suffered a military defeat at the hands of Tlingits in 1805, when warriors wiped out the foreign colony founded near Yakutat. Remembering this and hearing that the Soviets had the atom bomb, an old Indian lady appealed for protection. She was sure descendants of the slaughtered Russian settlers would now avenge the massacre by bombing tiny Yakutat.

The village lies on a bleak Pacific shore south of the great glaciers fed by the St. Elias Mountains. Here, from 1909 to 1911, the National Geographic Society sent three expeditions to study the Yakutat Bay area.

We found a willing guide in George Ramos, one of the best Indian dancers in Yakutat.



KODACHROMES BY W. C. GARRETT (BELOW) AND LARRY DUTTON;
COURTESY NATIONAL FILM BOARD OF CANADA © N.F.B.C.

Author's Family Follows Chilkoot Trail, Path of Frenzied Gold-rushers of '98

Klondike stampeders in an unbroken line climb steps of ice to the Chilkoot Pass in the 1898 photograph above. Before the final ascent, men wait in an area known as The Scales to weigh supplies and equipment. From here to the top, porters charged a dollar a pound. Canada required each fortune hunter to bring 1,100 pounds of food as insurance against starvation.

The Garretts, who walked the 35-mile trail, breakfast on the Alaska-Canada border above the pass. British Columbia's Crater Lake fills the abyss below them.

Relics of the rush, horseshoes tossed by Kenny Garrett mark the site of a trailside smithy on the Canadian side of the pass.



He borrowed a 16-foot outboard, and Lucille, Mike, Kenny, and I launched another Society "expedition" into Yakutat Bay.

After two hours of pounding through the icy water, we stopped at a small cabin along the wild shoreline. George told us this was a home he was building for his family. He was returning to hunting and fishing for a living.

I couldn't question the beauty of the location. Salmon were running up the nearby streams. There was plenty of food and fur-bearing game in the area. But Mrs. Ramos was a nurse, and George had worked for seven years with the U. S. Public Health Service. I couldn't understand why they would want to raise their family in such a remote spot.

"Won't it be lonely out here?" I asked.

George thought a moment before answering.

"Last New Year's Eve I was in Times Square in New York City," he said. "I've never been more lonely."

Where Glaciers Spawn Icebergs

We picked up extra fuel cans and continued northward past the Malaspina Glacier. It is as large as Rhode Island, yet we could see Mount St. Elias's 18,008-foot peak behind it.

As we approached the head of the bay, faint thunderlike rumbles sharpened into distinct detonations. Seventy-five years ago Professor Israel C. Russell, leader of the National Geographic Society's first expedition to this area, heard just such sounds as he neared the glacier he named in honor of Gardiner Greene Hubbard, then the Society's President.

The Hubbard face loomed 200 feet above our tiny boat and stretched a couple of miles on either side. We were too close for safety, but the awesome sight and sounds were compelling. As we watched, huge chunks of ice plunged into the water. Each collapse was followed by a wave which bobbed our boat.

One of the ice slides grew larger, and its rumble rose to a roar. Hundreds of tons fell in a seemingly slow slide to the sea. A cloud of ice crystals boiled up like smoke from a bomb blast.

We sped away ahead of the outrushing impact wave. Though it was partly spent by the time it reached us, it gave our little craft a powerful shove toward the mouth of the bay.

From Yakutat we flew south over Glacier Bay National Monument to Juneau to continue our interrupted journey. Once again we took the marine highway north, this time to the end of the line at Skagway, gateway to the Yukon.

The town had grown in one year, 1897, from a single settler's cabin into the biggest, toughest city in Alaska. The location at the head of the Inside Passage and at the foot of the Chilkoot Pass (preceding page) and White Pass Trails attracted a transient population of 15,000, including several thousand opportunists who fed, housed, entertained, and often robbed the gold seekers. Today only 750 people live in Skagway.

We were to find the town much the way the rush left it. Boardwalks and old saloons still line the dusty main street which is kept, for the benefit of tourists, in its original unpaved state (opposite). Featureless frame houses face the waterfront.

Our ferry docked late at night. We drove through town and parked our home beside Skagway's Trail of '98 Museum. Next day we met Mrs. Jeannette Hillery, receptionist in the museum and a resident of Skagway for 66 of its 68 years. I asked Mrs. Hillery how the community had survived.



Ta-ra-ra-BOOM-deay! Skagway residents put on a "Days of '98" show for visitors to the gold-rush community. The frolic also features a re-enactment of "The Shooting of Dan McGrew": "Then I ducked my head, and the lights went out, and two guns blazed in the dark. And a woman screamed, and the lights went up, and two men lay stiff and stark."

False-front buildings and board sidewalks flank Skagway's unpaved Broadway. *Roadrunner* finds no parking problem here.



RECALCITRANCE BY W. E. GARRETT © NATIONAL GEOGRAPHIC SOCIETY





"The rush ended as fast as it started," she told me, "but for quite a while there were men in the hills looking for the mother lode. Those men had to be supplied. Later the railroad provided jobs. We carried on as best we could. A town dies hard."

We told her we wanted to walk the Chilkoot Trail to Bennett, British Columbia, 35 miles north. Mrs. Hillery discussed the trail's reputation as a man-killer in the gentle tone of a teacher who loves her subject.

"It's not as bad as the old stories make it. You have to realize that many of the men who suffered so on the Chilkoot were soft. They were 'cheechakos,' as we call them. Some, like my father, were clerical workers. It was difficult for them."

Larry Dutton, of the Alaska Division of Lands, offered to act as our guide. "Dutt," a long-legged, husky young Alaskan with a red sourdough beard, was packed and ready early. We four cheechakos took most of the forenoon getting our packs light enough to carry, yet full enough to provide for four days in the wilderness.

Cheechakos Follow the Gold-rush Trail

For the first few hours we walked along a well-marked path through the rain forest. By evening the trail narrowed and steepened. The mosquitos seemed hungrier.

The first night we enjoyed one of the state's sturdy cabins. By ten o'clock the next night we were approaching the high point on the trail after climbing a mountain of loose, sliding scree. We had been laboring upward for 13 hours. The August day lingered as if to savor Alaska's short summer. Ahead of us the Big Dipper slowly came into view as we struggled up the last few yards of soft ice to a ridge overlooking the pass. We had reached the desolate summit line of the Coast Mountains, the border between Alaska and Canada (page 800).

As we stood alone and exhausted on the mountaintop that evening, we shivered in the same chill wind which met thousands who poured past this spot in their dash for the Yukon gold. Tired muscles and the moonless dark put an end to the day's trek. An inhospitable rock ledge bordering the snowcap became our bivouac for the night.

The wind cooled our pot as fast as the little alcohol stove could warm it, but even lukewarm stew was welcome. Lucille feared the boys might walk in their sleep and fall off the ledge. Mike reassured her: "I'm not walking anywhere tonight."

Certainly Lucille was not the first woman to pass here. Any woman who reached the Yukon towns in 1898 could get married or rich or both. Some found the prospect irresistible. One lady, impatient to move on despite dangerous conditions that winter, was caught in a snowslide which killed her and some fifty others.

For three days we walked over the bones of the gold rush. We slept in the only cabin left standing in long-deserted Lindeman, and explored the ruins of a blacksmith's shop where the arid climate had preserved in near-perfect condition sledge runners, wagon wheels, and hundreds of horse and mule shoes.

Dense underbrush delayed us on the fourth morning. Only by running the last hundred yards to the railroad right of way near Bennett were we

Like circus acrobats, wooden Indians and animals compose a modern-day Tlingit totem pole at Wrangell. Totem carving by the Tlingits had virtually died out before a U.S. Forest Service project revived the art in the 1930's.

Snow-thatched St. Elias Mountains reduce *Roadrunner* to puny size. Here the Garretts travel along the Haines Highway to join the Alaska Highway in Canada on the 785-mile overland journey to Anchorage (map, pages 778-9).



able to flag the narrow-gauge train which would take us back to Skagway.

Each day during the summer the old White Pass and Yukon Railroad takes tourists from Skagway to Bennett in antique wooden parlor cars, serves a gold-rushers' lunch, and brings them back over the same scenic route.

This day the tourists enjoying the wild northwest scenery saw two bearded men burst from the underbrush and flag the train to a halt. Dutton's big pistol and our generally

disheveled appearance gave the passengers some uneasiness at first. It vanished when we helped Lucille and the two boys aboard.

"We thought we were being robbed," joked one passenger. "Where in the world did you come from?" It was hard to convince him that we'd walked from Skagway.

Dutt and I went to the baggage car to wring the water out of our socks. In a soft, understated tone he informed me I had a hole in my pants. I felt behind and found that the entire



seat of my knickers had split. No wonder some of the passengers smiled when I assured them the trip had been uneventful and the rigors of the trail overrated by zealous writers and cheechakos.

In Skagway we treated ourselves to steak dinners and whooped it up at the "Days of '98" show like sourdoughs on their first night back in town (pages 802-3). Afterward we took the ferry's shortest trip, a 17-mile run to Haines. By rail and road it's 360 miles.

RENDERING © NATIONAL GEOGRAPHIC SOCIETY



Haines boasts the most publicized performance in the panhandle: the Chilkat Dancers (pages 798-9). The dancers are sponsored by Carl Heinmiller, head of Alaska Indian Arts, a nonprofit corporation which also produces Indian handicrafts. A former major of Army Rangers, with a sealskin beret and a black patch to cover an eye blinded by a booby trap, Carl has become more Indian than many of the Tlingits. He has been given three names—a high honor, especially from Indians who tell such tales as this about white men:

A white trader married an Indian girl and quarreled with her constantly. He turned to a brave for sympathy, complaining, "I should never have married a squaw."

"You right," was the answer. "White woman plenty good enough for you."

White Man's Mask Passes Test

"The Indians didn't trust me at first," Carl said. "They had been cheated and lied to by white men since the Russians first arrived. I studied their customs and handicrafts at the Alaska Museum in Juneau and at the Smithsonian Institution in Washington. I tried to tell them that I understood and respected their culture, but I got nowhere until I carved a Tlingit mask myself and took it to the village. One of the old men studied it carefully and said, 'White man, you guys make a lot of promises, but this one I can feel.'"

Carl now employs 40 Indians who carve masks and totems and make canoes, dance costumes, and moccasins. We enjoyed the dances that evening with about 200 tourists from the ferry and a tour boat. As we left the tribal dance house, the purples, greens, and reds of the northern lights flowed through the sky, sometimes as a faint teasing trickle, then as bright flowing splashes.

We drove north over the old Dalton Trail, originally surveyed and cleared by the opportunistic Jack Dalton, who later demanded and got \$150 from each traveler upon his road. Driving 42 miles on asphalt, we left Alaska, entering it again after 320 gravel miles through British Columbia and the Yukon. We reached Anchorage in two days.

I had been there four months earlier, just

Earthquake's sudden jerk dished up this gargantuan fudge sundae. More than eight million tons of earth and rock slid from a nearby mountain onto Sherman Glacier, 18 miles from Cordova, on March 27, 1964.





ANCHORAGE: LARGEL AND BODATHORNE © NATIONAL GEOGRAPHIC SOCIETY

Oasis of light, Anchorage gleams against the Chugach Mountains in the afterglow of a summer evening. From atop the 15-story Anchorage-Westward Hotel, tallest building in Alaska, the 4th Avenue areas collapsed by the Good Friday earthquake show as holes (left), long since cleared of debris.

Wake of a quake: Bulldozers work amid tumbled shops, cafes, and offices along Anchorage's 4th Avenue two days after the Good Friday disaster. Apartment building in the background survived tremors, but had to be vacated because of heavy damage. Seismologists believe an ancient glacial stream bed underlay this part of the city and caved in during the violent shake.

after the Good Friday earthquake.* Now debris had been cleared away, and new buildings were being erected. But the state had been shaken economically as well as geologically. Certainly Alaska survived and probably will emerge stronger than ever, but the more than \$310,000,000 in losses—twice the state's annual budget—was too great a blow for hard-hit Alaskans to absorb. Massive Federal aid has been essential to the recovery.

Salmon Derby Offers \$3,000 Prize

We would return to Anchorage. But right now we wanted to join the city's fishermen in their annual expedition to Seward and its Silver Salmon Derby. From Seward we would take the ferry *Tustumena* to Kodiak and back to Anchorage, by way of Homer.

The road to Seward was open only two hours a day. It had settled several feet during the shaking and was now under water in several places at high tide. Seward itself had lost all its port and industrial facilities and payrolls.

But this week the tragedy was half forgotten. Silver salmon were running in Resurrection Bay, and hundreds of boats crowded the water. The derby offered a \$3,000 top prize for the biggest fish; so far only a 17-pounder had been caught. Tomorrow would be the last day of the contest, but our boys felt lucky.

By 5 a.m. we had finished breakfast, had our entry ticket punched, and were trolling. Suddenly Kenny hollered; his rod bent, the reel whirred, and a nice silver broke water. He got the fish close to the boat. Then, with a flip of his tail, the salmon dived. Kenny jerked the rod and the line broke. He almost cried.

Soon we saw a flurry of action among the skiffs near shore. The word passed like an echo from boat to boat: A 21-pounder!

"Couldn't be a silver," said our guide, Russell Lohman, a 27-year-old diver, pilot, and commercial fisherman. "Must be a king."

As we edged closer, Russ exclaimed in true fisherman's appreciation. "Mister," he called, "I've never seen a silver salmon that big around here. You've got a sure winner."

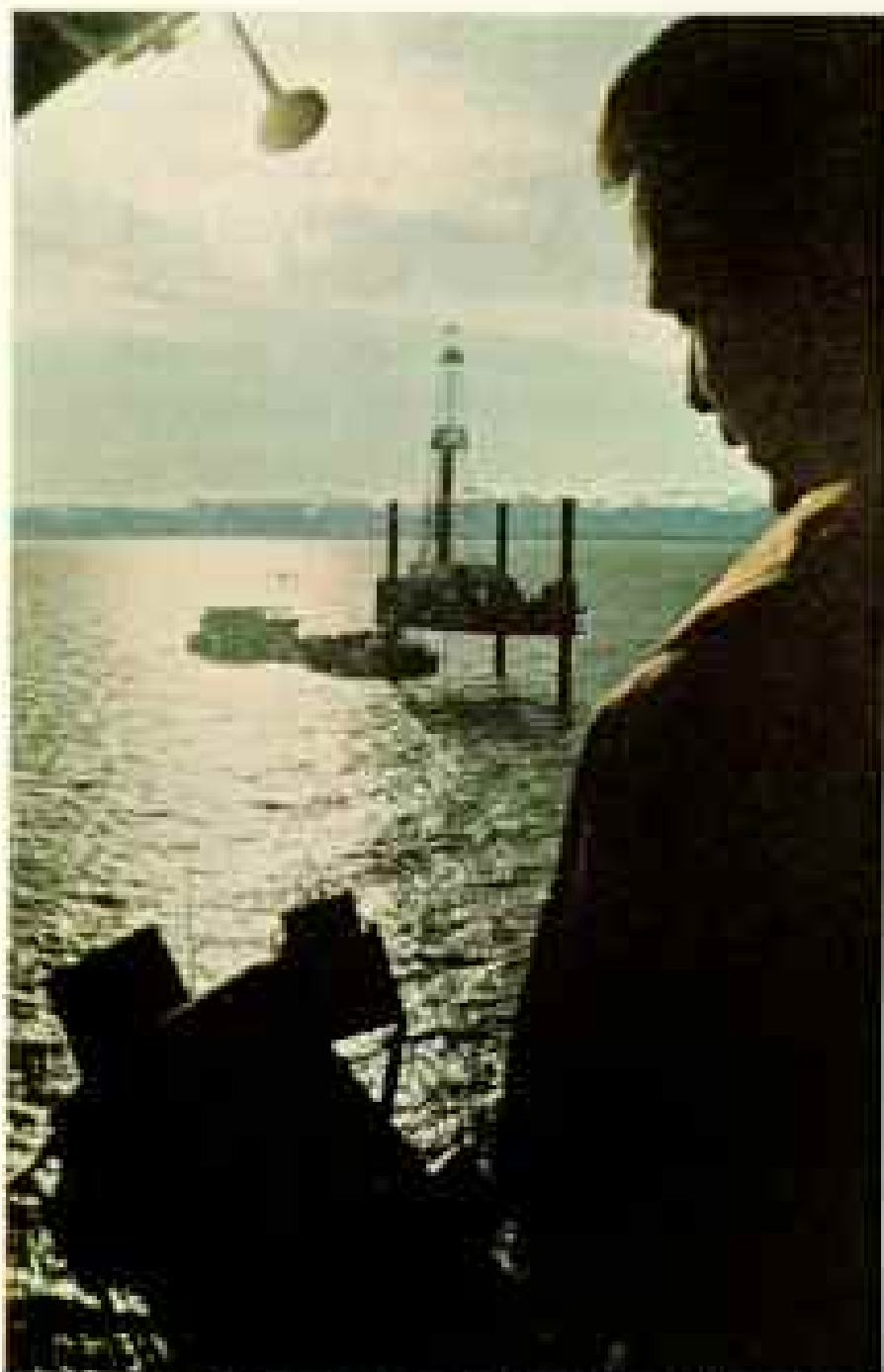
Then we heard the saddest fish story of the year. Walter Krotke, an electrician for an airline in Anchorage, had fished in seven derbies and on every day of this one. This time he was on his way to get his ticket punched when he made his big catch. It could not be entered.

Kenny suggested he go in, get his ticket punched, and come back out. It was still only 7:30 a.m.

"No, sonny," replied Mr. Krotke, "that wouldn't be honest. I just fish for fun anyway."

To the lady who had sold us our fishing gear, I commented on the honesty of Alaska's fishermen.

*See "Earthquake!" by William Graves; "Our Restless Earth," by Maynard M. Miller; and "An Alaskan Family's Night of Terror," by Mrs. Lowell Thomas, Jr., all in the July, 1964, *GEOGRAPHIC*.



STRECHER (LEFT) AND EDWARDS © R.G.A.



Black gold from offshore rigs (top) may bring Alaska more wealth than old prospectors dreamed of. Derricks on Middle Ground Shoal and elsewhere in Cook Inlet tap major oil pools. Icy waters, swift currents, and 30-foot tides make drilling hazardous.

Long-horned and shaggy, hardy West Highland cattle from Scotland graze on Kodiak Island. Ronald Hurst, who raises them, told the author he first saw the breed pictured in the May, 1946, NATIONAL GEOGRAPHIC.

Hacked from the wilderness three decades ago, the fertile Matanuska Valley (opposite) produces 70 percent of Alaska's farm income and contains 58 percent of its cultivated land.

"It's not unusual," she replied. "That's just the way people are up here."

The sky darkened as we left to catch the overnight ferry to Kodiak. We had heard that the water between Seward and Kodiak could get choppy when squalls hit. Now we watched and waited.

Before dinner could be served, the ship began to pitch, yaw, and roll, and within a few minutes dishes were crashing to the steel deck. Dinner was canceled. During the night the ship rolled as much as 30 degrees. A fisherman on his way to Kodiak to join his boat admitted that for the first time in his life he felt seasick. A waiter revealed that at times like these the ferry was known as the "Dramamine Express."

Meeting Place of Wind and Tide

When I visited the bridge the next morning, Capt. Maitland Merkley asked with a straight face if we had slept well. Then he smiled.

"We had swells coming at us from three different directions in the area we passed through last night. Tides out of Cook Inlet mix with the currents and Aleutian winds coming up Shelikof Strait, sometimes blowing 100 knots. Right in the middle of all that are the Barren Islands" (pages 812-13).

I asked if anyone lived there.

"Only seals and sea lions. Used to be a guy lived there. Raised foxes. He had the ugliest squaw I've ever seen. Said he used to have a beautiful wife, but somebody was always trying to steal her. Somebody finally did, so he married the ugliest woman he could find. Said some fool even tried to steal *her*."

Seventeen hours after leaving Seward, we reached the town of Kodiak. In the quake-generated wave which hit Kodiak last year, one man lost a \$100,000 fishing boat anchored there. Four hours later the same wave destroyed a six-unit apartment house he owned in Crescent City, California.

The captain docked at the King Crab Cannery. He pointed to the giant crabs being off-loaded near our bow.

"Some guys from Louisville found one of those and brought it to me. They asked what it was. I told them it was an Alaskan spider—had to be that big to catch the flies up here. Told 'em they sometimes even jump a jackrabbit."









DETACHMENT (MIDDLE) AND RECALIBRATION BY R. E. DEWITT © R.E.D.

"Lonely sunsets flare forlorn"—as poet Service wrote—over the Barren Islands, often swept by Alaska storms. Clouds hover like halos over island peaks in this moment of calm. Currents, tides, and winds meet between Kodiak Island and the Alaska mainland, often producing some of the most turbulent water in the Pacific.

Rolling and pitching in an 18-foot swell off the Barren Islands, the ferry *Tustumena* demonstrates why some dub her the "Dramamine Express." The first mate secures the gangway with extra lashings in the stinging spray. The 240-foot vessel carries 200 passengers and 58 cars on the sometimes blustery run connecting Kodiak Island with the Kenai Peninsula and Anchorage.

Mayor Pete Deveau, who runs one of Kodiak's eight canneries, greeted us on the dock. He likes to make sure that newcomers find out what a king crab is.

"Until after the war, not many fished for the king. Now it's our biggest money-maker next to salmon—and after what happened to us on Good Friday, we need the money."

Pete talked about plans to rebuild downtown Kodiak with a covered-arcade shopping center behind a new small-boat harbor.

Alaskan Brown Bear Is World's Biggest

The crab may taste better, but the symbol of Kodiak is still its huge brown bear. The hunting season hadn't opened yet, so Alf Madsen, most famous of Kodiak's bear guides, offered us the use of one of his camps for a few days to get pictures.

As Alf flew us to the Uganik Lake camp, he speculated that the great bears on Kodiak may have descended from migrating bears of the Ice Age. Stranded when the ice retreated and the sea returned, and with plentiful food and good climate (for bears), they became true giants of the bear family.

Trophy hunters, eager for a shot at the largest carnivorous mammal on land, bring about \$2,000 into the island's economy for each bear they take out.

"The bears aren't as large as the writers say," Alf warned. "They just look big when you meet them in the woods. The largest I ever weighed went 1,320 pounds; the males average about 900 pounds."

Alf loaned me his .30-06 rifle in case of an unexpected attack. It seemed to me too small to stop an angry bear, but the big guide had been hunting them for 30 years, and this was his only weapon. "Of course," he warned, "if you just wound a big one and he gets his adrenalin up, by golly, he's hard to stop. We put 18 shots in one before he fell."

I asked Alf what his closest call had been.

"It happened when I was helping a fellow from Hollywood. We shot a sow—a female—by mistake. The man wanted to get to the bottom of a cliff, set up his camera, and have me roll her off so he could shoot her tumbling down. We got her to the edge. I leaned my gun against a tree and sat on the old bear while he set up. He got his camera ready and looked up but didn't say anything—seemed to be staring past me. I turned just in time to see the sow's mate standing 15 feet away.

"I dived for the gun and had a bullet in the chamber almost before I hit the ground. I got him just below the eye as he lunged. He

fell, hit the sow, and they both tumbled down the cliff. The photographer kept on staring. He never shot a frame."

Alf left us; he would return in five days. We saw several bears along the streams during our first three days, but none close enough for good photographs. On the fourth morning, I loaded a pack and went into the hills looking for them.

I had walked a few miles when the sense of a sound I really hadn't heard made me duck down in the bear path I was following. Seconds later a cub appeared about 70 feet away. As I lifted the camera, another one joined him. I quietly eased the lens through the brush, squeezed off one frame—and immediately fell into that category of writers to whom bears look bigger when met in the woods. The mother I hadn't seen heard the camera click, stood up beside her babies, and looked straight at me (page 816).

She probably wasn't eight feet tall, but she looked ten. I made one picture before she started toward me; then I dropped my camera and reached for Alf's 6-shot rifle, hoping I could get her down before she got her adrenalin up. She took a step or two, stood up again, looked my way with an inquiring rather than angry expression, then turned and disappeared into the brush.

I neither heard nor saw them again. Their silence was more eerie than their presence.

Alaska's Progress Threatens Bears

Unfortunately for the bear, progress is closing in on him. Kodiak ranchers claim they are losing cattle to the bears at a serious rate. Last summer, with state support, a plane equipped with an automatic rifle was used to kill bears spotted in the 270,000-acre grazing area.

The clash between "bear" men and "cattle" men had been smoldering, but this brought it to a flame quickly. Said Ron Hurst, one of the cattle ranchers whose herd had been hurt by the bears:

"Nobody enjoys watching an old brownie fish a salmon stream more than I do, but I lose a darn sight more beef to the bears than I market. Civilization is moving north, and the bear is going to have to give way."

Jim Brooks of the Alaska Department of Fish and Game admitted that cattle were here to stay, but felt better herding would help, especially in the spring when the bears are hungry and the cattle are weak. The fight will grow more bitter, but I'm afraid that in the end the bear, like the bison, will suffer most.

Tide-washed Homer Spit, a 4½-mile tongue of land extending into Kachemak Bay from Homer, Alaska, dropped as much as 6 feet during the Good Friday earthquake. At mid-tide on a summer evening (right), the spit still stands above water. But a higher-than-normal tide in November, 1964, nearly submerges it (far right). The Land's End resort area at its tip remains in business despite obvious problems (below).

No land at Land's End: Pilings thrust hotel buildings above eroding waters, and roads lie awash. Millions of tons of fill are being dumped to rebuild the spit.



We flew back to Kodiak in time to catch the northbound ferry for Homer. After a relatively calm return trip, we off-loaded on the dock at the end of Homer Spit, a 4½-mile-long finger of land that settled an average of 4.5 feet during the quake. High tides still threaten it (above), but millions of tons of earth fill are being brought in to save it.

Homer residents will tell you they have the best climate, the richest farm land, the greatest growth potential, and the finest scenery in Alaska. Civic pride aside, their enthusiasm is understandable.

Past the spit and across Kachemak Bay we could see six glaciers in the Kenai Mountains. Not far from Homer we watched a herd of Dall sheep graze in a high valley near Tustumena Glacier. Moose abound in the nearby Kenai National Moose Range. Fresh crab, halibut, flounder, shrimp, and salmon were for sale at the docks. And from fields just north of the town, we learned, have



EXTREMELY (ARISE, RIGHT) AND HIGHWATER (BELOW) BY JOE NYCHETNIK; WODAKRUM BY W. E. GARRETT © N.S.S.



come oil and gas worth some \$120,000,000.

The next ferry to Anchorage was two days away; so we drove up the Sterling Highway and reached Alaska's largest city in time for lunch. We ate at the Top of the World restaurant crowning the Anchorage-Westward Hotel, which had miraculously survived the earthquake (page 808).

Below us, extending three blocks along 4th Avenue, was a sunken field of bulldozed earth. Thirty-one stores, saloons, and pawnshops had stood there before the clay-sand earth slid away. Beyond lay the more modern section of the city, appearing at this distance to have been little damaged.

Offshore Oil Promises New Wealth

To the north we could see the anchorage for which the city was named in 1914—now a modern port facility. One hundred and thirty miles beyond, Mount McKinley rose above the horizon. To the southwest we looked past

Turnagain, where 72 homes were destroyed by the quake, to the new offshore oil fields.

In the past Alaska has rewarded its people with fur, gold, copper, fish, and timber. Now oil promises to outdo all of them combined. What may become one of the richest oil areas in the world is just being opened. In the Kenai Peninsula, 50 wells now yield 30,000 barrels a day. Five major companies are drilling in Cook Inlet (page 810). Millions are being spent in testing possible fields north of the Brooks Range.

I hitched a ride to an offshore oil rig, called WODECO II, in one of the helicopters which shuttle men and parts from Anchorage. This offshore drilling barge brought in one of the first wells in the inlet. Now there are 10, with more being drilled.

We stayed up most of the night while the crew struggled to install a blowout preventer on the well they were drilling. Diver Paul Greenke pulled on his suit as the riggers



rushed to lower the 100,000-pound unit into place. During slack tide, near midnight, Paul would go to the bottom to direct the final fitting.

The men topside had to be ready or wait for the next tide change—an expensive delay where costs are \$600 an hour whether you're drilling or not.

I stood beside Paul on the slippery steel deck watching an operation which seemed chaotic, yet ruled by a certain frenzied order. Intuitive teamwork coordinated the work of oil-rig tool pushers, riggers, and roughnecks. The squealing of winches, the slamming of steel, and the clatter of huge ratchets drowned out the orders and answers yelled from level to level. At a signal, Paul stepped in the water. His assistant handed me one of the telephone headsets.

Paul had 25 minutes to go down, do the job, and get back. If the tide started to run, he would be pulled along with it. From 100 feet down in the 40' water he called for the rigger to lean the preventer to starboard. I could hear the bubbling of his breath over the phones as he felt for catches which had to snap into place.

After eight minutes he called: "That's got it. Let's get out of here."

I took the crew boat back to Anchorage, getting there in time to fly over the epicenter of the great earthquake (map, pages 778-9) with a group from the National Academy of Sciences. The trip enabled me to see the last segment of the Alaska Ferry System.

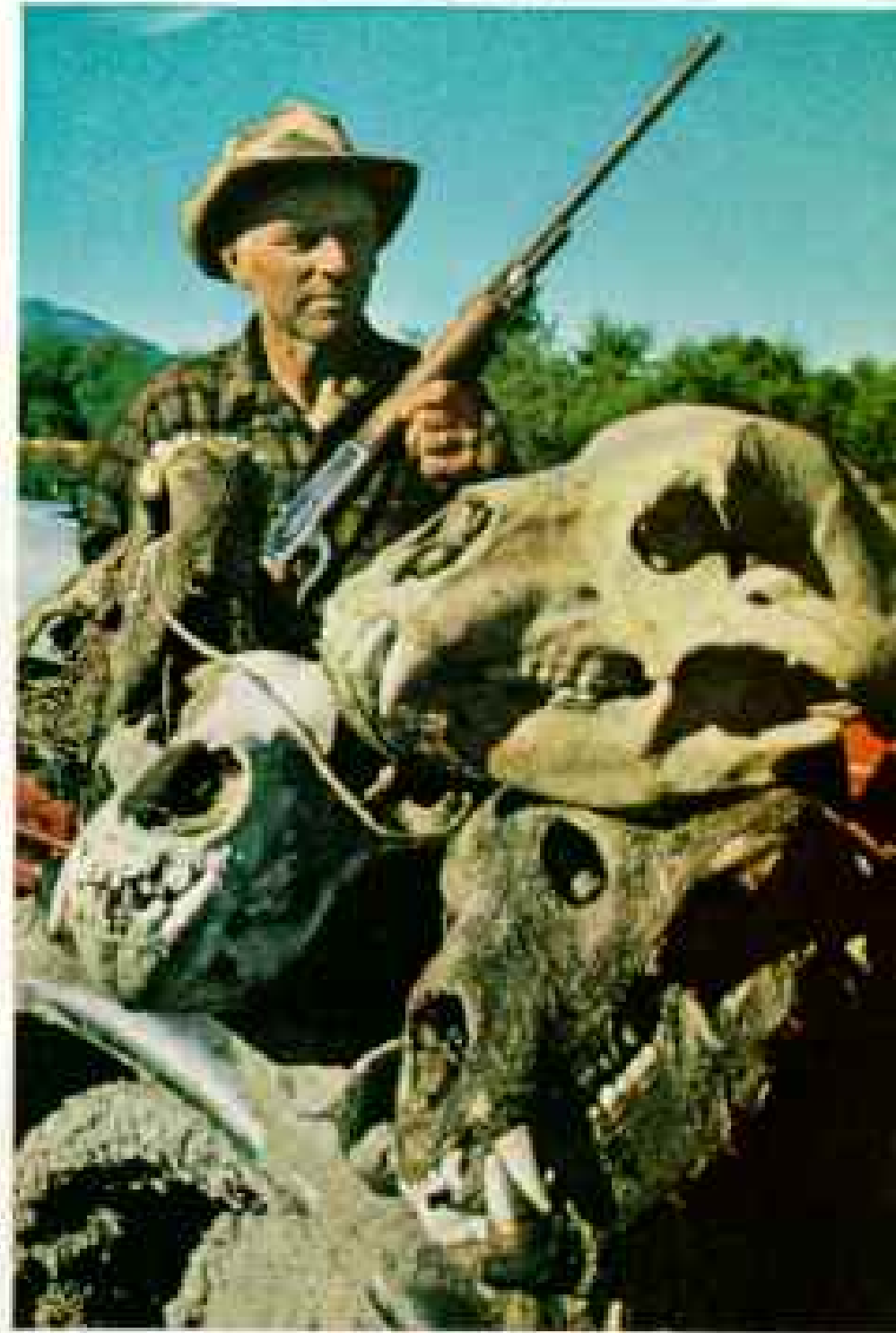
The small ferry *Chilkat* carries 15 cars and 60 passengers between Valdez and Cordova on Prince William Sound. At Valdez we saw what was left of the town which had called itself the "Switzerland of Alaska." Destruction and risk had seemed great enough to warrant moving it to a safer location 4½ miles away. Its 600 residents will be relocated by 1967.

Some mountains were jolted five feet horizontally by the quake, according to the Coast and Geodetic Survey. On the way to Cordova we saw evidence that one small peak had literally been shaken to pieces, spreading eight million tons of earth across the white surface of Sherman Glacier (pages 806-7).

When its mines closed in 1938, Cordova had shipped more than \$100,000,000 in copper ore. Today it depends mainly on fishing. But the town rose six feet during the earthquake, dumping most of the water out of the harbor and putting the canneries beyond

Wary mother and curious cub stand erect after they hear the camera's first click. The author spent four days on Kodiak Island photographing Alaska brown bears, largest carnivores that walk the earth. But this encounter was unexpected. The shaggy animals looked him over, then decided to head another way.

"Alaska's trailmakers," as the lumbering brown bears are known, tread on the footprints left by generations of predecessors, wearing deep impressions in lichen-covered ground.



Kodiak rancher-guide Ronald Hurst shows the author skulls of four brown bears of record-book size that he shot in recent years as killers of his cattle. Opinion is sharply split between "cattle" men who shoot bears that prey on stock and "bear" men who fear the great animal's extinction (page 814).



Woodland priest, Father Gerasim Schmaltz lives alone on roadless Spruce Island. Russian-born, the 76-year-old monk looks after the grave of another Russian Orthodox priest, Father Herman, who preached to Aleut Indians in the 19th century. Father Schmaltz has served in this area since 1917. He has few visitors to his isolated cabin.

Northward bound, *Tustumena* leaves Kodiak's harbor. The town's white buildings hug summer-green hillsides. Fishing boats lie at anchor behind man-made breakwaters. Cargo elevator at *Tustumena*'s stern enables her to load and discharge vehicles at all her ports of call at any stage of the tide. Next stop: the Alaska mainland.

reach of the boats. The Corps of Engineers has dredged out the harbor so that the docks are once again accessible.

As we returned to Anchorage by way of Montague Island, Dr. William E. Benson of the National Science Foundation pointed out new beaches of white barnacles where the south end of the island had tipped up. The ocean bottom in that area lifted as much as 50 feet—the greatest uplift on record.

In Anchorage our friends Joe and Donna Rychetnik had planned an Alaskan dinner for our last night. Judge Richard Collins brought pickled salmon from Cordova. Air Force Maj. Bob Reed contributed smoked



salmon—squaw candy, as Alaskans call it. Airline pilot Arnt Antonsen flew in four whole king crabs from Kodiak that afternoon. Joe fried an Alaska-size platter of moose and caribou steaks from his freezer. Donna capped the meal with three Baked Alaskas.

The next morning we started the long trip home to the South 48. The days were beginning to shorten, and the evening chill carried the first hint of the deep winter ahead. Yet winter has lost its sting for Alaskans. Ferries travel the year round, and the Haines Highway is kept open despite drifting snow.

As we drove away from Anchorage, a sign reminded us that the Alaska Highway, built

during World War II, was opened to civilian traffic only 18 years before. It has been as important to this territory as was the Santa Fe Trail to our earlier frontier.

Now the marine highway has opened a new trail to the north. By 1966 Canada will have added a ferry link between Vancouver Island and the Alaska Ferry System terminus at Prince Rupert. With already existing service from the State of Washington to the city of Victoria on Vancouver Island, this will complete the ferry route through the Inside Passage, a new lifeline from parent nation to youthful state, speeding its great and imminent growth.

THE END 819

EXTACHROME (OPPOSITE) AND KODACHROME BY W. E. GARRETT © N.A.S.



The Living Sand

Article and photographs by
WILLIAM H. AMOS

Driven by sea winds, moving dunes creep inland from Cape Henlopen on the Delaware coast. Seemingly devoid of life, the waves of sand actually harbor a fascinating world of their own.



MY SNEAKERS press into the warm sands of the undulating dunes on Cape Henlopen, at the mouth of Delaware Bay. On the crest of a shimmering slope, I shade my eyes from the August sun and scan this miniature Sahara of sand hillocks, bordered by marsh and scrub pine.

Nothing seems astir. For a few minutes I fancy that I am the only living creature on the Henlopen Dunes.

It is a pleasant thought. Each day I work with teeming masses of plankton,

Scraggly stubble of white insulates the



shrimp, and worms at the University of Delaware's Marine Laboratory, in nearby Lewes. Here on the dunes I can—at least for a few tranquil hours—cease being a biologist.

Or can I?

Wasp Launches Quest for Dune Life

A small dark image skims over the sand and alights near me. It is a wasp. What, I wonder, attracts it to this barren place?

The insect searches about with quick, nervous movements, then begins to dig furiously, shooting sand between its legs in the manner

of some tiny winged terrier. Every few moments the wasp takes flight, hovers above the hot sand, then again descends, each time burrowing deeper into the dune. Finally it tunnels out of sight.

I edge closer to the hole, careful not to disturb the occupant. Without warning, the busy wasp backs out and flies off low across the dune. The show over, I sink into a more comfortable position and relax.

But this is my day to be wrong—about the digger wasp, about me, about the seeming lifelessness of the dunes. For as I recline on

head of a tiger beetle larva (*Cicindela*) amid sun-baked grains of sand on the Henlopen Dunes.

REPRODUCTION IN THREE LIFE-SIZES © NATIONAL GEOGRAPHIC SOCIETY



the sand, the wasp, flying slowly, returns to pique my curiosity once more. A dead bee fly in its grasp tells me that "it" is a she, for female wasps provision their nests with dead or paralyzed insects and spiders. This dune mother enters her burrow to lay an egg on the bee fly, the food that will nourish the larval wasp when it hatches.

That evening, as I drove to my home in Middletown, Delaware, I conjectured that the Hellenopen Dunes might support more life than most people, including biologists, had supposed. If a few digger wasps could live there, why not other creatures? By the time I pulled into my driveway, I knew that I must return to the dunes and inspect them more closely.

Grasshopper Wears Sandy Camouflage

Several weeks later I was back, with my son Bill, to seek out the curious wasps. We found not a one, although, as we discovered another time, wasp burrows virtually honeycomb some of the slopes. Wandering ahead, Bill abruptly turned to ask if there were many grasshoppers on the dunes.

"Here?" I laughed. "Sand is hardly the place for grasshoppers!"

"Well, what's that?" he demanded.

Eyes straining, I could not see a thing on the glittering white surface. Then, suddenly, up leaped a large sand locust. A few yards from us it dived again and disappeared.

Approaching the spot cautiously, Bill and I discovered the insect sitting fully exposed on the surface, its color (opposite page, lower left) blending with that of the sand. Its camouflage indicated that it belonged here, that it had not strayed in from a nearby meadow.

As Bill and I knelt on the scorching sand, we realized that our bodies had entered a warmer stratum of air. As I extended my hands closer toward the surface, I felt the air grow hotter with every inch.

"How can the grasshopper stand it?" Bill asked, as we both grimaced with discomfort. I didn't know, but we watched and learned.

The insect, which at first had squatted down on the sand, now raised its body high upon its long legs. In a few moments it flew into the cooler air above, landing some 20 yards distant.

"That's one way to escape a hotfoot!" Bill cried, and he, too, sprang to his feet and raced to the shade of a small pitch pine growing at the edge of the dunes. I wasted no time in joining him.

On my next trip to the dunes, I took along a laboratory thermometer. I found that the temperature at the surface of the sand hovered near 120° F., and in spots soared as high as 135°. But at head level the air might be 50 degrees cooler.

(Continued on page 827)



Bulbous eyes and pincer jaws equip the adult tiger beetle to spy out and skewer an insect. In the larval stage (below) the beetle inhabits a crystalline palace of sand grains. Inching up the burrow, it will fill the hole with its head and catch unwary creatures that wander by.

RODOLPHUS • THREE LIFE-SIZES © W.S.A.





STYLING (CENTER) AND PHOTOGRAPHS BY WILLIAM H. AMOS; PHOTOGRAPHS (AROUND) BY JOHN E. FLETCHER © N.E.J.



Campinoclis octomaculata 1/2 LIFE SIZE

Male yellow-banded wasp, a cousin of the digger wasps, rests on a spear of grass. After mating, the female captures a beetle grub, paralyzes it with her sting, and lays an egg atop the victim.

Dressed in white, the maritime, or sand, locust (*Trimerotropis maritima*) blends with its locale. When the sand gets too hot, it rises high on its legs or takes a short, cooling flight.

1/2 LIFE SIZE



Spying on a spider, author William Amos endures the hot sand as he waits patiently for a wolf spider to crawl within camera range. A research associate at the University of Delaware Marine Laboratory in Lewes, Mr. Amos spends his summer leisure investigating the bizarre life of the Henlopen Dunes. In winter he serves as Chairman of the Science Department at St. Andrew's School in Middletown, Delaware.

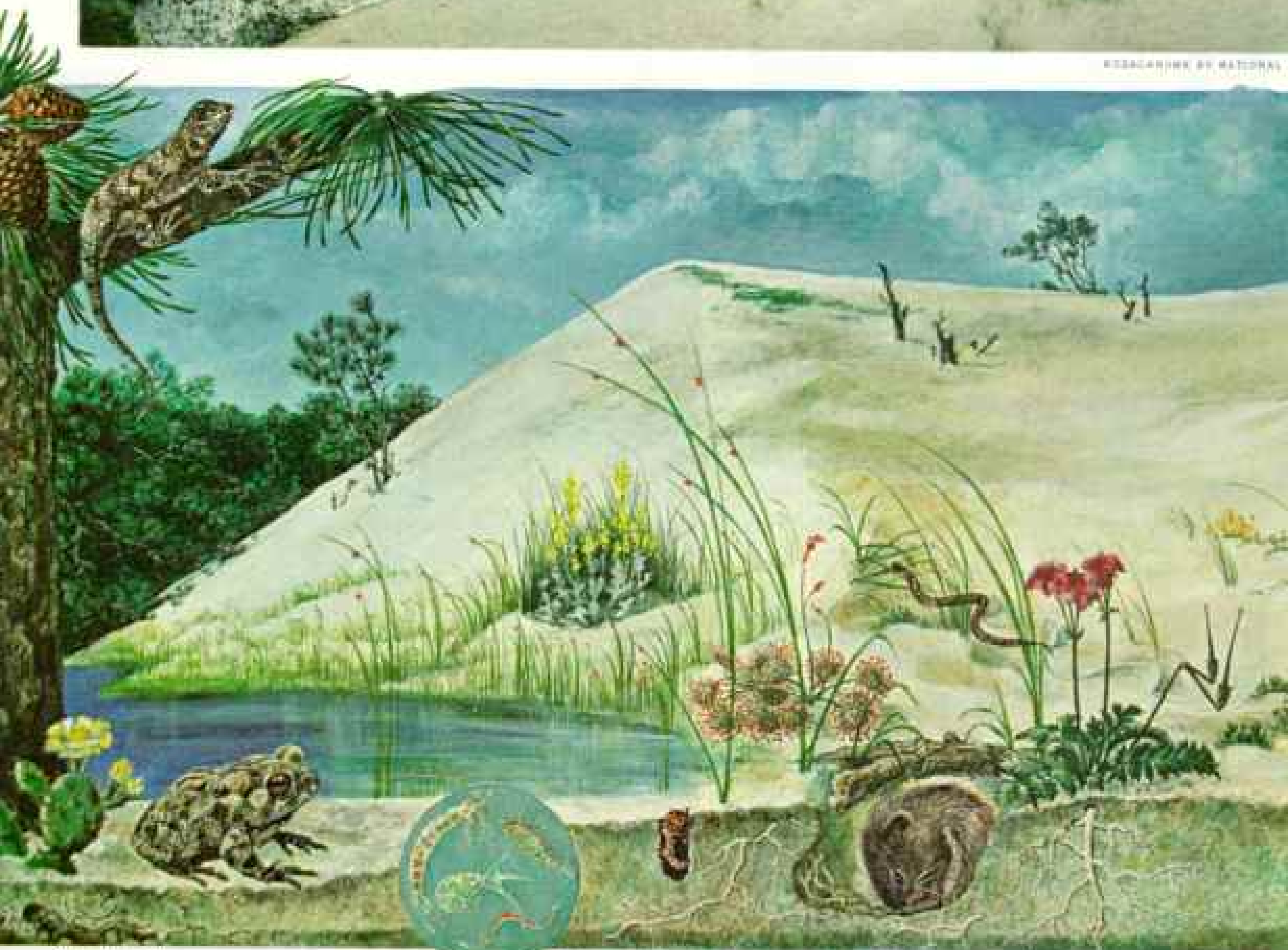
Brood on her back, a wolf spider meanders over the sand. The young enjoy such free rides until they molt. Spiders rarely dare the dunes by day, preferring to forage in the cooler nighttime.

Geolycinus pikei 1/2 LIFE SIZE





RESEARCH BY NATIONAL



Pine lizard *Dusty miller* *Sundew plant* *Magnose snake*
Pitch pine *Fowler's toad* *Ground-water micro-organisms* *Three-square rush* *Stork's-bill*
Prickly pear cactus *enlarged 50 times* *Tiger beetle larva* *Field vole*



Myriad creatures inhabit the ever-moving dunes

WAVE OF SAND swallows everything in its path as the Henlopen Dunes creep inland before the wind. Some trees survive the onslaught, their tops appearing like low bushes; others die, their denuded trunks standing as stark sentinels above the white sand. Unobservant visitors to the dunes might think the area devoid of life, but beetles, wasps, and spiders lurk in small sand holes. Under a piece of rotting timber a mother rabbit hides her babies. The vole, or field mouse, huddles in a hollow beneath a low-lying shrub. They wait until cool evening breezes dissipate the heat of the day before venturing forth over the dunes in search of food. Cold-blooded animals such as lizards, toads, and snakes also keep to the shade during the day.

It takes a microscope to reveal the tiniest creatures of the dunes. Micro-organisms swim about in dune ponds or wriggle among the grains of sand saturated with moisture (page 819).

Only hardy plants take root in the sand at first. Prickly pear cactus stores large quantities of water in its spiny stems. Beach wormwood, or dusty miller, so called because of densely matted white hairs that cover its leaves, sprouts beside a pond. In late spring, beach heather brightens the dunes with clusters of yellow blossoms. As these plants die, organic matter enriches the sand to allow less hardy plants to grow.

Gradually the decaying vegetation creates topsoil; the dunes stop moving and eventually disappear.

825

EGGARTON PHOTOGRAPHER JOHN F. FLETCHER © N.A.S.



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Lisa Biganzoli

Digger wasp, wolf spider, velvet ant, all life-size

Beach heather

Tiger beetle, life-size

Eastern cottontail rabbit

Sand locust

Baby eastern cottontail rabbits

Ant lion

Marram grass

Ant lion larva, pupa



The subsurface sand proved far more stable; six inches below the surface, day or night, the temperature remained about 80° F. In the hot afternoon sun I could wriggle my toes deep in the sand to cool my scorching soles. On chilly nights I could do the same thing and find the warmth of day.

As air temperature increases, insects become more active—up to a point. If the air grows too hot, they enter a heat stupor and die. Unlike more highly developed birds and mammals, insects have no temperature-regulating system; they have to adjust to the intense surface heat—or avoid it—if they are to survive.

The digger wasp and the sand locust avoided the killing heat by periodically flying into cooler strata of air, and thus were able to live permanently on the dunes. Now I wanted to find a strictly surface-dwelling animal—one adapted to the heat by its structure rather than by its behavior.

In that first summer of dune exploration, it seemed that I would never find the creature I was looking for. Then one day my luck changed with the yell of a small boy.

“Daddy! I found a pretty ant!”

Steve, one of Bill’s younger brothers, was then, and still is, determined to pick up and fondle every living thing in sight. Across his hand ran a strikingly beautiful scarlet-and-black insect. But it was no ant. I recognized it at once as a female velvet “ant”—actually a wingless wasp known for its excruciating sting (opposite).

A flick of my finger sent the velvet ant scooting across the sand. Indignant at the loss of his pet, Steve brightened when I suggested following the insect. When it headed for a clump of marram grass, I thought the chase was over. Naturally, it would rest in the shade until the dunes cooled.

Instead, it promptly emerged from the far side of the clump, and Steve, with an exuberant yell, hopped along beside it. Coursing over the sand, the velvet ant spent entirely too much time under the scorching sun, I thought. It dawned on me that here was the example I sought—an insect that could live on the superheated sand with complete equanimity. But how did it survive?

Close examination of the velvet ant revealed its secret: a dense hairlike coat which provided effective insulation.

Many Dune Dwellers Wear Heat Shields

The more I studied the dunes, the more insects and other creatures I found, and the more I noticed their protective heat shields. Some creatures were so swathed in light-colored “fur” that they looked like miniature Eskimos in hooded parkas. Flies, wasps, beetles, and spiders all wore furry coverings, although often it took a powerful magnifying glass to detect them (page 821). Some of the digger wasps had silvery hairs between the eyes, in the region of their tiny brains. It is conceivable that these may serve as efficient heat reflectors.

Insects don’t have a monopoly on this type



Fiery coat of the velvet “ant” warns that this wingless wasp carries a painful sting. Wearing the insulating fur common to dune dwellers, *Dasyneura*

biculata, life-size above and magnified tenfold at left, scurries in search of digger wasp nests in which to lay eggs. Her young will feed on digger larvae that have been already provided with their own insect larder (text, page 822)—a curious case of double parasitism.

Outdoor science lesson: Students of the Delaware Summer Science Workshop examine a sundew, a carnivorous plant that grows in the moist sand. It traps insects with sticky tentacles and slowly digests them, supplementing the meager nutrition it gets from the soil.



ENTOMOLOGIC SUPPORT AND PHOTOGRAPHY BY WILLIAM H. ARNDT © N.C.S.

of protection, as my wife Catherine pointed out one day. She called to my attention the common seaside beach wormwood, known as dusty miller, that grows beside our cottage. Its grayish leaves are covered with a thick tangle of white threads. Scraping off this insulation reveals the normal green foliage.

Man, Sea, and Winds Transform Cape

Not only are the Henlopen Dunes a haven for highly specialized forms of life; in a sense, they are themselves alive and moving. Born of the eroding coast, driven by the prevailing wind, they creep inland at the rate of five to fourteen feet a year.

I grew more curious, and sought out early published accounts and old land surveys of the area. Charts drawn before the American Revolution showed Cape Henlopen as a rounded promontory—not hook-shaped, as today—forested almost to the water's edge. Other evidence of a former cape turned up. Shore erosion, for example, had toppled the last lighthouse into the sea in 1926; at low tide I have combed the offshore flats and found the imprint of horses' hoofs in hardened clay matted with dead marsh grass.

In the days of sail, the bay must have been a mariner's terror. Some two hundred ships are believed to have foundered off the cape. In 1828 bargeloads of stone blocks were floated down the Delaware River and dumped into the sea, and construction began on a breakwater just inside Cape Henlopen—a refuge for ships against gale, ice, and violent riptides. An army of workmen moved in, clearing trees to build their camps. Denuded of vegetation, the cape lay exposed to the ceaseless workings of winds and coastal currents.

When the workmen left seven years later, a giant sand genie had been liberated. In this way, I believe, today's Henlopen Dunes were born. Fed by the eroding coast, a great tongue of sand began creeping inland. At last, like some animate thing, it broke away from its nourishing parent, the sea, and plunged on by itself, driven by the wind. Its inexorable march covered forest, homestead, and pasture. Nothing could stop it.

Yet dunes eventually die. It is the order of nature that the gradual spread of vegetation will slow them, stabilize them, and finally absorb them. Thus the first great dune has all but vanished, while another is building.

Working together, Mr. and Mrs. Amos spend evening hours in the laboratory. Here she places a sample of dune water on a slide for her husband to photograph under the microscope. Mr. Amos's investigation of dune ponds and subsurface water revealed myriad organisms, so small they can swim among the grains of sand. Normally an inhabitant of open water, a water flea of the order *Cladocera* (upper left), magnified 50 times, penetrates several feet into saturated sand. Single-celled dinoflagellates (upper right), enlarged 130 times, and aquatic worm *Dero obtusa* (lower left), enlarged 45 times, also dwell below the water table. Ideally suited to its environment, a harpacticoid crustacean (lower right), 35 times life-size, navigates the channels between sand grains.



At first only the hardiest plants take root on the shifting sands. They anchor the dunes and cause wind-borne sand particles to be dropped. Decaying plant material nourishes future vegetation. Ultimately the whiteness of the dunes is lost, and trees and shrubs spring up in the now fertile soil (page 824).

One day on the dunes I was describing to some students the succession of vegetation, explaining that as the sand wave moves on, it leaves areas which support ever larger and more firmly rooted plants.

"But you can see all this right now," remarked my laboratory assistant, Jim Thomas. "Marram grass is growing up there on the slope, beach heather is flourishing right here, and pine trees are growing over there on the sand flats. Doesn't this show succession?" Of course it did, illustrating in a glance what had already occurred on other, older dunes.

As the dunes stream on, their plant and animal populations gradually shift from those of the seashore to those of the desert. Small animals come to graze on the sparse vegetation, and they in turn become prey for other creatures. Today almost all the dune inhabitants are predators.

Among the fiercest, and most fascinating, are the larval ant lions, or doodlebugs as my children call them (next page). They ambush their prey from the conical pits they dig in the surface of the dunes. An insect trespasser that tumbles into the trap is grabbed immediately and dragged beneath the sand to be pierced by huge sickle-shaped jaws and consumed.

Doodlebugs Spew Sand Fountains

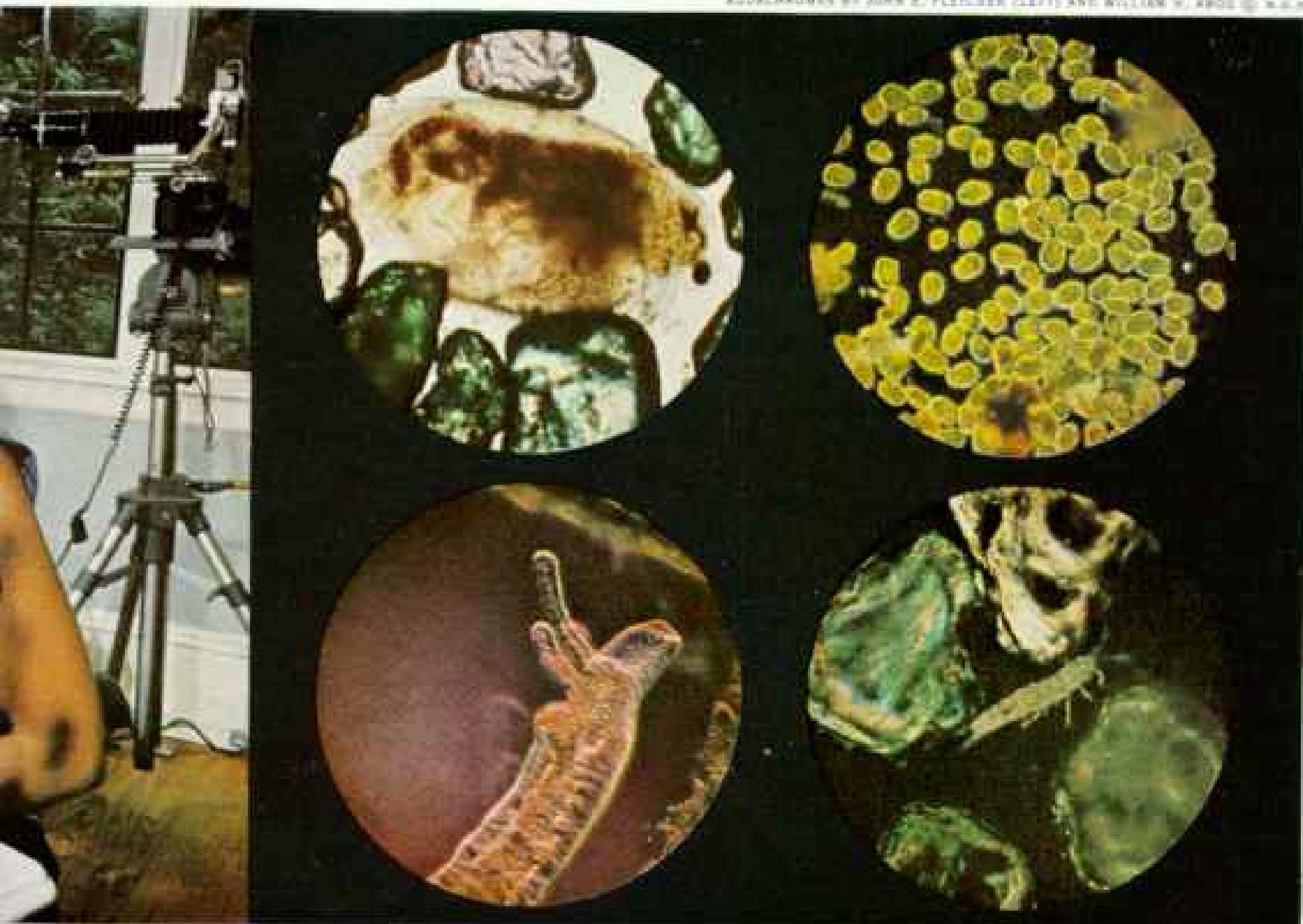
The ant lion makes his trap more effective by throwing sand up the sides of the pit to cascade down on the victim.

Steve discovered one day that if he tickled the edge of a pit with a straw, a shower of sand grains immediately shot up from the bottom. His amusement proved contagious. Soon all the children, straws in hand, were triggering tiny geysers of sand. I cautioned them not to overdo it, for each pit represented great industry on the part of the insect.

We took several of the larvae to our cottage near the beach, putting them in a pan filled with sand. Bill and Steve kept them well fed with insects.

Weeks later the boys discovered that balls of sand interlaced with silken webbing had

ADDORCHAMBER BY JOHN E. FLETCHER (LEFT) AND WILLIAM W. FROE © N.S.A.





Fragile fairy wings adorn the ungainly-looking body of a mature ant lion. The gauzy adult lives about 20 days, only long enough to mate and lay eggs in the sand. Freshly hatched larvae immediately dig little pits. Insects venturing to the crumbling



edge of a pit tumble into the larva's sicklelike jaws. Full grown, the larva (left) pupates in a hollow ball of sand held together and lined with silken threads. After 30 to 50 days, an adult ant lion crawls forth.

PHOTOGRAPHS 7 TIMES LIFE-SIZE BY WILLIAM H. ARMB © NATIONAL GEOGRAPHIC SOCIETY



replaced the ant lions (left). These, I explained, were pupae; soon adults would emerge.

Finally our patience was rewarded: Lacy-winged ant lions struggled up through the sand and fluttered across the room. The adults' sole function is to mate. Then the female deposits eggs in the sand beneath a sprig of vegetation. This done, its life ends.

The voracious, predatory larva may live nearly two years. The adult ant lion exists for only a few weeks.

Dunes Come Alive at Night

In exploring Henlopen Dunes at night with Jim Thomas, I discovered an intensity of life that escaped my eyes during the day. In the beams of our searchlights rabbits fled, bats swooped down to snap up gyrating insects, and toads, unruffled by our intrusion, sat stolidly on the sand.

One night, pointing his lamp at a distant clump of marram grass, Jim picked out tiny pinpoints of light in shimmering ice-blue clusters. When one cluster shifted slightly, we tiptoed toward it. There, spread-eagled beside a hole, we saw a sand-colored spider the size of a silver dollar, its eight eyes brilliant stabs of reflected light.

One moment the spider was there, and the next it was gone. When Jim flashed the light down the hole, once again we saw those jewel-like eyes, peeping through the sand.

By now I knew that abundant life existed on the dunes. But what about the extent of life *in* the dunes? While digging in the sand, I had noticed that the water table sometimes lay quite close to the surface. Did this subsurface moisture support microscopic life? Were there inhabitants of the dunes so minute that they could wriggle between individual grains of sand? Jim and I proposed to find out.

Several depressions within the dunes exposed the water table, and near these shallow ponds we first probed for subsurface life. We dug a series of potholes leading away from a pond. As they flooded, we collected samples of the water in jars, labeled them, and brought them to the laboratory. Farther inland, we sank long metal core tubes in the dunes to reach the subsurface water.

At the lab I centrifuged our specimens soon after they were collected, separating the tiniest particles so that they could be removed for study under the microscope.

Samples from close to the pond revealed high populations of crustaceans, worms, and protozoan life. Collections from farther back into the dunes showed fewer animals, but we

never found subsurface water utterly barren of life (pages 828-9).

Our water samples had proved that there was another world beneath the hot hills of sand. But where did it come from? Some animals undoubtedly had migrated horizontally through the dunes. Others must have washed down from above. To test this idea, I took some dry surface sand and cultured it in the laboratory under sterile conditions.

What I had collected was not just sand, for bursting from their protective spores were countless bacteria and one-celled animals identical with those I had found far beneath the surface. Apparently, with every rainfall, vast numbers of wind-borne spores and cysts were percolated downward through the sand into the subsurface world.

Our activities of sinking pipes to take cores, digging holes, sifting sand, and the like seemed perfectly logical and meaningful to us. But they must have looked strange to the

townspeople of Lewes. One morning in a barbershop I overheard conversation describing some odd goings on at the dunes.

"I tell you, I saw those fellows down on their hands and knees, digging all over the dunes. Every now and then one would hop up and down [Jim stamping on a core pipe] and the other would get up and run like crazy through the weeds [me chasing a tiger beetle]. People see them over there even at night sometimes, running around. I tell you, I've never heard of anything so crazy. Somebody ought to hear about this."

Somebody did. The following day I explained our activities to responsible citizens of the town. As a result, we were soon conducting tours of the dunes as a part of the university's summer instruction program, sharing our discoveries with students, clubs, and other organized groups.

Whenever I take my family to Henlopen Dunes, we play a game called "What's My



Name?" It consists simply of noticing surface etchings on the sand, and trying to guess what caused them. In this way we have learned the telltale tracks of lizards, toads, tortoises, beetles, snakes, velvet ants, as well as blowing pine cones, bits of paper, and rain pits and rivulets.

Wind and Grass Autograph the Sand

At times the sculptor is the wind, and what a versatile artist it is. It folds the sand surface into gentle ripples and creases it into a knife edge along grass-held crests. It pushes and lifts sand particles up the long, gentle windward face of a dune, then with rolling turbulence drops them over the steep lee side. A precipitous slope is a child's delight but a rescuing parent's dilemma, for with every two steps up, you slip a full step back.

For my daughter Julie, the wind writes secret messages. It twirls dried blades of marram grass, broken and bent but still

anchored to the dune, back and forth on the sand, scribing perfect arcs. At times gusts whirl the blades completely about; a school-boy's compass could not do better (below).

Julie quietly watches the wind writing and tries to reply in kind, but her arcs and circles are deep and lack symmetry. Sighing, she admits, "The wind writes better than I do." I tell her that experience has something to do with it; the wind has been practicing for millions of years.

As the breeze dies and the last rays of the sun fade in the night sky, we see the glow of campfires on the sand; we listen, before beginning our songs, to the singing of others, drifting across the dunes.

The air grows chill, and we dig hands and bare feet into the still-warm sand. Nearby a whippoorwill calls out his name to us. Julie shivers delightedly. "Oh, Daddy," she whispers, "let's come back often."

We do.

THE END

Wriggling reptile fascinates the author's wife Catherine and his daughter Julie. Though harmless, the hognose snake (*Heterodon platyrhinus*) appears lethal—puffing and hissing if provoked.



STYLING BY WILLIAM H. ARIS © R.C.S.

Whipped by whistling wind, marram grass draws concentric circles in the sand, to the delight of seashore children. In colonial Massachusetts, law demanded that inhabitants of certain coastal towns plant marram grass, recognized even then as a valuable dune stabilizer.

Braided trail marks a snake's progress through Henlopen Dunes. Slithering over the sand, the reptile plows up pressure ridges, revealing its direction of travel (here top to bottom). To avoid daytime heat, snakes usually move by night, leaving only their telltale signatures on the dunes.

SAIGON

Eye of the Storm

By PETER T. WHITE

Photographs by W. E. GARRETT

Both National Geographic Staff



IN THE DUST and the heat an American-made tank tore at the pavement next to me and stopped. The South Vietnamese sergeant in the turret swerved his .50-caliber machine gun skyward. Roaring in at the angle of the machine gun came an American-made fighter-bomber of the South Vietnamese Air Force. From its wings hung rockets, slim and dark.

The sergeant in the tank held his fire. The plane pulled out of its dive, the rockets still in place. In its path came another.

"Things could blow up any time," said the sunburned United States Air Force captain at my side. And there we stood at Tan Son Nhut, the airport of Saigon, helpless on the brink of catastrophe.

The feeling was not new here in the capital of South Viet Nam, in the city once known as the "Pearl of the Orient." We stood trapped by a coup d'etat, the sixth to burst on Saigon in 16 months. Each time the leaders had proclaimed their aims to be national unity and

Lightning coup in Saigon: Tanks commanded by rebellious officers of the South Vietnamese Army rumble through the outskirts of the republic's capital this past February during an abortive attempt to overthrow the government. But civilian life goes on, little disturbed by the threat of gunfire and bloodshed.

EXCURSION © NATIONAL GEOGRAPHIC SOCIETY

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victory in the most fateful guerrilla war of our day. But no government had yet managed to suppress the long-term rebels who call themselves the Front of Liberation. Those opposing them call them Viet Cong or "VC," meaning Vietnamese Communists.

The governments in Saigon, one after another, depended on money and arms—and increasingly on soldiers—from the United States; the Viet Cong drew support from Communist North Viet Nam, from Communist China, and from the Soviet Union.* Would a war of the giants be ignited here? Saigon was now the tinderbox of the world.

I had not budged from beside that tank. Now it turned and rolled away, its aerials swaying. The fighter-bombers roared off too, to menace some other part of Saigon.

Such were the outward signs of the latest coup. Behind the clatter of the military gad-

etry, the generals and the colonels of South Viet Nam threatened and bluffed their way through negotiations, warily, via intermediaries. As they jockeyed to bribe or to capture each other, their American advisers clung to the hope that there would be no massacre in Saigon this time. Or next time. For a counter-coup seemed sure to come.

Two Million People in One-story City

Meanwhile life surged as usual in the streets and alleys and on the canals in one of the most crowded cities on the globe: 2,000,000 people bustling within 20 square miles.

*For other NATIONAL GEOGRAPHIC articles on this struggle, see: "South Viet Nam Fights the Red Tide," by Peter T. White, October, 1961; "Helicopter War in South Viet Nam," by Dickey Chapelle, November, 1962; "Slow Train Through Viet Nam's War," September, 1964, and "American Special Forces in Action in Viet Nam," January, 1965, both by Howard Sochurek.

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Man of the moment: Prime Minister Phan Huy Quat led a coalition government in February backed by the generals at right. Here, Quat praises former strong man Lt. Gen. Nguyen Khanh (first row, second officer from left), while sounding his political and military obituary; thereafter, Khanh left the country as roving ambassador.

Dr. Quat, a physician, headed the seventh regime since President Ngo Dinh Diem's Taking office, he said: "The situation of tiny Viet Nam has never been so complicated, but we will try to do our best."

Pool of power at the end of the February coup: (First row, left to right) Maj. Gen. Nguyen Van Thieu, deputy prime minister and defense minister; ousted Lt. Gen. Nguyen Khanh; Maj. Gen. Tran Van Minh, armed forces commander in chief; Maj. Gen. Pham Xuan Chieu, chairman of



These population and area figures rival those of Manhattan, but the dwellings of Manhattan average six stories in height; Saigon is virtually a one-story city (page 848). "As if the contents of a cookie jar had been squeezed into a sardine can," said my Vietnamese friend Dinh. He was as fond of cookies as he was of surprising me with his sayings.

"We say, 'The dirtier you are, the longer you'll live,'" he told me one day. I said I wasn't surprised. Children in Saigon who survive their first year must have more antibodies in them than well-vaccinated Americans.

Dinh said he was glad that I looked at things this way. "We say, 'The taller the bamboo, the lower it bends.' You come from a great country: you can afford an open mind."

The evening I arrived, a student named Nguyen Thi Nhu Mai received 3,000 piasters, or about \$40, from the Saigon Rotary Club as

a prize for her essay on civic virtue. Next morning at dawn, in the Central Market, a student named Le Van Khuyen was shot by a firing squad; the city was under martial law, and he had been caught on the street carrying Viet Cong leaflets, two mines, and a grenade.

That was typically Saigon. So was this story I heard from a U. S. Army captain from Texas:

"We were up on the roof at the Caravelle Hotel, celebrating the promotion of a fellow officer. A few miles down the river a tanker was burning and exploding. In the opposite direction, planes dropped flares on the VC; I could hear mortars. And here we were drinking pink champagne, while down on Tu Do Street people went about their business as if it were Saturday night back home."

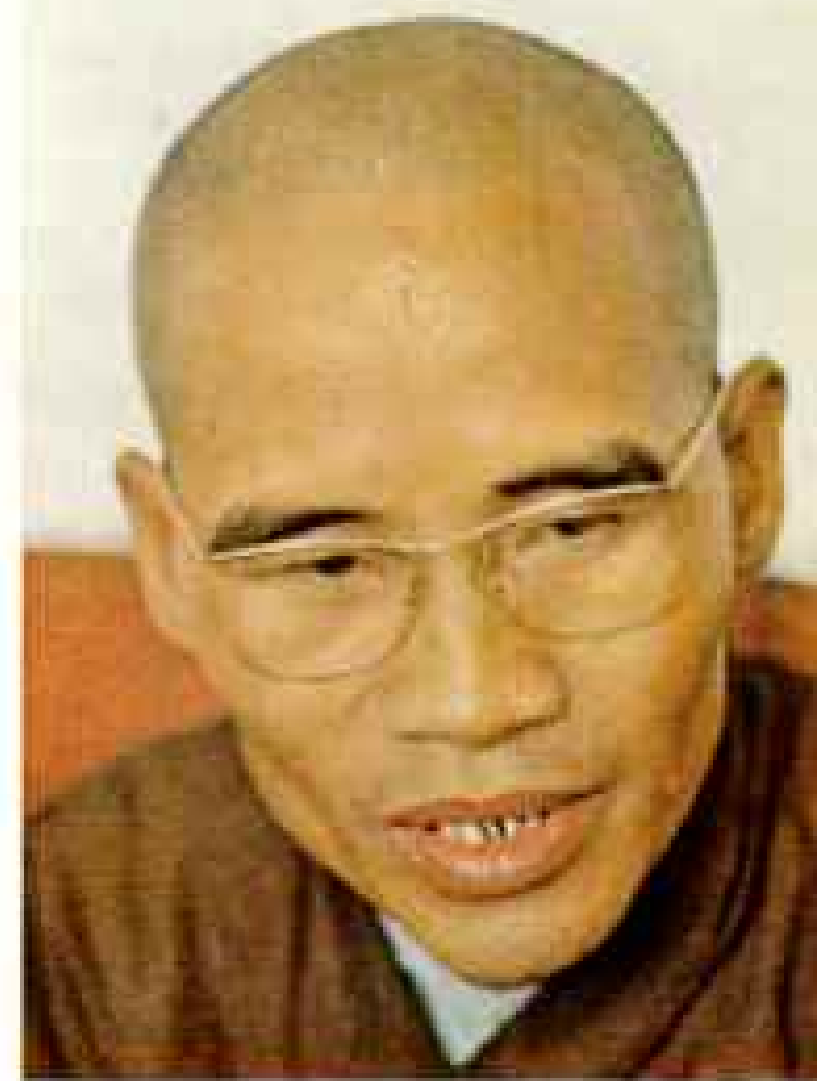
Nearly all the 15,000 Americans in Saigon could tell similar stories, and soon so could I. No other place had excited me so incessantly.

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the National Legislative Council; Gen. William C. Westmoreland, U.S. commander in Viet Nam; and Brig. Gen. Nguyen Huu Co, commander, II Corps. (Second row, extreme right) Brig. Gen. Nguyen Cao Ky, commander of the Viet Nam Air Force; and civilian ministers (far left).



AP/WIDEWORLD © N. S. S.



Spiritual spokesman: The Venerable Tam Chau directs the Buddhist Institute for Secular Affairs, a body that prays and parades for peace.

"Our people have been fighting for 20 years; there is a limit to human suffering. In the Year of the Snake, we must negotiate," he told photographer Garrett. The bonze participated in a hunger strike that toppled the government of Tran Van Huong.

"Consecration to a religious life does not mean idle contemplation," Tam Chau said. "We must thrust ourselves into the actual life of the people."

with feelings so strong and so strongly mixed.

One Sunday my friend Dinh drove me out of the city. We crossed the Saigon River on a new bridge and headed northeast on the Bien Hoa highway—both monuments to American aid, dispensed in Viet Nam by USOM, the United States Operations Mission.

We passed a new housing development, for professors at Saigon University; a new cement plant; new power lines, built by Japanese engineers as part of World War II reparations.

Just past the spot where a USOM official, Gustav C. Hertz, had been kidnapped by the Viet Cong the week before as he came by on his motorcycle, we turned off the highway and into a narrow road between rice paddies, palms, and fields of sugar cane.

A man went by carrying a bird trap of bamboo. "He's got a female turtledove in there," said Dinh. "With her he might catch twenty males today, and tomorrow you'll find them in the Saigon pet market."

After another bridge we reached our destination—the estate of the retired engineer Dao Vom Nhon, on Pho Island. Hidden from us only two miles away sprawled the Bien Hoa airbase, where Viet Cong mortars had just destroyed five American jet bombers.

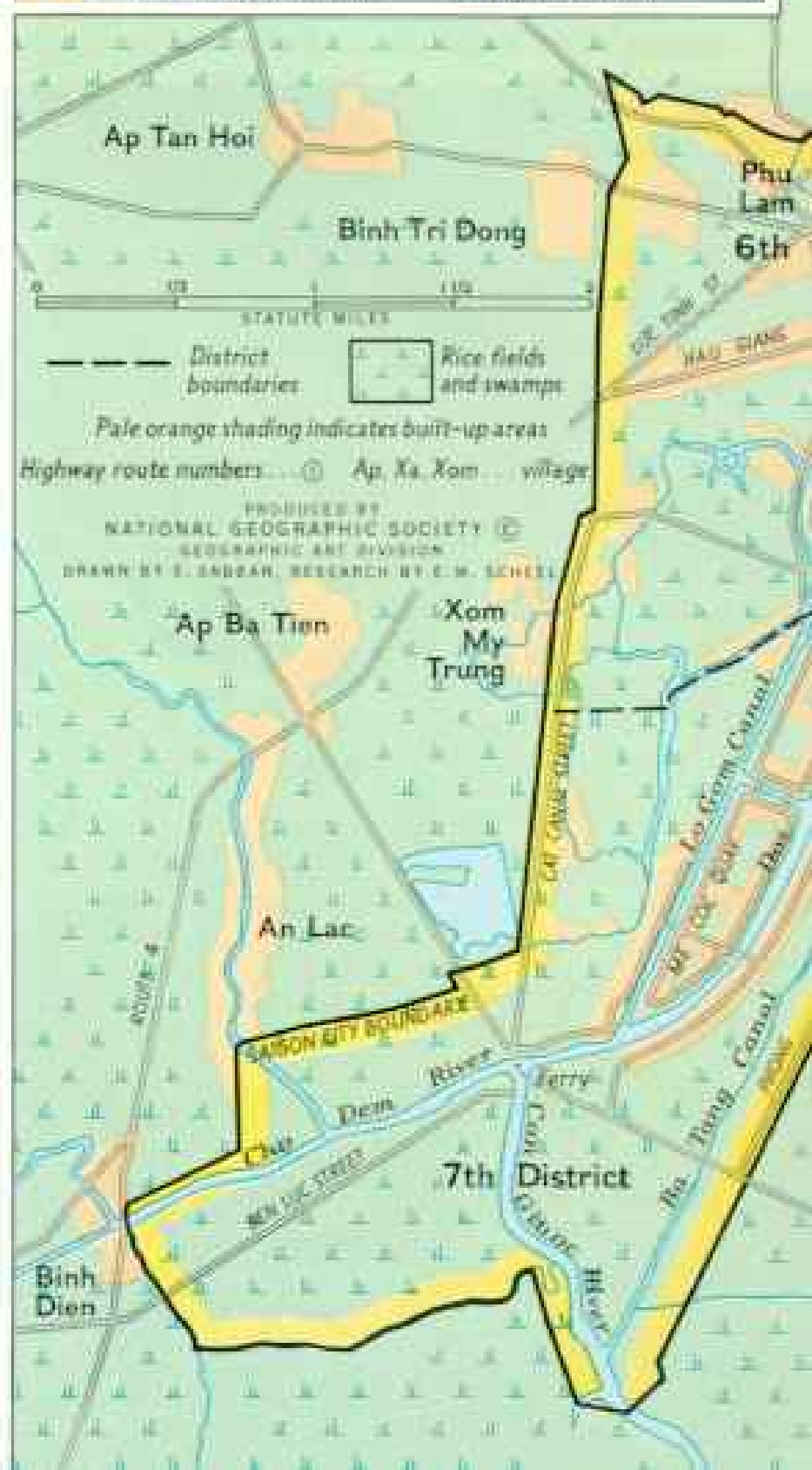
Grapefruit Trees Fall Victim to War

Mr. Nhon spoke of the island's remarkable flora. The velvety green plant that glows in the dark. The orange firecracker flower, at home in the highlands but flourishing here practically at sea level, in soil cooled by the river. And the famous grapefruit trees, whose seeds were brought from the north many years ago. Mr. Nhon owned 2,000 trees; as a rule each produced some 100 grapefruit twice a year, for a total yield of 400,000 a year. Mr. Nhon was the grapefruit king of Saigon.

"No more," he said. "Look, not one tree has more than fifty. And 20 percent of my trees are dead."

Last year, he explained, chemicals were sprayed along the highway to kill vegetation and make it more difficult for the VC to set ambushes. "A bit of those chemicals floated this way," said Dinh. "Grapefruit are expensive in Saigon this year."

War-buffed capital, Saigon, shaped like a fish jumping out of the water, clings to a loop of the Song Sai Gon, the Saigon River. Broad boulevards with imposing buildings lace the city. Riverside docks accommodate commercial vessels. Saigon governs the rice bowl of a battle-weary land divided near the 17th parallel (above).

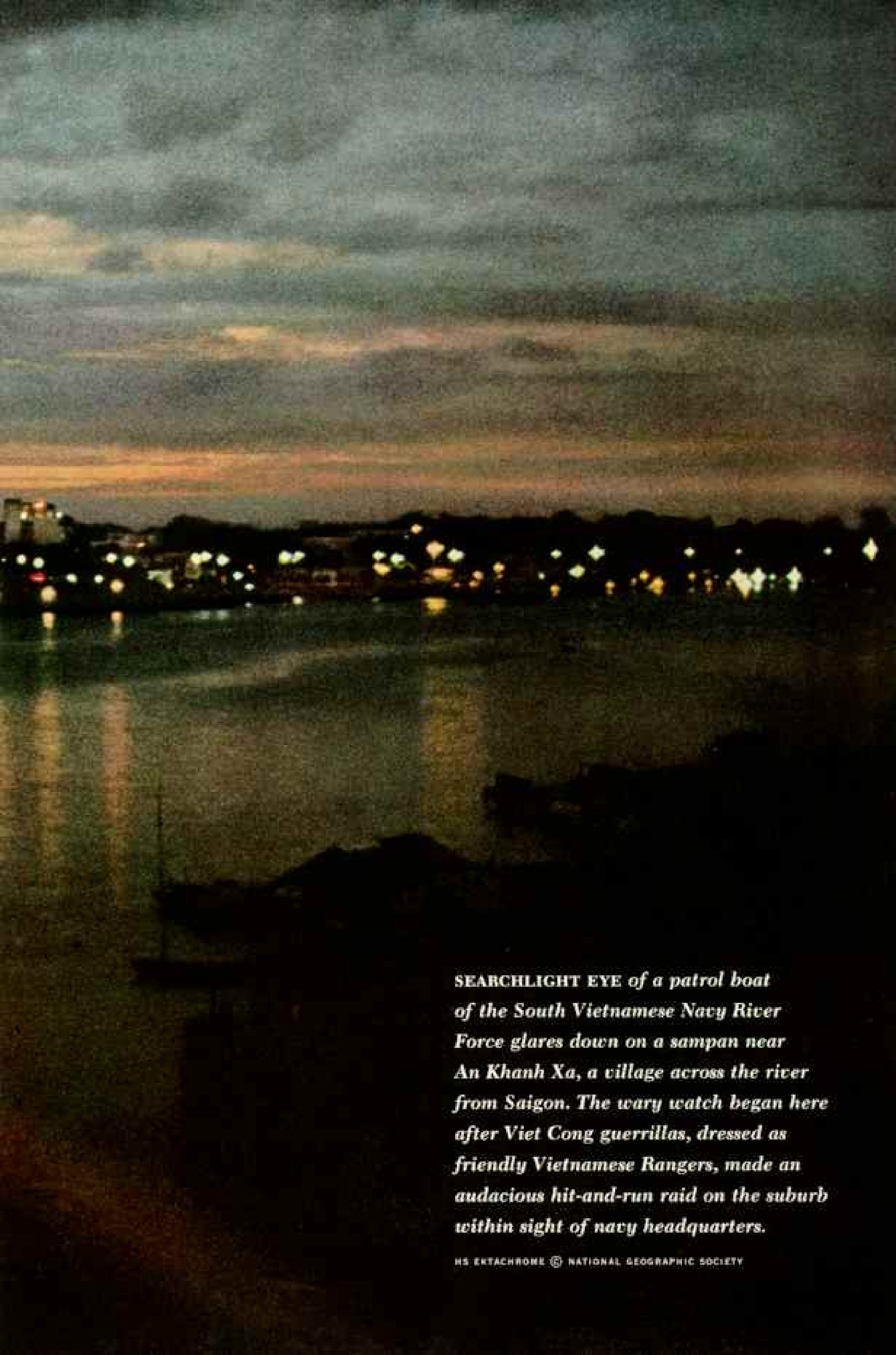




Saigon







SEARCHLIGHT EYE of a patrol boat of the South Vietnamese Navy River Force glares down on a sampan near An Khanh Xa, a village across the river from Saigon. The wary watch began here after Viet Cong guerrillas, dressed as friendly Vietnamese Rangers, made an audacious hit-and-run raid on the suburb within sight of navy headquarters.

A swarm of helicopters clattered overhead as we moved into Mr. Nhon's living room. In the Vietnamese tradition, it contained dark furniture, deeply carved. Two altars held brass incense burners and offerings of fruit and flowers to Mr. Nhon's ancestors, to the spirits of great men of the past, and to Buddha.

I admired the porcelain pot from which our tea was served. The painting on it was exquisite. It was more than that, Dinh said; it was a set of symbols, a veritable map of happiness.

It showed a bearded sage, for longevity. A

lady bearing a peach, for prosperity. A child, meaning many descendants. A dish with a duck, for good food; and a deer, for good luck—riches, that is, and favors from one's superiors. And the happiest sign of all, a red bat.

Talk of Wealth Spreads Happiness

I knew red to be a lucky color. But why a bat? Dinh explained: "The bat sleeps with his head down and his feet high. He is truly relaxed, he has no worries at all. Eat red bat meat and see what it will do for you!"



Official greeter with the Women's Army Forces, Nguyen Kim Chi waits for the first contingent of noncombatant Korean troops to arrive in South Viet Nam (page 867).

Expression of peace on the face of war: Lights of the Abraham Lincoln Library, a facility of the United States Information Service, beckon readers to this corner of Le Loi Boulevard.

U. S. officers and officials at a rooftop club often see the glare of air-dropped flares as government troops fight Viet Cong guerrillas in the fields surrounding Saigon. Many Americans have avoided public restaurants and theaters because of recent bombings by Communists.



Dinh had introduced Mr. Nhon as a rich man. "Didn't that embarrass him?" I asked.

"It delighted him," said Dinh. "It is polite to ask, 'How much do you earn a year?' Or 'How much did your new house cost?' If the price sounds high, you say fine, what a wonderful house. If it's low, you are happy that it was so cheap. To speak of money, you see, is a way to share happiness."

We passed fields of tobacco and manioc, rubber trees, and an ornate tomb—"the richest Chinese in Viet Nam," said Dinh.

We stopped along the river, at a restaurant favored by the well-to-do people of Saigon. At one table, surrounded by his family, sat His Excellency Ung Trinh, once a senior adviser to the last emperor of Viet Nam. At another, surrounded by American newsmen, sat Mrs. Katharine Graham from Washington, D. C., president of the *Washington Post*.

We ordered the specialties of the house—fried river fish, so tiny that they looked like French fried potatoes, and venison steaks. Before the ice cream came, a truck pulled up





明 爐 乳 豬

"Barbecued tender pork," advertise Chinese characters beside a display of meat and poultry. Lacquerlike coating, sweet and spicy, enhances the flavor and appearance of cooked pork and birds. Despite the ravages of war around Saigon, the city throbs with peacetime pursuits. "In the market one hears the noises of a city preoccupied with daily routine," reports author Peter White. "The vendor of dried beef and red peppers hawks his wares with a snip-snip sound of his scissors; the rhythmic tapping of wooden sticks heralds the approach of a portable soup kitchen."

American canned goods, sent as gifts to the Vietnamese people, find buyers at this stall. "I didn't steal them," protested the seller. "I bought them from somebody else." Often the recipient of U. S. food sells it because he is not accustomed to eating such fare and needs the money to buy rice, his basic diet.



EXTREME (ABOVE) AND HO KIEH-HOIE © W.A.S.



carrying U. S. Air Force Commandos in green fatigues. Big hats, revolvers, and belts with shiny cartridges gave them a Wild West air.

"All Air Force men—back to the base!" they shouted. "All Army personnel—contact your units!" Half the customers left in a hurry.

Early that day the Viet Cong had attacked the American compounds at Pleiku, 250 miles north of Saigon (map, page 838). In 30 minutes their rifle grenades and mortars had killed 8 Americans, wounded 126, and hit 21 aircraft. Now the response was in the making.

Flowers Honor Pilots and the Dead

That night U. S. planes bombed military targets in North Viet Nam, and the next day escorted 24 South Vietnamese planes striking north of the 17th parallel for the first time. A day later, at Tan Son Nhut, the Vietnamese pilots were awarded medals by Lt. Gen. Nguyen Khanh, then the South Viet Nam commander in chief. Schoolgirls placed garlands of flowers around their necks.

Brig. Gen. Nguyen Cao Ky—the commander of the Vietnamese Air Force, who had led the raid himself—wore a lavender scarf (opposite). "That's my wife's favorite color," he said. Well-wishers nearly smothered him.

At the same time, the other side of the field at Tan Son Nhut also saw a presentation of flowers and medals. These lay on the flag-draped coffins of the American dead from Pleiku (page 858). An officer read their citations over a loudspeaker, telling whence they came: Kansas, Tennessee, Maine. . . .

"Present . . . arms! Carry . . . casket!"

Gen. Maxwell D. Taylor, Ambassador of the United States (page 855), and Gen. William C. Westmoreland, head of MACV—Military Assistance Command, Viet Nam—froze at attention, while the dead of Pleiku were put aboard a plane.

That day from Tan Son Nhut the first American dependents left Saigon, as ordered by President Johnson. "We have no choice now but to clear the decks," he had said, and off they went, the children hung with name tags, the wives grim or smiling or tearful.

Saddest of all seemed the Vietnamese nursemaids. In the airport lounge Nguyen Thi May carried 7-month-old Claire Duiker for the last time (page 854). I saw her kiss the baby on the elbow. Claire's father, William J.

Fresh from combat, Brig. Gen. Nguyen Cao Ky gets a hero's welcome after bombing North Viet Nam military bases—a mission to avenge Americans who died at Pleiku. Most of the general's two dozen planes were hit by ground fire; one went down. A few days later, NATIONAL GEOGRAPHIC's writer-photographer team breakfasted on Chinese soup with Ky just before the flamboyant flyer began making air passes at coup forces.

PARACHUTE (BELOW) AND HE ESTABLISHED BY W. L. BARRETT © R. S. S.



Coup commander, Army Brig. Gen. Lam Van Phat occupies the headquarters of Air Force General Ky (opposite) during a February attempt to upset the government. British air attaché behind him acts as an intermediary. Ky threatened to bomb his own headquarters if Phat remained.

Duiker, Jr., a U. S. Foreign Service officer in Saigon, is the son of NATIONAL GEOGRAPHIC staff member Mrs. William J. Duiker.

Mrs. M. Keith Humble, president of AWAS, the American Women's Association of Saigon, worried about the files; after 15 years, AWAS had so many files.

In the house of Mrs. Robert Burke, the AWAS Welfare Committee allocated the last of the money raised through sales of cookbooks, Christmas cards, and baskets made by tribesmen in the Vietnamese Highlands. I accompanied Mrs. Erland Heginbotham to the Saigon Children's Hospital, when she went to deliver the last check and a box of toys.

Children's Hospital had 250 beds. In the ward I visited, some beds held two children, some three. But they seemed cheerful. Each had its mother right there, or at least a sister.



"The mothers stay all the time," said Miss Duong Nguyet Di, the social worker. "At night they sleep here, while older children look after the family at home. It's our built-in nursing system."

I also went to an orphanage, accompanying Mrs. Walter Wells. Her husband headed the Vietnamese-American Association, where so many Saigonese had learned English—more or less. Mrs. Wells, a registered nurse, had visited the orphanage every Saturday, to wash the children and put ointment on their insect bites. This would be the last time.

A little boy sat on the floor with a bowl of food in front of him.



Backbreaking bag of rice goes into a warehouse in Cholon, the Chinese section of Saigon (opposite). Rice is a leading export of South Viet Nam.

Huddle of humanity: Huts of sheet metal, wood scraps, and cardboard jam Cholon, Saigon, with 2,000,000 people in 20 square miles, offers dramatic proof of the Vietnamese proverb, "Every inch of earth is an inch of gold." Such tinderbox slums exist on the rim of disaster. Two years ago fire razed 2,000 shacks, leaving 30,000 homeless.

"He's too sick to feed himself," said Mrs. Wells. "I think in a week he'll be dead. My little girl was like that: thin arms, distended belly, and a rash. She wouldn't smile, and she wouldn't cry. She had no expression at all."

Mrs. Wells had adopted that girl, and tomorrow she would take her to Connecticut. I had met little Kim Loan Wells, already a charmer at three and a half—pretty and bright and mischievous. Some day, I thought, she'll be the most popular girl on campus.

Another part of the orphanage housed abandoned mothers. A woman held up her baby and looked at me intently. I asked my interpreter what she was saying.

"She says, 'Please take my son. Take him with you to America; then he will become an important man, and not be illiterate like me.'"

I didn't know what to say. I just left.

Birthday Cake Lightens Tension

I boarded a bus shuttling among the American installations that lay scattered through much of Saigon. Screens were bolted over the bus windows to keep out grenades.

A lieutenant of the Army Special Forces got on and spotted a friend. "Remember Jim, up in Binh Dinh Province? He got hit."

"Sorry about that. Serious?"

"No, through the shoulder. He's O.K."

Behind me one Air Force captain said to another: "My wife was mad—they didn't finish her elephant-hide shoes on time."

"Sorry about that," said the other. "I guess I'll be a major before I get my golf bag."

The bus route led from the BOQ's, or bachelor officers' quarters, to MACV-1, the headquarters of General Westmoreland; to the commissary; and to the BEQ's, or bachelor enlisted men's quarters. I got off at a former cigarette factory. Now it was HEDSUPACT—Headquarters Support Activity, Saigon—the organization that housed and fed the thousands of Americans assigned to MACV.

The commander, Capt. Archie C. Kuntze, of the United States Navy, was on the phone, congratulating a chef on the cake for the third anniversary celebration of MACV. "General Westmoreland was pleased," said Captain Kuntze. He put down the receiver and turned to me.

"The tension here is terrific," he said. "The usual tour of duty is one year, and after eight months they get the blues—they think they might not make it."

Captain Kuntze had come from the Harvard School of Business to Saigon to take on the largest overseas shore command in the



Pushed into the water by lack of living space, citizens crowd together on sampans and in shacks on stilts. A city law aiding owners of the spindle-legged houses decrees that property over water is not taxable. Residents along the



ENTRICHED BY W. E. GARRETT, NATIONAL GEOGRAPHIC STAFF © N.G.S.

malodorous Ben Nghe Canal run a high risk of cholera. Woman at left stands by a round charcoal cooker. A boatman propels his craft along the waterway, believing that the eye painted on the bow protects him from demons.

Navy, and the most diversified: 40 hotels, turned into BOQ's and BEQ's, plus some 200 other pieces of real estate; 1,500 buses, trucks, and jeeps; the busiest Navy Exchange in the world; and all the headaches that go with supplying food and movies to American units in 100 different spots across South Viet Nam.

Port Unloads Apples and Ammunition

The busiest part of Captain Kuntze's domain was the Port of Saigon. Next to the freighter *Illinois* from San Francisco, I saw mountains of bags of cement and fertilizer; pyramids of boxes of Washington State apples, rotor blades for helicopters, Seven-Up. In a warehouse, beyond a pile of jukeboxes, a forklift truck stacked crates full of .45-caliber cartridges for pistols and submachine guns. Each load held 108,000 rounds.

Nearby a big sign said: THINK RICE. "Potatoes are in short supply," said a Navy lieutenant. "That's the big complaint. We eat rice only when we're out of potatoes."

A group of female stevedores rested after carrying bags of grain all night. "Women do the really heavy work here," said another lieutenant. "The bags are put on their shoulders, and they walk about 200 feet to the trucks. Each bag weighs 50 kilos—110 pounds."

I talked to a woman stevedore with gold teeth and black pajamas. She had no husband now, but she had eight children, and she was glad to have the job. It paid 65 piasters for eight hours, enough to feed her family if her daughters shopped wisely. A pedicab driver might earn only 40 piasters a day.

Captain Kuntze's unusual command was faced with another headache: how to protect



all those thousands of Americans in Saigon.

"We are strengthening our security posture," I was told by the provost marshal of HEDSUPPACT, Lt. Col. Paul Atherton of the U. S. Army. Last Christmas Eve his room had collapsed while he was in it, in an explosion that wrecked the Brink BOQ.

"I was a mess," he said. "Eight stitches in the head, 12 in the shoulder. It was good indoctrination for me."

Bomb Disposal: "A Matter of Judgment"

Colonel Atherton's Military Police compound had one of the highest fences in town—six feet of wall plus 15 feet of wire mesh, to thwart grenade throwers.

What about carefully placed explosives, such as the 40-pound remote-control mine found in a flower pot at the American swim-

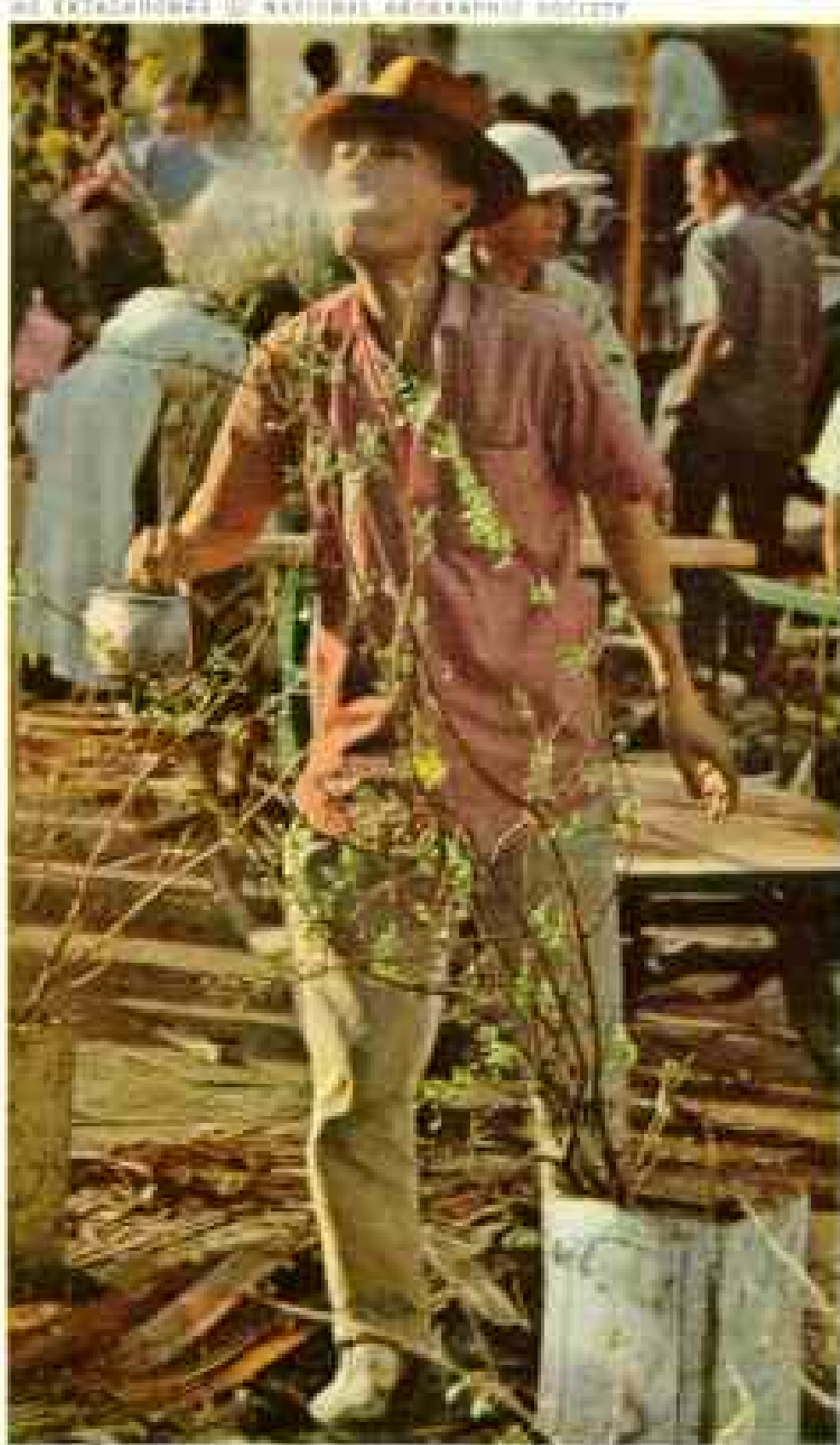
ming pool? Or the black box, with timing device, found outside the bedroom window of Hatcher James of USOM? That's where Richard Lays came in, the Navy lieutenant in charge of Explosive Ordnance Disposal—more simply, the bomb squad.

"Three chief petty officers and me," said Lays, "working in pairs. After we clear the area, one man goes and looks at the thing. He comes back and tells his partner what he thinks. The second man looks, and they talk. Then the man whose turn it is goes to work."

First the stethoscope. No sound? Attach string, take cover, and pull a little. Nothing? If it's a suitcase, try opening it, gently, to feel if there's a spring to set it off. If it's a package, cut into it with a hacksaw.

And if it really is a bomb?

"We put sandbags around it and blow it up



Spraying water, a man wets branches of the budding *mai* tree for Tet, the lunar New Year.

Coils of incense hang from the ceiling of a Chinese temple in Cholon. Supplicants light joss sticks and plant them in urns, or set votive papers afire (left), hoping for spiritual reward.

right there. Sometimes we can't do that, so we take out the detonator. Or we pour in plaster of Paris and let it harden, to immobilize the mechanism. That produces heat, unfortunately, and some detonators react to heat. It's a matter of judgment."

Lieutenant Lays, who was 27, gave me a disarming smile. "We had to cut into one suitcase, and the owner got mad. The luggage wasn't much, but he said we had ruined his gym sneakers."

I watched the American precautionary routine. Opening the handbags of ladies coming to a USO dance. Checking identity cards at the BOQ's, by guards behind barbed wire. Looking under car hoods at the gates of HED-SUPACT. But, in the main, the safety of the Americans rested in Vietnamese hands. So said Lt. Gen. John L. Throckmorton, deputy commander of MACV, adding that the Vietnamese had their hands so full that "we must take certain calculated risks."

Saigon Police Smile—and Search

The deputy director of the Saigon Police, Maj. Nguyen Van Luan, had four telephones on his desk, a swagger stick of buffalo horn, and a copy of *The Police and Resources Control in Counter-Insurgency*, prepared by USOM.

"We're tightening up," said Major Luan. "I'm off on an inspection tour. Come along."

We began with the Tan Thuan checkpoint in the 4th District, an airy hut behind barbed wire (pages 870-71). Inside were submachine guns, a telephone, a pot of tea, and a walkie-talkie, in case the telephone lines were cut. Posters, printed by USOM, showed smiling policemen searching people who smiled back.

Cars, bicycles, pedicabs, horsecarts, and motor scooters stopped in turn. The policemen saluted, smiled, and searched away. Ladies were frisked by a policewoman in blue slacks.

"Sometimes we find opium in a woman's hair, or VC orders strapped to a man's legs, or grenades," said Major Luan. "Most of all we watch the eyes. The unquiet conscience reveals itself in the eyes."

Recently a VC ran and jumped into the river, but a policeman killed him even as he hit the water. "Our men are good shots," said Major Luan. "Trained by USOM."

Night fell as we drove to the docks, boarded a police boat, and headed out past the freighters into the middle of the Saigon River. The breeze was soft, and the lights of Saigon twinkled from a floating restaurant, from the yacht club, from the Majestic Hotel.

We passed a sampan bearing a large family,



HO-SAYACHONG AND BODACHONG (TOP) © H.R.C.



REPRODUCED BY AP/WIDE WORLD

U. S. Ambassador Maxwell D. Taylor says goodbye to two junior commandos in camouflage suits. Maj. Gen. Joseph H. Moore, U. S. Air Force commander in Viet Nam, and General Westmoreland (right) stand behind. As tension grew in February, 1,800 U. S. dependents left the country by order of President Johnson.

Tagged tot, Claire Duiker awaits evacuation from Viet Nam (opposite, top). Her nurse, Nguyen Thi May, fights back the tears at her parting with the baby, whom she has cared for since birth.

Sadness of parting with loved ones clouds passengers' faces on the long flight home.

Treasured possessions in their arms, homeward-bound Americans stream out of Saigon's Tan Son Nhut Airport to board commercial jets. The first group left within 36 hours after the President announced. "We have no choice now but to clear the decks." Airman holds a rapid-fire rifle.



Metal dragonfly, an armed Bell HU-1B helicopter flies over Saigon. Once across the river, it flutters into range of Viet Cong snipers; ring of security ends at the beginning of green fields. Pilot Michael J. Davis, who flew more than 500 missions during his first five months in Viet Nam, has had three copters shot out from under him. Brink BOQ (right foreground, center) suffered a Christmas Eve bombing that killed two Americans and injured more than 100 other people.

STYLING BY R. J. GARRETT © NATIONAL GEOGRAPHIC SOCIETY

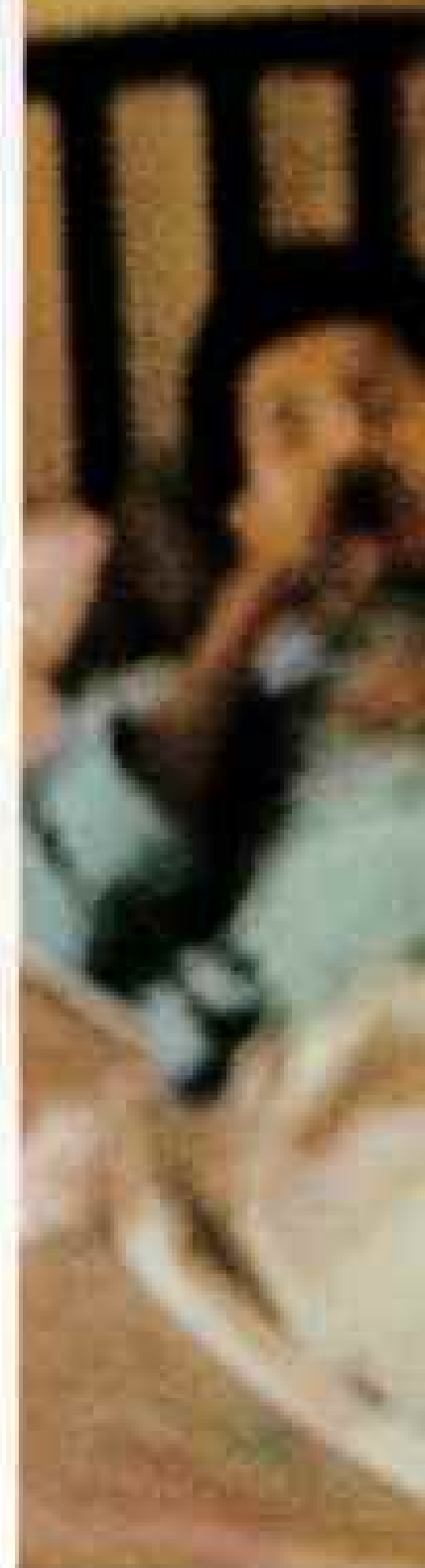






Medals for heroism, awarded by South Viet Nam, decorate flag-draped coffins of American soldiers, eight of whom died at Pleiku, site of a U. S. airbase. Viet Cong infiltrated the military installations and blasted them with mortar and small-arms fire. The 2 a.m. attack claimed more than 130 United States casualties and ended an informal peace that had prevailed during the Vietnamese New Year celebration. In the first three months of the current year, 101 American servicemen lost their lives.

Maimed by war, Le Van Cu stands forlornly in Cong Hoa Military Hospital, near Go Vap. The soldier lost his arm during a rain of mortar shells at Duc Hoa, 15 miles west of Saigon.



a dog, and dinner cooking on a charcoal stove. Our lights were turned off. We came on another sampan, also darkened. We turned a searchlight on it and stopped (page 840).

"He says the wind blew out his lamp," translated Major Luan. "Could be."

Ashore again, we drove past stevedores angling for shrimp as long as my hand, past waterfront bars, and through Cholon—Saigon's Chinese section, where life in the shops and on the sidewalks brimmed as brightly and busily after dark as it did by day. When we reached the Phu Lam checkpoint at the western limit of the city, all was quiet except for the crickets, and dark except for the stars.

A truck arrived, full of pigs. Policemen with flashlights looked into its tool box and at the underside of the chassis. "We worry about big quantities of *plastique* explosive sneaking into the city," said Major Luan.

A Mercedes bus stopped, jammed with countrypeople. Police frisked the men, but

the women went unsearched. "No policewoman here," said the major.

Did the VC know that? "Probably. But we can't get enough policewomen."

Not enough money?

"Not enough recruits. We may get more soon. Anyway, the big hauls come through tips. Some of the drivers are our agents. They pass the word, and we let the truck go through. We follow to see who gets the stuff."

Major Luan said goodbye at midnight. "All day we had no fire, no explosion, and when I get home and into my pajamas, the phone will ring. It happens nearly every night."

Flowers Bloom in Air-raid Trenches

After the first air strikes at North Viet Nam, in August, 1964, in retaliation for attack on U. S. destroyers in the Gulf of Tonkin, Saigon dug trenches along some streets and in public squares to protect people in case of air raids. Now newspapers announced the digging of



RETAKORONI (OPPOSITE) AND AN RETAKORONI © NATIONAL GEOGRAPHIC SOCIETY

new trenches and the testing of air-raid sirens.

But announcements were one thing, accomplishments another. The mayor of Saigon—the distinguished physician Pham Phu Khai—viewed this difference philosophically.

“We’ll clean out the earlier trenches,” he said, “and we are planning to buy some new sirens in Hong Kong, because the ones we have are not much good.”

Only recently Mayor Khai had ordered the trenches in front of City Hall filled in and planted with flowers—in time for Tet, the lunar New Year, Viet Nam’s biggest holiday. “We’ll empty some storage rooms under the City Hall, for use as a shelter,” he said, “but we’ll leave the flowers out there. One must also do something for the spirit.”

The mayor took me to the enormous reception chamber, where 12 ceiling fans turned amid murals of flowers and cherubs. Paintings on the walls depicted Saigon in different stages of development: As a walled fortress in

1795, with bastions in the shape of a 12-pointed star, built by Vietnamese overlords from the north; as a tree-shaded, spacious colonial town of the late 19th century, a jewel of the French empire. There was also an artist’s idea of the Saigon of the future—with gray skyscrapers.

“Don’t take that one seriously,” said the mayor. “We don’t need skyscrapers; we’re expanding horizontally instead.” He outlined what he planned, if he could get the money.

“Traffic is choking us, especially in the 2d District, so we’ll move the railroad station. Now the tracks make dead ends of many busy streets. We’ll build a new bus station, underground, and underpasses for pedestrians at the corners of the Central Market. But we can’t do anything until the political situation is stable.”

Next morning I visited the chief of the busiest of Saigon’s eight districts, Mr. Nguyen Tan Huong.





Moonlight patrol waits to ambush a company of Viet Cong raiders hiding near Go Vap. Members of the Popular Forces—a kind of home guard—nightly comb their district, which lies within mortar range of strategic Tan Son Nhut Airport. Lights of a plane from the airfield streak above the hut. The Communists had recently hit the area, burning 50 homes and blowing up a maternity clinic. But Popular Forces soldiers, like the stern-faced one at right, later killed five raiders.



REUTERS (LEFT), AP (RIGHT) © N.S.I.

"This is the heart of the city," said Mr. Huong. "We have 21 cinemas and playhouses, 46 daily newspapers, and the prettiest girls in all Saigon." Too bad, he added, that the 2d District posed such problems of security.

"Our most important buildings are American installations"—he mentioned the Metropole BEQ, the U. S. Navy hospital, the bowling alley, and the big USOM offices—"and that means difficulties. Two explosions in the Kinh Do cinema, bombs in the Rainbow Bar, the Playboy Bar, and in other bars. We also get much VC propaganda, leaflets and word of mouth."

What were the VC saying?

"That they kill many government soldiers. That the government is corrupt. That Americans are imperialists and exploit the country the way the French did."

Mr. Huong took me to the headquarters of one of the seven neighborhoods in his district. I noticed government posters: "The Americans improve the lives of the people, the VC bring fire and death." But I saw no telephone.

"No need," said the chief of the neighborhood. "I can use the telephone across the street, at the Plymouth dealer's."

I saw no guns, either. Mr. Huong said, "The chief is a civilian, so the VC wouldn't attack here." In the 2d District, I gathered, the VC attacked only Americans.

Viet Cong Sets Booby Traps for Americans

This made me sad, that Americans in Saigon should be so hated and hunted. I had heard about a balloon seller asking an American to hold his wares for a moment. The balloons blew up.

I heard about VC with hypodermic needles. They could stab silently, in a crowd, to poison an American.

I saw an American light a cigarette, and inwardly I winced. Cigarette lighters had been found with the wick set to ignite a high-explosive charge.

But weren't there many plainclothes police in the hotels and on the streets, watching over us? And did not the

security services take the powder out of grenades, fill them with sand, and pass them via undercover agents to the Viet Cong? At least some terrorists would be risking their lives throwing duds.

I chased the dark thoughts from my mind, for it was Sunday morning again, and I was off to the movie at the French Cultural Center: Walt Disney's *Bambi*, with sound dubbed in French, and Vietnamese subtitles.

The hall was jammed with well-dressed Vietnamese children. "No, no police here," said a French cultural officer. "We French have nothing to fear." He was proud that the

Vietnamese still send as many children to French schools in Saigon as ever. He took me home to an excellent lunch. After that I went to Phu Tho racetrack.

I saw no Americans, and only two policemen in the crowd of the young and old, the apparently wealthy and plainly poor. The horses looked small to me, but exceedingly proud, they held their heads so high.

"The best are a cross between Anglo-Arabian stallions and Vietnamese mares," said Mr. Ly Vinh Khuon of the Saigon Racing Society. "Heredity is most important, of course, but the spirit of the horse, of the jockey,



and of the owner can make the difference."

I asked, "In a sense, isn't this also true in politics, in war, in everything?"

He replied, "Here we talk about horse races. We never discuss politics."

Viet Nam's National Sport: Soccer

I left the track in time for the big soccer match at the Cong Hoa Stadium. "Biggest crowd of the year," said sports writer Phan Nhu My.

"Because people are optimistic after the air strikes in the north?"

"No, because it's the championship finals—

Armed Forces versus Customs. Customs has a magnificent goalkeeper, Pham Van Rang."

Soccer is Saigon's biggest sport, said Mr. Phan Nhu My. Next comes ping-pong. "Saigon has 57 soccer teams. Of the 14 in the first division, 6 are military. That's war."

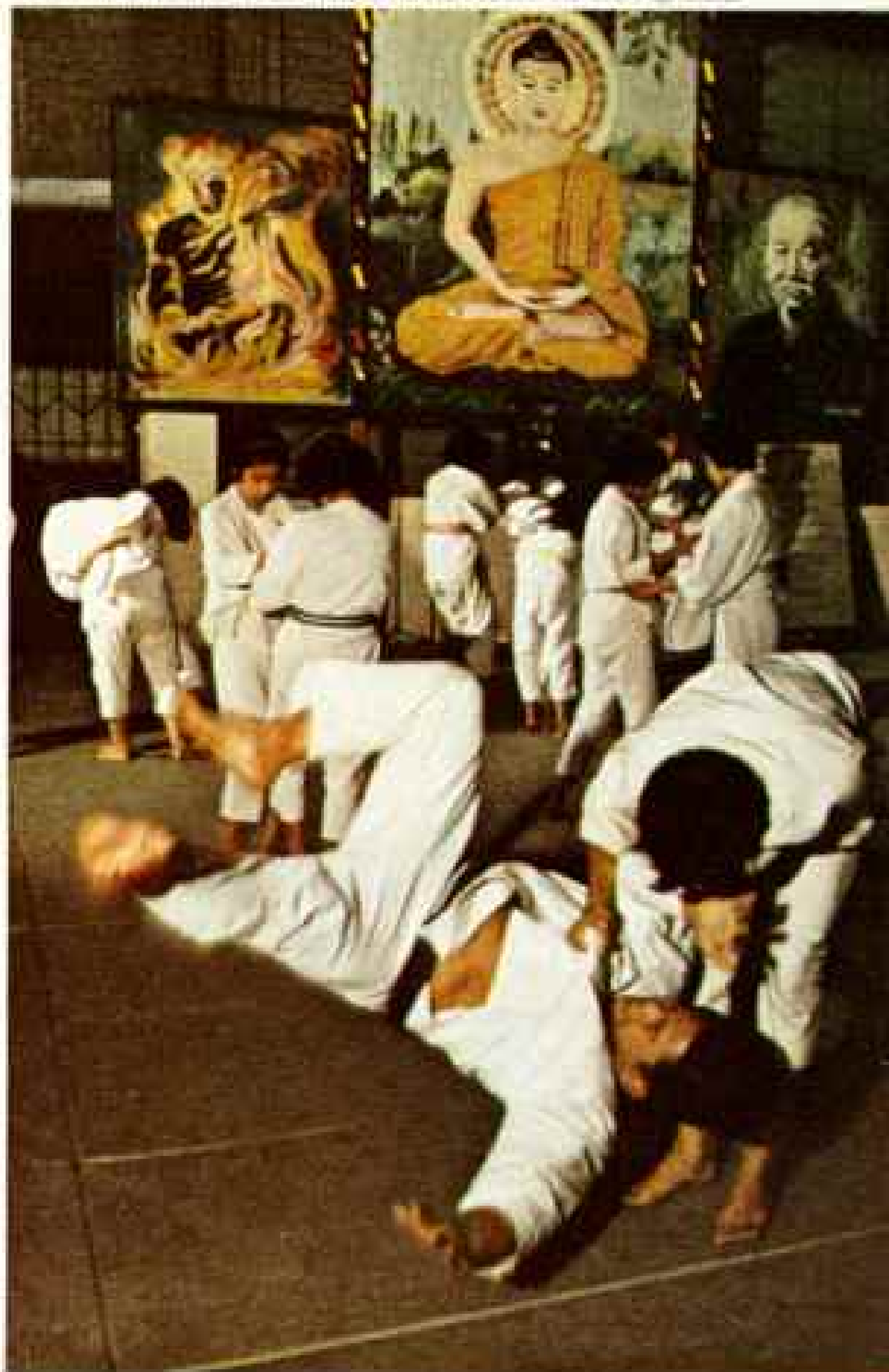
In the stadium, too, I saw hardly any police. Armed Forces won, 1 to 0, and I left, as relaxed and happy as a red bat.

That night Maj. Glenn Petrenko of the U.S. Army called for me in his jeep, to take me on a patrol in an outlying part of the Saigon metropolitan area. This area—roughly circular, with a radius of 11 miles

863



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Meditation before a match: A Buddhist judo class hears loudspeaker prayers of the Venerable Tam Giac (left). A senior monk, he is also a Black Belt judo expert and chief of Buddhist chaplains in the Vietnamese Army. Each night he supervises 1,500 students, aged 6 to 70, who believe this disciplined art builds moral character. The class above practices beneath pictures of Buddha, Quang Duc, the first monk to commit suicide by fire as a protest against the Diem government, and Jigoro Kano, the Japanese founder of judo.

from the city's center—encompasses the Province of Gia Dinh. It includes Tan Son Nhut Airport, the Vietnamese high command, an American communications center, and a fuel dump—all highly tempting to the mortar men of the VC.

"When I was first in Viet Nam in 1962," said Major Petrenko, "Gia Dinh Province was just a big suburb. You could take a cab out there and not worry about it." But things had changed; now his detachment was advising Vietnamese Captain Binh, chief of the Go Vap District, on security.

Captain Binh's villa was our first stop. We sang happy birthday to the captain's wife, and I skipped rope with his children in the garden. It took a brave man to be a district chief. The VC killed them by the score, and sometimes their families as well.

"My district is the smallest in Viet Nam but the most populous—284,000 people in seven villages," said Captain Binh. "Five are quite urban. Two are quite rural." He joined our little convoy, and we drove through busy streets, then quiet ones, into the silent countryside. We turned off our headlights, and my eyes got used to seeing by moonlight.

With me sat Cpl. L. R. Gallino of Major Petrenko's unit. "Over there they built a maternity clinic with USOM money," he said, pointing with his shotgun. "Two days before it was supposed to open, the VC blew it up."

We drove as far as the big steel bridge across the Saigon River at Phu Long, an important gateway to the city. Guards sat in a tower and in sandbagged emplacements.

"We need a company to defend the bridge and patrol the area," said Major Petrenko. "We have only a squad."

The bridge defenses had been overrun once. And just across the river, Major Petrenko's counterpart—another U. S. Army major—had been assassinated. "Somebody threw a grenade into his Land-Rover. The man got away. He may still be living over there."

Ambushes Work Both Ways

In the village of Thanh Loc we met our patrol, 24 men with carbines and grenades, in dark clothes, barefoot. "The VC go barefoot, and we mustn't leave tracks different from theirs," said Captain Binh. He addressed the men: "You are the defenders of Thanh Loc. You must live up to that honor...."

We walked out of the village in two columns, one along each side of the road. After a while Corporal Gallino said, "They ambushed the patrol here not long ago and killed the



squad leader. They hid in the sugar cane and opened up from 20 yards."

We passed 15 yards from a cane field and halted. The men fanned out (pages 860-61). This was an ambush patrol, and all lay low. Except Major Petrenko: there he went, 6 feet 2 inches tall, with his carbine and his German P-38 pistol, checking each man's position. Two weeks earlier in a similar ambush, his men had killed five VC, with no casualties themselves.

Crouching silently in one spot made the time pass slowly, and it made me think. Of the fine dinner a couple of hours ago on the roof of the Majestic, ten miles away. Of Major Petrenko saying, "So far we've run into nothing larger than a platoon." Most often I thought of Corporal Gallino near me somewhere, with his fine medical kit....

A little before dawn we returned to Thanh Loc and flopped down in the market, under a roof paid for by United States aid funds. Around village headquarters stood guards in sentry boxes, and every 15 minutes they banged on pieces of pipe, in turn, to assure each other that they were still alive. The pipes, of varying lengths, sounded like chimes. To their music I fell asleep.



Rock-and-roll music entertains Buddhist youths. They crowd a makeshift teen club, part of a Buddhist fair to raise money for victims of the 1964 flood that left 6,000 South Vietnamese dead.

Midnight prayers of Buddhist priests usher in the New Year. Ritual of Tet springs from the Chinese, who conquered the Vietnamese in the 2d century B.C. and ruled them for about 1,000 years.





Back in the center of Saigon once more, I was hit by a renewed awareness of how amazingly this city mixed the cheerfully peaceful with things too horrible to think about.

In the Central Market, women picked their way among fruit and fish and a hundred trinkets—as they did every day. But right here, in a riot against a recent government, a boy of 10 had been stabbed. As he dragged himself away, the mob followed, threw a bicycle over him, and stomped him to death.

I knew of similar happenings too grim to repeat. All the greater was my relief when the latest coup d'état brought nothing worse than tension and perplexity.

Amid Trouble, a Break for Soup

My first inkling of trouble had come at the airport, where I was waiting to meet a friend in the U. S. Air Force. Rebel tanks raced to block the runways. It was then that a tank rolled up beside me and stopped, while the fighter-bombers armed with rockets roared in for their menacing passes.

I followed the tanks downtown to the radio station, just taken over by the insurgents of Col. Pham Ngoc Thao and Brig. Gen. Lam Van Phat (page 847). Colonel Thao broadcast that Lt. Gen. Nguyen Khanh, the Vietnamese commander in chief, must go.

That night more flares than usual dropped around Saigon, like many moons of pale gold. By morning paratroopers, in a countercoup, had recovered the radio station for General Khanh. It broadcast that Colonel Thao and General Phat were crushed and in hiding.

Extra flares again glowed brightly, and next morning, lo, General Khanh had been deposed. The commander in chief was now Maj. Gen. Tran Van Minh.

Amid this confusion, I spoke with a soldier on a rebel tank. "We are cadets," he said. "Last night an officer woke us up and told us to get on these tanks. We are awaiting orders."

From whom? He didn't know.

While trucks full of soldiers in battle gear rolled through the streets, civilians took their morning break for Chinese soup. In a soup parlor on Vo Tanh Street, the talk was animated. Editors talked about censorship, merchants about business, students about girls, and everybody about soccer.

This firm hold on casual good sense—the Saigonese ability to concentrate on one's own affairs—was also brought home to me in the 7th District, a section almost entirely rural, with palms, fish ponds, rice fields, and an occasional water buffalo.

And a lot of VC, my driver said. "Policemen here always go in groups of at least three. Please, can we go back to the hotel?"

Men mended nets, children flew kites; the atmosphere here seemed as calm as that of the South Seas. In the well-guarded district headquarters, an official said: "At night, of course, you cannot be here. No foreigners, by order of the mayor."

An old man with black pajamas and an old pith helmet sat on a bench, waiting. At last he got a hearing.

"He says somebody keeps getting into his goat pasture," said the official. "We'll look

Laden altar before Buddha at Saigon's Xa Loi Pagoda holds offerings of fruit and candles—red for good fortune. Mai branches, symbol of spring, spread above flanking jars. A worshiper approaches the altar barefoot, as custom demands. The temple preserves a revered relic, a strand of hair that the faithful believe belonged to Buddha. Ceylon donated the sacred gift in 1958.

Help from Asia: A soldier arrives in a contingent from South Korea, which had committed 2,000 troops—chiefly engineering and construction personnel—to repair roads and bridges. Korea was the first nation after the United States to send substantial numbers of men to aid South Viet Nam.



into it." To that man that day, what mattered was the safety of his goats.

Didn't the people of Saigon realize the seriousness of their plight? They did indeed.

I asked a policeman at the airport what he thought of the situation. His expression stayed blank as he said, "We are a fish on the chopping block."

And who could feel more deeply than the women trying to cheer their broken men in the army hospital (page 859)? I thought of a classic Vietnamese poem, the *Chinh Phu Ngam*, or "Warrior's Wife's Plaintive Ballad," whose lines begin: "In time of devastating war, the gentle sex is submitted to many misfortunes . . ."

As War Mounts, Saigon Grows

Every day the newspapers of Saigon showed white gaps, where type had been removed by censorship. But it was no secret that the VC attacked in growing strength. American planes stepped up their bombing of the infiltration routes from Laos, but the VC kept coming through the jungles. They had infiltrated singly or in squads. Now they came sometimes in groups as large as battalions.

Concurrently, more and more people seeped into Saigon. War in the countryside had been a big factor in tripling the city's population in the past 25 years.

868 In many already crowded blocks, the last



Congestion of cycles clogs a parking area in the middle of a downtown boulevard. The city counts some 1,500,000 such two-wheelers, an estimated two to a family. Amid the rows, a boy balances a tray of sugar cane chunks eaten as candy. Two Saigon factories, built with U.S. funds, assemble parts for Italian motor bikes.

Butterfly on wheels, a Vietnamese beauty pedals along a Saigon street. She ties down the flowing rear panel of her *ao dai* to prevent it from becoming entangled.

Barbed-wire barricade snares a scooter; riders try to free it. Saigon authorities often string such a defensive fence without warning; this one was thrown up during the February coup. Some hapless cyclists saw the roadblock too late. "Several times in the evening I heard squealing tires and knew that another driver had hit the wire," reported photographer Garrett.





EXTREMES AND HIS DISTANCE OPPOSITE © W.C.C.



inches of space were swallowed by ramshackle houses, with walls of cardboard or wood scraps and roofs made of sheet metal or thatch. Here as many as two hundred families depended on a single communal water faucet, and on a communal toilet or two over an open ditch or a canal. Now 250,000 people lived that way.

By comparison the house of my friend Dinh was spacious. But now a partition was going up across his living room. "My parents are moving in," he said. "They will bring my two brothers, a sister, and maid."

Dinh did not complain. To serve one's parents was the highest duty of a Vietnamese. "It is at the heart of our religion," he said.

An Education in Vietnamese Religion

I asked Dinh what his religion was.

"If I had to give it a name, I'd call myself a Confucianist," he said. "But if you insist on labels you will be misled. We have two million Catholics in South Viet Nam. But the belief of the majority is a prescription of many ingredients."

He summed them up for me.

"First, take Confucianism: teaching us how to behave correctly—toward our parents, teachers, rulers, everyone. The cult of our ancestors, and the cult of the memory of our national heroes as our protectors—that is the Confucianist element.

"Second, Taoism: teaching how to stay in harmony with the forces of nature, and with the supernatural—with the spirits.

"Finally, Buddhism: teaching compassion, self-denial, and universal love."

Dinh explained that Buddhism flourished in Viet Nam centuries ago and then withered. "Now it flowers again—as a moral force, and lately also as a force for nationalism." And he took me to meet the Venerable Tam Giac, at the Quang Trung Judo School (pages 862-3).

"We call judo *nhu dao*, 'the gentle way,'" said the Venerable Tam Giac. "It teaches ethics and morality, just as much as praying in a pagoda does."

Checkpoint search: Polite policemen examine all comers at a security gate; they man every road into the city to restrict terrorist infiltration at night. Such precautions have trapped would-be assassins. One student caught carrying a concealed grenade and two mines was promptly tried and executed by a firing squad. Yet explosives still got through: Last March 30 a bomb-rigged car exploded with terrible force beside the U. S. Embassy in Saigon, killing 22 people and injuring about 180.

Around us boys and girls kicked and threw each other, wearing judo clothes of white, symbolizing purity. On the walls, musical instruments symbolized harmony. A painting showed the Venerable Quang Duc in flames as he burned himself to death in 1963, protesting against the government of the late President Ngo Dinh Diem. Quang Duc symbolized courage.

We were joined by judo teacher Pham Loi. "We teach our youth to face Communism



without fear," he said. "Young people need self-confidence, and you don't give them that by giving them guns. Guns are for the weak."

The Venerable Tam Giac said: "We teach the sons of pedicab drivers and of prime ministers. You'll find Catholics here too; we don't ask anybody's religion. We also have Americans. Our judo mats were given us by an American organization, the Asia Foundation."

"The Venerable is also chief of Buddhist chaplains in the Vietnamese Army," said

Dinh. "His rank is lieutenant colonel, but when he talks to the generals, they listen."

The Venerable took a microphone and told the class: "Here is a friend from America; he wants to know about us. What do we mean by civilization? We don't mean clean streets, and we don't mean good clothes. Civilization resides in the mind, in one's way of living. Order, discipline—that's civilization too, and so are self-respect and meditation."

All sat in lines, cross-legged, and chanted

RE DETACHMENT BY W. D. BARRETT, NATIONAL GEOGRAPHIC STAFF © N.G.S.



in honor of Buddha, bringer of civilization.

As the news grew grimmer still—with American advisers now dying every day—I was glad to find people in Saigon whose cheerful outlook had not been shaken.

"South Viet Nam has the best industrial base in Southeast Asia," said a businessman from New Orleans selling machine tools. "Two thousand jobs in plastics. Eighty thousand in textile mills. Sugar refineries, paper mills, rubber products—the place is loaded with opportunities!"

Optimism Survives Amid Turmoil

Prime Minister Phan Huy Quat (page 836) told me: "It is not easy to bring together so many political factions. But I think we can succeed. I am optimistic."

So was Brig. Gen. Robert R. Rowland of the U.S. Air Force. As we walked into the Military Medical School, he said: "An awful lot of wounded died because there was nobody to treat them before they were flown out. But this is a great day! Graduation of the first class of Vietnamese air-evacuation medics!"

They knelt to take the oath. Their pennant carried the name of T/Sgt. James E. Ellis from California, who was mortally wounded as he gave artificial respiration to a Vietnamese. General Rowland was proud. "When you look at these boys, how can you be pessimistic?"

Then I met the Venerable Tam Chau, the head of the Buddhist Institute for Secular Affairs (page 837). His optimism took a different tack.

"In Saigon," he said, "the people live calmly, but in the countryside they fear for their lives every day." He had just visited central Viet Nam. In one week, he said, VC attacks there—and also the strafings and bombings by government forces—had brought death to some 4,000 men, women, and children.

Four thousand South Vietnamese? Out of 14,500,000 in the country? In the United States, with its 193,000,000, a disaster of the same proportion would mean 53,000 killed in one week alone.

"The war must end soon," said the Venerable Tam Chau. He was confident that the end would come within a year.

Dinh, who was with us, agreed and quoted Confucius: "When difficulties are greatest, the solution is closest."

Dean Rusk, the United States Secretary of State, had said that not until the Viet Cong and their North Vietnamese allies stopped

their aggression could South Viet Nam be at peace. But would the Viet Cong stop?

On my last day in Saigon I visited the sage Sieu Hoan. He was a master of geomancy, the Taoist science of adapting to one's surroundings to best advantage. Clues to the future, he said, could be found in Saigon's geography.

I had heard that the name Saigon meant "the place of the boxwoods."

"Yes," he said. "But it also has another meaning." He showed me two Chinese characters: "In Cantonese, *Tsai Con*, roughly meaning 'given to the Westerners'—as a vassal gives tribute to his ruler. In 1862 the French demanded a place to settle, and the Vietnamese deliberately gave them a bad spot. Look."

He unrolled a map and pointed to the curve in the Saigon River (map, page 839). "This curve is like a pair of arms, in supplication—Saigon in supplication to the countryside across the river." No regime, he added, Vietnamese or foreign, could last more than ten years in Saigon. The dictatorship of Ngo Dinh Diem had lasted nine and a half.

Hadn't the French lasted nearly 100 years?

"Yes, because they also had Hanoi, an excellent spot, to counterbalance Saigon."

What if a bridge were built, and the city expanded right over the unfortunate river curve? "That would help. But remember, the forces of nature do not determine everything. Human forces must play a role also, in harmony with nature. Good things happen when human forces reflect high moral virtue."

"Men Get What They Deserve"

I still had doubts. Hadn't the Viet Cong just attacked the village chief in that good place across the river, 500 yards from my hotel?

The sage Sieu Hoan looked at me patiently.

"Suppose a man receives a ton of silver. But his virtue does not deserve that much. He deserves only 100 pounds. What will happen when he gets a ton? He will be crushed. Men get what they deserve."

The dark walls displayed poems in Chinese and a picture of Kinh Duong Vuong, the king who supposedly ruled the Vietnamese about 5,000 years ago; also pictures of Buddha and of Christ.

"We must harmonize many schools of thought," said the sage Sieu Hoan.

I went out into the bright sun, wondering. Perhaps harmony would come to Saigon after all, and good things to all Viet Nam. What people could deserve them more?



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Thanks to good equipment, it was easy. I used a Honeywell Pentax H3v camera fitted with an accessory 200mm Takumar lens for this shot. Because it's a single-lens reflex, and because of the superior Pentax viewing system, I was able to compose my picture knowing that I'd get on film exactly what I saw through the viewfinder.

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Shelburne Museum

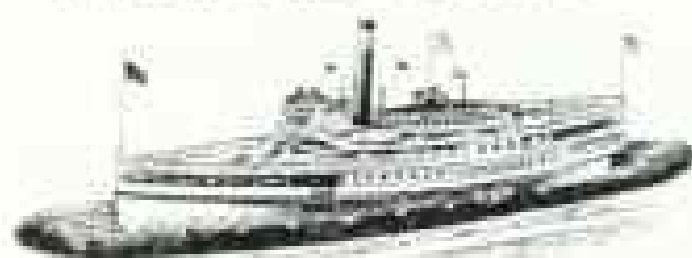
Shelburne 15, Vermont
(Route 7 near Burlington)

“It is the Museum of the American Spirit!”

Three centuries of American Life in New England. 35 buildings on 45 acres. Furnished houses, Sidewheeler TICONDEROGA, Webb Gallery of American Art, Country Store, Apothecary Shop, Stage Coach Inn, Meeting House, School, Blacksmith Shop, Hunting Lodge, R. R. Station, private car, engine. Exhibits of coaches, carriages, dolls, toys, decoys, folk art, tools, rugs, quilts, pewter, china. Spack Bar and Picnic Area. Write: Illustr. Folder.



Open Daily 9 to 5
May 25 thru October 20





Excitement for charter: join the happy crew in Bermuda!

Perhaps you cannot *buy* happiness. But here in Bermuda you can *rent* it by the hour, day, or week. There is nothing like sailing with friends under azure skies for banishing those home-grown cares.

You'll love these sparkling waters: reef-guarded, breeze-blessed, deep blue. You can cruise them for less than \$20 a day in a Firefly, Snipe, or O'Day Sailer. A Sunfish or Corvette is less. You may even see a race of the unique Bermuda Fitted



Dinghy, one of the trickiest rigs ever perpetrated on an unwary sailor.

Bermuda's Gulf Stream setting brings other joys. Like "coves for two" with the pinkest sand you ever basked on. You can dive below the

water and meet the bizarre life of the coral reef. Or skim above it on water skis, in hired motor boats, or aboard a sight-seeing cruiser.

If you're a golfer—our seven spectacular links await you. Bring tennis racquets and fishing gear (or rent them here.) Our deep-sea and reef fishing are famous, and less expensive than you'd guess.

Idea—why not bring the family? You'll enjoy exploring British Bermuda, from ancient Fort St. Catherine to Gibb's Hill Lighthouse, from 17th century St. George to shimmering crystalline caves. Evenings leave the children with a trustworthy Bermuda nanny and dance 'til the wee hours. Next morning, sleep late, brunch on the terrace

while the children splash in the pool.

So near to home, so faraway! Only 90 minutes flying time from eastern cities, an hour farther from the Midwest and Canada. Or a lazy weekend cruise by ship!



You'll find fabulous bargains here in spirits, clothing, and perfumes.

Accommodations tailored to your dreams: posh resort hotels. Smaller, more intimate hotels. Cottage colonies on the beach. Unique Bermuda guest houses, friendly and informal.

See your travel agent soon. Or write Bermuda, 620 Fifth Avenue, New York 20 • 6 North Michigan Avenue, Chicago 2 • 111 Richmond St., West, Toronto.



Having trouble with weight control?

The Special K Breakfast is for you. Only 240 calories. Good in protein. 99% fat-free. Tastes fine, day after day.

THE SPECIAL K BREAKFAST

4 ounces of orange or tomato juice
—or half a medium-size grapefruit

1-ounce (1½ cups) Special K
with 1 teaspoon sugar

4 ounces skim milk

Black coffee or tea

(Only 240 calories)
(Only 0.62 grams of fat)

The Nutrition Story of Kellogg's Special K

One serving of Special K (1½ cups with ½ cup skim milk) supplies 14% of the recommended daily protein allowance for an adult man, and approximately these percentages of his minimum daily requirements as established by the Food and Drug Administration:

Thiamine (B ₁)	44%
Riboflavin (B ₂)	60%
Niacin	51%
Vitamin C	38%
Vitamin D	50%
Calcium	22%
Phosphorus	22%
Iron	24%



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This is the weight control breakfast you can live with, month after month.

Glance again at the picture. Appetizing, isn't it? The Special K Breakfast is a normal, natural meal.

And in spite of its modest calorie count, it starts your day with a heaping helping of nourishment: Complete quality protein. Important vitamins and minerals. And energy to get you going.

A sensibly nutritious breakfast like this can en-

courage you to eat sensibly at lunch and dinner.

Key to the success of the Special K Breakfast is a uniquely delicious cereal: Kellogg's Special K. Besides being exceptionally high in protein, and low in fat, it has a flavor you'll relish every time you sit down to it.

Kellogg's Special K has become an important part of breakfast with millions of people.

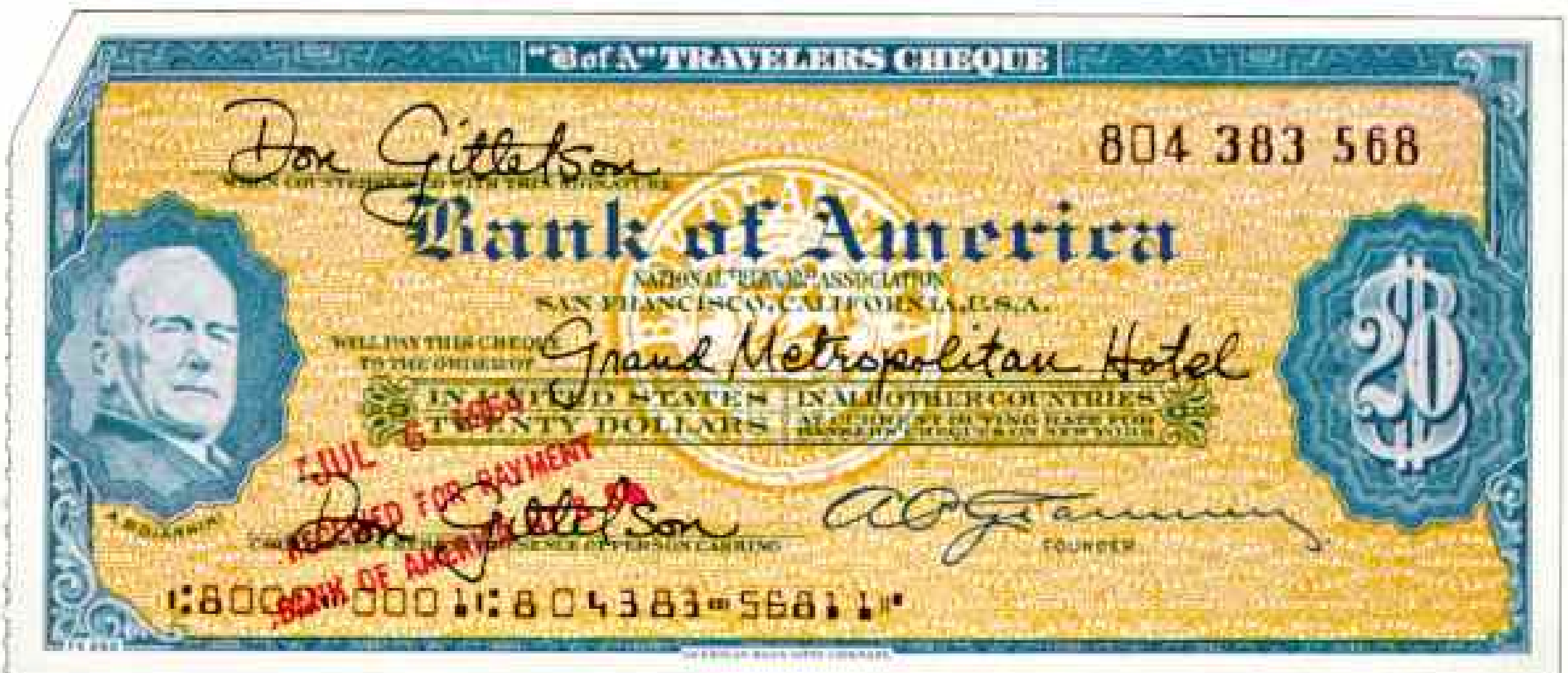
Don't you think it deserves a place on your table?

"The best to you each morning"
Kellogg's SPECIAL K



The shilling is local currency in England.

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In London or Lima — or Lincoln, Nebraska — Bank of America Travelers Cheques are as good as cash. And they're safer to carry because a money-back guarantee assures you of prompt replacement anywhere if your cheques are lost or stolen. Whenever you travel, carry money only you can spend — **BANK OF AMERICA TRAVELERS CHEQUES.**

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**take
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Take an extra carton of Coke!

things go
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