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THE NATIONAL GEOGRAPHIC MAGAZINE

DECEMBER, 1956

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Seventy-two Pages of Illustrations in Color

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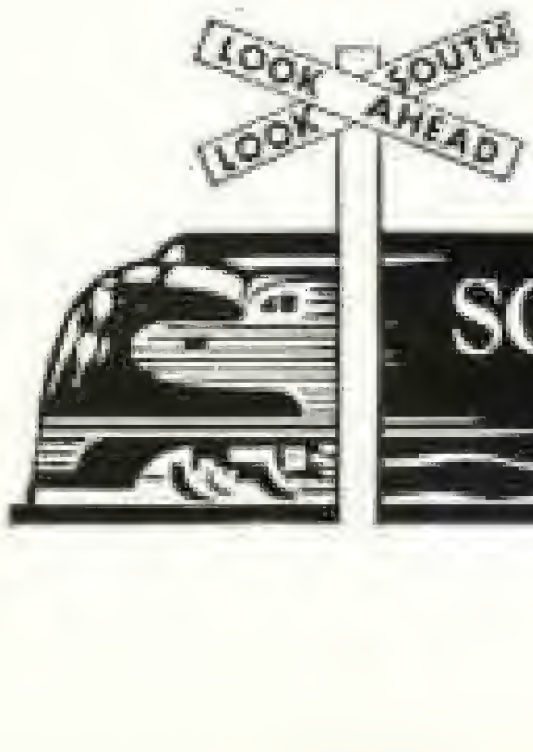

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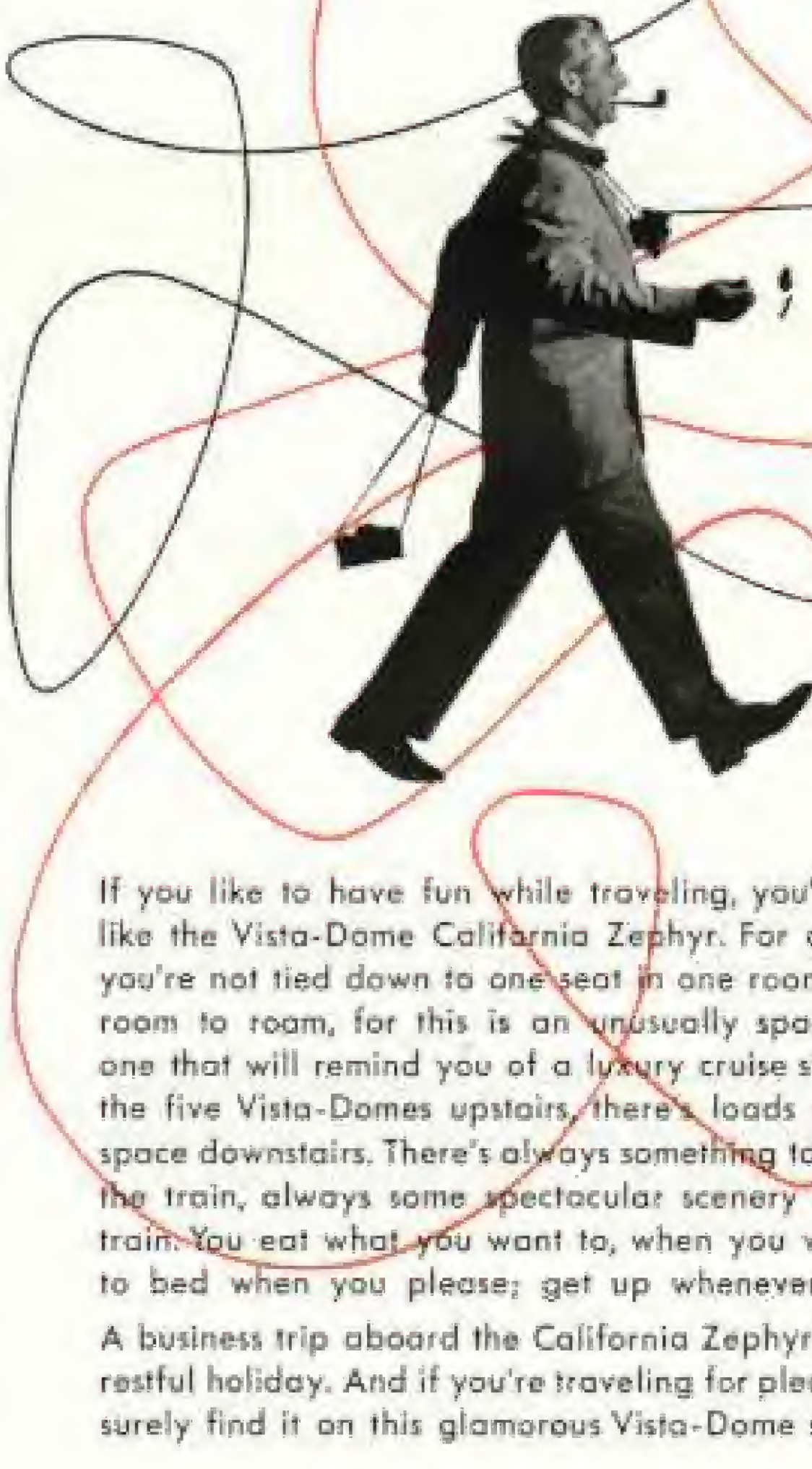

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2. Broaden your horizons as you grow older. "Mental adventure," whether it be in absorbing hobbies or in activities devoted to helping others, will stand you in good stead during your leisure years. "To learn what is new is to remain young."

3. Take stock of your health. Complete medical check-ups annually after you are 35 or 40 can help assure you a healthier life in your later years. Not the least of the benefits which you will get from regular visits to your doctor is medical advice about what you should and should not do as you get along in years.

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Look at the older people around you who have mastered the art of growing old gracefully. Find out what they have done to achieve health and happiness in the sunset years. You may learn a lot that will help you. Indeed, you may live to echo the sentiments of an 80-year-old man who said, "I'm not 80. I'm just 4 times 20!"

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VOL. CX, NO. 6 WASHINGTON DECEMBER, 1956

THE NATIONAL GEOGRAPHIC MAGAZINE

Jerusalem to Rome in the Path of St. Paul

BY DAVID S. BOYER

Foreign Editorial Staff, National Geographic Magazine

With Illustrations from Photographs by the Author

As a special Christmas supplement, the National Geographic Society presents a new ten-color map of the cradle of Christianity and adjacent lands of the Near East. Entitled "Lands of the Bible Today, with Historical Notes," it projects thousands of years of history against a modern geographical background.

To help bring the map to vivid life, The Society sent writer-photographer David S. Boyer to trace the 12,000-mile trail of the Apostle Paul—most ardent traveler of his time—and to record with a color camera the scenes Paul knew.—The Editor.

WHEREVER St. Paul traveled to preach the gospel 1,900 years ago, he trod Roman roads or took passage in ships on a Roman sea. In the far-flung empire of the Caesars, he had no national boundaries to cross. He carried no passport and needed no visas.

Today it is literally impossible to pursue the precise route of St. Paul. Except under a flag of truce, no one crosses the Jordan-Israel no man's land without taking his life in his hands. For eight years the ordinary pilgrim or sightseer has been unable to move freely from one side of divided Jerusalem to the other. Instead of walking a few feet to visit the other side of the city, I had to detour 650 miles by way of neutral Cyprus, itself a bomb-wracked trouble spot.

Paul's Story Starts in Jerusalem

Where Paul walked in an empire united under the Pax Romana, I crossed the borders of nine countries on my way from Jerusalem to Rome. Once my cameras were confiscated temporarily, and I had to talk all afternoon to convince a suspicious general that my mission was really the peaceful one of following and photographing the route of the Apostle.

In search of the footsteps of St. Paul, I went first to St. Stephen's Gate, in the Arab sector of Jerusalem. It was Palm Sunday, and a procession of devout Christians shuffled past me into the Holy City. Endlessly they streamed beside the stepladder that raised my camera over the heads of a silent, watching crowd (page 711).

Gate Named for First Christian Martyr

Imagination pictured a far different scene—the stoning of the first Christian martyr, Stephen, for whom this gate is named. A member of the mob bent on Stephen's death was a young man bearing the Hebrew name of Saul, but known to his Greek and Roman friends as Paul, for he was a Roman citizen as well as a Jew. As a young rabbinical student from Tarsus, Saul had come to Jerusalem to study the religion of his fathers.

Stephen was a convert to what was still, at that time, only a small sect of Judaism. The new faith was spreading—it had perhaps 5,000 followers in Jerusalem—but it was

"Tarry Ye in . . . Jerusalem, Until Ye Be Endued with Power from on High"—Luke 24:49

One of those who may have stood on a hilltop contemplating Jerusalem after the Crucifixion was a young Jew, Saul of Tarsus, later known as Paul. At first a persecutor of Christians, Saul became a convert, spreading the new religion through much of the Roman Empire. During his lifetime Christianity developed from a small Jewish community into a widespread faith. The command quoted above was Jesus' last to His disciples.

709

Israel and Jordan Divide the Holy City; This Arab Surveys It from His Side

The seventh-century Dome of the Rock dominates the city's skyline (page 715). In its place 1,900 years ago, Paul would have seen the Temple built by Herod the Great. Possibly he pondered on Jesus' prediction: "There shall not be left one stone upon another." A few years after St. Paul's death the Romans destroyed Jerusalem and the Temple. Here, outside the Old City's wall, the village of Silwan overlooks the Valley of Kidron.

meeting angry opposition from those who believed it threatened the established religion.

Haled before the Jewish governing body, the Sanhedrin, Stephen was accused of blasphemy. In the tumult stirred by an impassioned speech in his own defense, he fell into the hands of an angry mob.

"Then they cried out with a loud voice, and stopped their ears, and ran upon him with one accord, And cast him out of the city, and stoned him: and the witnesses laid down their clothes at a young man's feet, whose name was Saul.

"And they stoned Stephen. . . . And he kneeled down, and cried with a loud voice, Lord, lay not this sin to their charge. And when he had said this, he fell asleep. And Saul was consenting unto his death" (Acts, 7:57-60; 8:1).

Thus Paul, the Apostle to the Gentiles, who would carry the tidings of Christ across much of the Roman Empire, first appears on the world's stage as a persecutor of the Christian faith.

Second Crossing of Apostle's Path

Drifting away from St. Stephen's Gate with the Palm Sunday crowds, I crossed St. Paul's path a second time. About 400 yards away, in a vast courtyard, stands the Moslem Dome of the Rock. In the time of Christ, Stephen, and Paul, the courtyard surrounded the Temple built by Herod. Here the 12-year-old Jesus conversed with the teachers in the Temple, and here Saul studied Judaism under the famous Gamaliel (page 714).

In New Testament times a stone stairway joined the Temple area to the barracks, traditionally the Praetorium where the Roman procurator, Pontius Pilate, sat in judgment on Jesus. At the border of the courtyard of the Dome of the Rock I found the remnant of just such stairs. It may well have been on these very stones that St. Paul, toward the end of his life, was rescued by a Roman soldier from a mob that would have killed him as Stephen had been killed.

Paul had returned to Jerusalem after thousands of miles of travel, during which he established Christian congregations all the way to Athens and Corinth. He had returned to confer with leaders of the church, bringing with him Gentile converts from abroad.

Angry Jews accused Paul of defiling the Temple by taking Gentiles into its sacred inner confines. Paul stood on these steps to plead with his onetime friends. When they rejected him, he took refuge in his Roman citizenship. Arrested, he was sent to a prison in Caesarea on the Palestine coast and then to Rome to face trial.

Travels Total 12,000 Miles

In a sense, then, the dramatic story of St. Paul both begins and ends in Jerusalem. From here he went forth to punish Christ's followers in Damascus and drag them in chains to prison. After his miraculous conversion on the Damascus road, he made three long missionary journeys to preach redemption through Jesus. These and his fourth great journey, to Rome, are shown in an inset on the Bible Lands map. His known travels totaled some 12,000 miles, and he and his missionary colleagues transformed Christianity from a small Jewish sect into a world religion.

In a lifetime of traveling, Paul returned to Jerusalem time after time, moving freely across what are now guarded frontiers. I planned to visit first the places on the Jordanian side of Jerusalem that are traditionally associated with St. Paul. Then I would set out to follow his path across the vast areas of his mission, backtracking from Cyprus to find his steps across Israel's portion of the Holy Land.

The modern pilgrim who tries to trace Biblical history in the Near East faces another problem almost as formidable as barbed wire and border guards. Many of the holy places are located not by archeology or trustworthy landmarks, but only by tradition. And tradition is often vague and contradictory.

St. Stephen's Gate itself, for example, may not mark the true location of the stoning

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Page 711

"People . . . Took Branches of Palm Trees, and Went Forth to Meet Him"—John 12

In the climactic last week of His life, Jesus entered Jerusalem in triumph. But after the Crucifixion His followers were persecuted. One tradition says that St. Stephen, the first Christian martyr, was killed near here; the gate bears his name.

Paul, the future Apostle to the Gentiles, entered history during the last moments of the martyr's life. The Bible relates that those who stoned Stephen laid down their clothes at Saul's feet, and "Saul was consenting unto his death."

Here on Palm Sunday the Latin Patriarch of Jerusalem, in bright biretta, walks in procession through St. Stephen's Gate. Spectators form a living frieze above the arch. Mount of Olives shows through the span.

"I Am Verily . . . a Jew . . . Brought Up in This City at the Feet of Gamaliel"—Acts 22:3

Addressing Jerusalemites late in his life, St. Paul recounted his boyhood. He had studied in the Holy City under the learned Gamaliel. Often, as a student, Saul must have sat as these boys do about their rabbi, being "taught according to the perfect manner of the law of the fathers."

The youngsters study in the Israel sector of Jerusalem at the General Talmud Torah Schools and Grand Yeshiva Etz-Hayim. Founded in 1843, the orthodox school is one of the oldest religious institutions in Israel.

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of Stephen. Damascus Gate of the Old City was also once named for St. Stephen.

Halfway up Mount Zion I found a second contradictory tradition about St. Paul.

Outside the Holy City's wall stands the ruin of a long stone stairway, laid down in Old Testament times. Jesus may have climbed it, and so may Saul, up Mount Zion. Halfway to the top is a church called St. Peter in Gallicantu. It means "St. Peter at the crowing of the cock" (page 720).

Where St. Peter Denied Christ

It was here, in the opinion of Catholic Assumptionist Fathers, that Christ was interrogated in the House of Caiaphas, the high priest. Here, the Assumptionists say, Caiaphas questioned Jesus on the fateful Thursday night before He was led to Pontius Pilate for judgment.

Simon Peter, the Galilean fisherman who was the first of Jesus' disciples, loitered about the palace through the night. Pretending to be only a curious bystander, he tried to learn what was happening to his Master. Three times before the crowing of the cock at dawn, he denied knowing Jesus. Peter's beloved Teacher Himself had predicted it would be so.

Farther up the hill, atop Mount Zion and not far from the traditional tomb of King David, stands the Armenian Monastery of the Holy Saviour. Here, others claim, is the true location of the House of Caiaphas. But it stands deserted in no man's land, and I could not visit it.

I was thus saved the problem of choosing one site in preference to the other. For unless you are an archeological scholar, you make these choices largely on the basis of how the actual settings agree with the way you imagine them.

It was not difficult, then, for me to think that Saul had climbed this stairway up Mount

Zion. He would have come here to take from the hands of the high priest his authority for casting into prison those Jews who believed Christ was the Messiah.

After having taken part in the stoning of Stephen, Saul, like a madman, "made havock of the church, entering into every house, and haling men and women committed them to prison" (Acts 8:3).

"And Saul, yet breathing out threatenings and slaughter against the disciples of the Lord, went unto the high priest, And desired of him letters to Damascus to the synagogues . . ." (Acts 9:1-2).

Saul Sets Out for Damascus

What Saul wanted of Caiaphas was a warrant to raid the large Jewish congregation in the city of Damascus. He would search out those who had accepted the teaching of Jesus and return them in bonds to Jerusalem for judgment.

Armed with this authority, Saul set out from Jerusalem, probably accompanied by guards placed at his service by Caiaphas. Which road he took to Damascus, nobody knows. He could have avoided the desert heat by following the hills north toward Nazareth, then traveling up the River Jordan from the Sea of Galilee and past snow-crowned Mount Hermon.*

Jordanian border guards would bar me from following this route, so I flew to Damascus instead. After my plane took off from the wavy runway of Jerusalem's airport, it headed eastward above Jordan, giving Israel a wide berth. I tried to follow from the air the way Saul and his cohort of persecutors would have taken.

A springtime haze defeated my straining eyes. The hills blurred in the vapor. The Sea of Galilee emerged, a smear of dull aluminum, from the purple mass of Galilean hills. Down there Israel fishermen would be mending nets for another night of work on the lake they call Kinneret; I knew, for once I had gone fishing with them.

Perhaps Saul stopped at Lake Kinneret to buy fish for his men. Ironically, he and his band may have dined on the same fish that would later be called St. Peter fish, after Christ's first disciple.

From Jerusalem to Damascus is but three inches on the Bible Lands map—yet the conversion of Saul in the course of this journey was destined to change the world. Saul had now only a little time and a short distance to go before the light would strike. What was he thinking, I wondered, during those last few hours?

Was he impatient to hear the screams of those he would drag away to prison from Damascus? Or was he haunted by the faces

* See "The Geography of the Jordan," by Nelson Glueck, National Geographic Magazine, December, 1944.

Islam's Dome of the Rock Stands on the Spot Where Solomon and Herod Built Temples

It was here, according to tradition, that Abraham prepared to sacrifice Isaac. From such courts Jesus drove out the money-changers. This mullah instructs Moslem businessmen atop a building overlooking the temple area.

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"Go, Stand and Speak in the Temple . . . All the Words of This Life"—Acts 5:20

The Apostles' obedience to this divine command won many to faith in Jesus, but spurred Saul to persecute His followers. Later, as Paul the Apostle, he himself was mobbed in the Temple because of his Christian beliefs.

Notwithstanding their persecution, the earliest Christians gathered in the city's streets and alleys to discuss Jesus and the Apostles.

These Jordanians talk of the uneasy armistice prevailing in the Holy City today. A no man's land watched by riflemen separates them from the Israel sector.

of those in Jerusalem who had steadfastly refused to deny Jesus? As he passed through Galilee, was he remembering all that he knew about the Messiah from Nazareth?

"And as he journeyed, he came near Damascus: and suddenly there shined round about him a light from heaven: And he fell to the earth, and heard a voice saying unto him, Saul, Saul, why persecutest thou me? And he said, Who art thou, Lord? And the Lord said, I am Jesus whom thou persecutest . . ." (Acts 9:3-5).

When the vision ended and Paul stood up, he was blind. Friends led him by the hand to Damascus. This was the great event of his life; as a result, he became an Apostle of Christ.

New Buildings Climb Damascus Slopes

We landed at Damascus airport, and I drove into the city, possibly passing on the road the unknown place where Saul had his vision.

The capital of modern Syria has expanded far beyond the Roman walls of Saul's day (page 724). Handsome new apartment buildings climb like steps up the mountainside. Each succeeding balcony boasts a grander view than its neighbor below.

Still, a great deal has remained unchanged within the ruined walls of the old city.

When Saul came here, there were no people called Christians. There were Jews who believed that Jesus was the Messiah. They attended the same synagogues as the rest. They observed the same Jewish law and ritual. Only in their faith that Jesus was the Christ, the Lord's Anointed, and in their communal meals commemorating those Jesus shared with His followers, did the believers differ.

Today, in the predominantly Moslem old city, the Jewish and Christian quarters are side by side, occupying much the same area as did the Jewish quarter in Roman times.

In shops of Christian merchants I met Jewish artisans busy with chisels and mallets, designing and cutting the silver-inlaid brassware the tourist buys so eagerly—only to wonder later whether the giant tray looks as

← *"And He Reasoned in the Synagogue Every Sabbath"*—Acts 18:4

The scattering of the Jews began centuries before Christ. Alexander the Great's good roads and new cities spurred the movement. As a Jew, Paul was welcomed to Jewish houses of prayer, where he created many Christian congregations.

Here in Safad, Israel, Orthodox Rabbi Samuel Gurenbaum of New York reads a prayer book in the Rabbi Isaac Luria synagogue, one of Israel's oldest. Its Ark of Holiness houses the Torah, or first five books of the Old Testament.

↓ **Good Samaritans Exist to This Day**

As persecution continued, many Christians fled Jerusalem. Philip, a deacon of the early church, carried the story of Jesus to the Samaritans.

Members of a Hebrew sect, the once-powerful Samaritans have dwindled to some 300 individuals. They believe that only the first five books of the Bible have divine inspiration. Here, in the Samaritan synagogue at Nablus, Jordan, High Priest Amran Ishak (left) and his assistants show ancient parchment scrolls of the Torah.

romantic in Des Moines as it did in Damascus.

The Jewish and Christian quarters flank the Street Called Straight, *Vicus Rectus*, the Roman highway that still slices the old city in two. My Arab guide called it Suq et Tawil, the Long Bazaar, for the street is lined today with a parade of little shops selling brassware, Persian carpets, Damascus brocades, furniture inlaid with ivory and mother-of-pearl, and a host of items for everyday living.

Ruins of one of the street's Roman arches have recently been excavated and reconstructed. Beneath it I watched a curious, un-Roman-like procession (page 723).

Boys on bicycles dodged men on donkeys. Poor pedestrians shuffled along in sandals made from castoff automobile tires; more fortunate townsmen wore fine ornamented slippers. Creaking horse-drawn carriages competed with gleaming new American cars for the tourist traffic. Occasionally a camel, foaming at the mouth, would come humping along this venerable highway.

It was here that Saul was led after his vision on the road. Taken to the house of a man named Judas, Saul passed three days without sight, without food or water. His spirit was still in turmoil after the tremendous collision between the man who was Saul the persecutor and the man who was to become St. Paul the Apostle.

Apostle Escaped in a Basket

From a near-by house came the disciple Ananias. He too had received a vision, directing him to where Saul lay. Ananias placed his hands on Saul and restored sight to his eyes. Saul rose and was baptized in the new faith.

Today a little underground chapel occupies what some believe to be the site of the home of Ananias (page 725).

When Saul became a turncoat, his former friends hatched a plot to do away with him. He was forced to escape the city by night. His new friends among the believers lowered him from the wall, for the gates were watched. A recent restoration purports to show the kind of window in the Roman wall from which Saul was let down in a basket.

The window may be near the actual spot of Saul's dramatic flight. But it opens directly over a gate, a poor place to escape if the gate was guarded.

Many observers have knowingly pointed to houses of the old Jewish quarter built into and atop the present wall. From one of these inconspicuous windows I could easily imagine an escape more likely to succeed.

But in Damascus I met a Syrian University history professor who refuted this idea.

"Rome's walls," he said, "were built for defense. The untamed marauders of the desert were near at hand. Can you imagine the Romans allowing houses along the top of the wall? St. Paul's 'window' must have been one of the openings in the crenellated guard walk."

Retreat to the Desert

At this point there is a hiatus in the history of St. Paul. The Apostle tells in a letter written years later that he "went into Arabia," perhaps into the wilderness (Galatians, 1:17).

He may have needed time to be alone, after the overpowering experience of his miraculous conversion, to gather strength for the new dedication that lay before him. He fled, some think, into the desert.

His path could have led into the realm of the Nabataeans, rulers of the desert from Damascus southward into present-day Saudi Arabia. Some writers have conjectured that Saul went to Petra, the Nabataean capital south of the Dead Sea.

I recalled an earlier trip I had made into the wild rockiness of Petra.* To just such a place Saul might have gone. There, his reputation unknown, he would have found a welcome among the little colony of Jews in the pagan Nabataean stronghold.

He would have worked, for Saul had learned weaving as part of the tentmaker's trade when a boy in Tarsus. As he sat at his loom in the semidarkness of a cave, his hands would have made the shuttle fly from side to side. His thoughts, meanwhile, would have outdistanced the shuttle.

At night, when work was done, he could have climbed to some rocky ledge (page 726). Avoiding those high places where pagan rites were performed in worship of a sun god, he could have communed with his own God of Israel and with Jesus, his Redeemer.

For a moment, Saul appears again. He joins the Apostles in Jerusalem, preaching in the name of Jesus. But again he is threatened. The Apostles decide that wisdom is

* See "Petra, Rose-red Citadel of Biblical Edom," by David S. Boyer, NATIONAL GEOGRAPHIC MAGAZINE, December, 1953.

Church of St. Peter in Gallicantu Claims the Site of Christ's Interrogation

Assumptionist Fathers of Jerusalem believe this spot held the house of the high priest, where Jesus was charged with blasphemy. In that house Saul, "breathing out threatenings ... against disciples of the Lord, went unto the high priest, And desired of him letters to Damascus ... that ... he might bring them bound unto Jerusalem."

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Jesus Said, "*Before the Cock Crow, Thou Shalt Deny Me Thrice*"—Matthew 26:34

Gallicantu (Latin for cock's crow) commemorates Peter's repentance in Caiaphas's courtyard. The site was noted by a French pilgrim in the year 333. The original St. Peter's Church rose some 100 years later, perhaps on this spot. Here a Latin priest celebrates Mass in a grotto beneath the 20th-century church.

the better part of valor. They send him back home to Tarsus, and once again Saul disappears from view.

Modern Beirut, a World Crossroads

From Damascus I drove to Beirut, Lebanon's capital. The city is not mentioned in the Bible, but St. Paul must have known it as a thriving Roman port. Today it is a crossroads of world airways and a doorway to a cool mountain retreat for vacationers from all corners of the parched Near East.

High on a mountain ridge overlooking Beirut and the Mediterranean coastal road that Paul walked in his early travels, I found a glowing tribute to the Apostle.

Near the mountain village of Harissa, east of Junive, perched like an eagle's nest on a crag, rose the vaulted concrete framework of a church to be dedicated to St. Paul. When the Catholic Missionaries of St. Paul muster funds to complete it, its sparkling amber stonework will flash a welcome to the eyes of pilgrims miles away.

Syrian Father Superior Paul Ashar invited me to see the sunrise from this partially completed aerie. In the convent beside the church

(Continued on page 731)

"There Shined Round About Him a Light From Heaven: And He Fell to the Earth"

On the road to Damascus Saul "heard a voice saying unto him, Saul, Saul, why persecutest thou me? And he said, Who art thou, Lord? And the Lord said, I am Jesus ..." (Acts 9:3-5). This engraving depicting Saul's conversion comes from the rare Kitto Bible, a treasure of the Huntington Library in San Marino, California.

"Go into the Street ... Called Straight, and Enquire ... for One Called Saul"

➔Page 733: Blinded by the light from heaven, Saul was led into Damascus and lodged at the home of a man named Judas. It was here on the Street Called Straight that Ananias, directed by a vision, sought out Saul and restored his sight (Acts 9:11-18).

In those days the street cut a mile-long, 100-foot-broad swath across the city. Chariots and horsemen swept along a roadbed lined with columns.

Motor, donkey, and foot traffic crowds this narrow descendant of the Roman road. The arch is a restoration.

↑ **A Syrian Gazes Out over the Rooftops of Damascus, Where Paul Came *"And Straightway . . . Preached Christ"***

Snow-streaked Mount Hermon keeps watch over the world's oldest continuously inhabited city. Moslems believe the head of John the Baptist rests in the Omayyad Mosque supporting the Mohammed minaret (right).

↓ **Chapel of Ananias Pictures Paul's Escape (Acts 9:23-25): *"Disciples . . . Let Him Down by the Wall in a Basket"***

A Franciscan father in Damascus shows paintings of Saul's conversion (right) and flight. Legend says the helmeted guard (left) was slain for abetting the escape; Christian Damascenes venerate him as St. George of Abyssinia.

Jagged Sandstone Cliffs Wall a Passage to Jordan's Rose-red Citadel of Petra

Here in Saul's time desert merchants lived amid temples and tombs carved from living rock. This visitor, making a motion picture, trains his camera toward the distant city.

"I Conferred Not with Flesh and Blood . . . but I Went into Arabia"—Galatians 1:16-17

Fleeing Damascus, Saul dropped from history for a time. He may have secluded himself in desert wastes like these canyons radiating from Petra, capital of the ancient Nabatean kingdom.

"These Hands Have Ministered unto My Necessities," **Spoke Paul in Acts 20:34**

Saul was born a Roman citizen, a fact that argues his parents were well to do. Nevertheless he was taught the tentmaking trade as a youth in Tarsus. Time and again the skill made the difference between food and want on the Apostle's missionary journeys. Furthermore it proved an example to his disciples, for, as Paul explained, "I have shewed you all things, how that so labouring ye ought to support the weak." Taking the Apostle's word as command, today's Missionaries of St. Paul teach students to use their hands at a trade school at Juniye, Lebanon. This young man, operating a sanding machine, polishes concrete-and-marble tiles for flooring.

For about a decade Saul may have preached at Tarsus, his birthplace, possibly while supporting himself as a tentmaker. Perhaps he worked with weavers such as these two, who thread warp yarn for a loom in the Çukurova cotton mill. Largest in Tarsus, Turkey, the plant produces some 27,000 yards of finished cloth a day.

"Whosoever Drinketh of the Water That I Shall Give Him Shall Never Thirst"—John 4:14

Jacob's Well at Nablus, Jordan, still refreshes thirsty travelers. Jesus asked for a drink here from the Samaritan woman before offering her everlasting life. Saul may have passed this way going from Damascus back to Jerusalem.

we had a typical Holy Land breakfast: olives, cheese, green onions, radishes, and fried eggs. As we ate, Father Ashar told me about the St. Paul Missionaries.

"St. Paul, as you know, was a manual laborer," he began. "Wherever Paul went, he earned his own way as a weaver and tentmaker. Nearly always he refused money offered by his church members.

"We take our cue from him. In this part of the world that so badly needs men skilled with their hands, we are trying to do our part. Here and in Juniye we employ 250 young men from Lebanon and countries around us. We teach them to be carpenters, electricians, printers, stoneworkers, makers of tile (page 728). Presently we are going to build a fine new building and expand our activities."

Presses Print Books in Many Tongues

Father Ashar showed me an enormous print shop where presses were turning out all manner of publications, including books illustrated in color. A dozen workers, disdaining the linotype, were setting type by hand, for one of the primary purposes is to employ more hands.

"They can set type for you in Latin letters, or Greek, or Arabic. These boys come from many religions, and we do not press Catholicism upon them. Our church will be open as a sanctuary of prayer to everyone. St. Paul, you may remember, was a believer in unity. Even though he did so much to separate Christianity from Judaism, he always wished it could have been otherwise."

Page 730

← **Antioch: Here "*Disciples Were Called Christians First*"—Acts 11:26**

When a small Christian community grew up in Antioch, the mother church at Jerusalem sent Barnabas there to preach. "Then departed Barnabas to Tarsus, for to seek Saul: And when he had found him, he brought him unto Antioch." The two arrived about A.D. 45. From Antioch Paul made three great missionary journeys (see inset on supplement map, Lands of the Bible Today).

Antioch at that time was the world's largest city after Rome and Alexandria. Gay, witty, and luxury-loving, it covered the plain beside the Orontes River (center). A marvelous system of aqueducts carried water through marble streets to sumptuous villas, public baths, fountains, race tracks, music halls, and theaters. By night thousands of lights glinted like a moonlit sea.

This Turkish town, now called Antakya, shares nothing but the river and a fraction of the site with its illustrious predecessor of the first century. The shepherd tends his flock on the side of Mount Silpius.

St. Paul had visited the Christian congregations of Sidon and Tyre in old Phoenicia. I followed the coastal road southward and photographed the fishermen of Sidon, the present-day Saida (page 742). To Sur, Tyre's successor, I could not take my cameras. Standing close to the Israel border, it lay in a restricted military zone.

Israelis Live with Gun at Hand

Now, having completed my tour of Arab lands, I flew to Israel via the British Crown Colony of Cyprus.

An old friend met me at Israel's busy Lydda airport, between Tel Aviv and the Jewish sector of Jerusalem. I noticed that he was carrying a gun. We waited at the airfield till daylight, for night attacks across no man's land are still not uncommon in this troubled part of the world.

I could not take time to examine many of the wonders of modern Israel. But in 1956 one cannot even speed across this misshapen patch of land without whistling in surprise.

King David and King Solomon, in all their glory, would stand enthralled in the lobby of an Israel luxury hotel or before the singing machinery of some impressive new industry. Simply to gaze across the green irrigated countryside is a revelation. Hundreds of modern settlements dot the land. Forests spring up where before were barren hills.

On the Israel coast I pursued St. Paul to the ruins of Caesarea. Here, after his rescue from the mob on his final visit to Jerusalem, the Apostle spent two years in the custody of the Roman governor, Felix. Finally Paul, as a Roman citizen, appealed to Caesar and was sent to Rome for trial.

The lavish marble city of Caesarea was built and fawningly dedicated to Caesar Augustus by King Herod the Great. During my visit it was undergoing excavation by the Israel Department of Antiquities. Much of Herod's marble, however, was already gone; an 18th-century Turkish pasha named Ahmed al-Jazzar had beaten the archeologists to it.

In near-by Acre I saw some of the marble decorating Ahmed's mosque (page 755). It may have come from Herod's palace, where Paul lived as a prisoner. More of it lined Ahmed's extensive Turkish baths, still in use until 1947, when they were damaged by terrorist dynamite. They now serve the city as a rather unusual museum.

↑ **Greek (Left) and Turk Mend Fishing Nets in Cyprus**

In Paphos the Roman proconsul called Barnabas and Saul to preach "the word of God. But Elymas the sorcerer . . . withstood them." Saul called on the Lord to strike the man blind, and the official was converted. Henceforth Paul was known by his Roman name, rather than by the Hebrew Saul.

↓ **Cypriote Priests Paint Icons in a Salamis Monastery**

Cyprus tradition says Barnabas, Paul's companion, was buried on the island with a copy of the Gospel of St. Matthew. This fresco depicts the discovery of the saint's tomb in the fifth century (left). At center the Gospel is presented to Emperor Zeno of Constantinople. Icon at right shows a crowned Barnabas.


ΖΗΝΩΝ Ο ΒΑΣΙΛΕΥΣ
ΕΔΑΠΕΝΗΣΕ.
ΑΛΕΞΙΑΔΗΣ
ΒΑΡΝΑ

Cyprus was in a state of turmoil when I returned to the island on the trail of St. Paul. Captured rebels were penned behind barbed wire, and roadblocks, searches, and curfews were the order of the day.

Among the Greeks of Cyprus, outnumbering Turks by at least four to one, there was violent agitation for union with Greece.

Scrawled on the whitewashed walls of mud-brick houses were slogans of the EOKA, an organization of bomb-throwing rebels. By violence they hoped to force Britain to abandon Cyprus.*

Great Britain's reply was to declare a state of emergency. At a roadblock I silently obeyed orders to leave my car, hoist my hands in the air, and submit to search. But I could not refrain, finally, from making a joking remark to the soldier. He immediately recognized my accent.

"I say!" he called out to his corporal. "This bloke's a ruddy American!"

"Blimey!" came the rejoinder. "'E must take 'is sightseein' seriously!"

Apostle's First Mission Leads to Cyprus

Cyprus was the scene of Saul's first recorded triumph. Here he addressed the heathen, pitting his God against their pagan deities. The island's Roman proconsul, Sergius Paulus, called Saul before him to hear the story of Jesus. Heckled by Elymas, a sorcerer, Saul called down the wrath of God, and Elymas was blinded.

Witnessing this first of Saul's miracles, the proconsul "believed." Saul's success here may have done much to spur him in his desire to preach the new religion to Gentiles as well as to Jews.

Saul came to Cyprus with his missionary colleague Barnabas. A native Jew of Cyprus, Barnabas had become a convert to the Messianic faith, probably in Jerusalem. He wanted to spread the belief in Jesus through the synagogues of his own land.

At Salamis, the commercial capital of the Roman island, they landed and preached among the Jews. Local legend has it that St. Barnabas, on a later mission here, was stoned to death and that St. Mark, young kinsman and constant companion of Barnabas, buried him outside the city, placing on his breast a copy of the Gospel of St. Matthew (page 733).

From the ruins of the great city of Salamis, slowly being exposed by the picks and shovels

"Thrice I Suffered Shipwreck, a Night and a Day I Have Been in the Deep"—II Corinthians 11:25

Page 735: In his account of the hazards and hardships of missionary work, Paul did not neglect the sea. In his day ships had no compasses and hugged unlighted coastlines in constant danger of hitting uncharted reefs.

Sailing from Cyprus to Asia Minor, Paul's vessel may have set its course on the snow-capped Toros Mountains (background). The Apostle could have landed here at Antalya, Turkey, a port known to him as Attalia. Later he sailed from this spot on his return to Antioch.

These boatmen unload steel for a new electric power line.

Lower: Trudging inland from the sea, Paul doubtless met nomads as homeless as himself. This gypsy father leads a dancing bear, the family's chief support, on a road near Avvalik, Turkey.

of Cypriote archeologists, I crossed the island to Paphos. On the way I passed through the rebels' alleged hide-out, the Troodos mountains. Their highest peak is Cyprus's Olympus, one of several in the classic Greek world named for the home of the gods and goddesses of Hellenic mythology.

There were other routes I could have driven to Paphos. But the mountain way was a forest ride of such primeval majesty that I should gladly risk it again, rebels or no.

Lightning over Mount Olympus

Through a writhing mist we climbed. At times we were sheeted in storm and cuffed by squalls of driving rain. Then the clouds dipped and swirled through the valleys to reveal Olympian views of blue-and-purple mountains lashed by jagged tongues of lightning. I thought I should be less surprised to come face to face with Zeus or Apollo than to meet a Cypriote rebel.

I wandered among the ruins of Sergius Paulus's provincial seat of Roman government at Paphos, and a few miles along the shore I watched the seafoam from which the mythical Aphrodite arose.

St. Paul, though he had grown up among heathen gods in Tarsus, must have been shocked at the pagan sex worship that surrounded this Greek Cypriote deity. And he would have sensed the yearning of many

* See, in the National Geographic Magazine: "Cyprus, Geography's Stepchild," by Franc Shor, June, 1956; and "Cyprus, Idyllic Island in a Troubled Sea," by Jean and Franc Shor, May, 1952.

thinking people for a more meaningful belief.

Saul nearly always went to the Jewish quarter of a new city on his mission route. There he found listeners whose moral concepts and background were one with those that had shaped the life of the Messiah from Galilee. At every synagogue Saul could be certain of a hearing. In accordance with Jewish custom, visiting teachers were always invited to speak (page 718).

At the synagogues he found Gentiles, too, led to Judaism by their longing for a religion that called upon the higher qualities of the human soul. Frequently they were women.

Roman Tarsus Lies Buried in Mud

After Saul left Cyprus, he is known in the Bible by his Greco-Roman name, Paul. With Barnabas, Paul went next into Asia Minor. Following him there into what is now Turkey, I went first of all to Tarsus, where the Apostle was born.

"Our town is a disappointment to most pilgrims," I was told by the principal of the American College of Tarsus, once called St. Paul's Institute. Even the hand-weaving of tent cloth from goats' hair, he told me, the one traditional activity that might recall the Apostle's youth, has recently been discontinued in Tarsus.

As a boy, Paul worked on a hand loom here. Today the weaving is mechanized. One mill I visited turns out 650,000 yards of finished fabric monthly, using cotton that grows near by on the hot Cilician plain (page 728).

Tarsus is a jumble of stone and mud-brick houses. There is nothing at all to call to mind the colonnades, the temples, the marble halls, and the grandeur of Paul's day. Egypt's Cleopatra sailed here in state to dazzle Mark Antony. The city she saw, where Paul was born, lies many feet below ground, covered by the silt of centuries.

But if it is difficult to feel close to St. Paul in Tarsus, there is a spot not far away where his figure seems astonishingly real. This is Gülek Pass, or the Cilician Gates.

Tarsus engineers in ancient times carved a road 80 miles through the forbidding Toros mountain range to the north. The pass, scarcely a hundred yards long, is actually a knife slit in towering cliffs through which the road passes (page 746). Alexander the Great, fearful of ambush by the Persians, led his army this way three centuries before Christ. Christian Crusaders from Europe, bent on liberating the Holy Land from the Saracens a thousand years after Paul's time, grimly

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Konya Is the Iconium Known to Paul

As in Bible days, Toros mountain waters irrigate this Turkish oasis on the barren Lycaonian plain. Twin minarets beckon Moslems to Arizive Mosque

"They Shook off the Dust of Their Feet . . . and Came unto Iconium"—Acts 13:51

Acts of Paul and Thecla, an apocryphal work, tells how Paul here converted a girl named Thecla. Pagans tried to burn her at the stake, but divine intervention quenched the flames. Thrown to lions and bears, Thecla withstood them with prayers. St. Thecla peak (not shown) is one of Konya's few reminders of Bible times.

♠ Paul Wrote to Timothy, *"The Cloke That I Left . . . Bring with Thee"* —II Timothy 4:13

Starting his second missionary journey, Paul returned to the uplands of Asia Minor, revisiting the churches he had founded.

This Turkish shepherd wears a cloak such as Paul might have used on the road. Made of felted wool, the coat bears Turkey's crescent and star.

Page 739, upper: Just as in Paul's time, tribes migrate each summer to the high plateaus to pasture their sheep and goats. Here, near Antalya, a donkey leads camels carrying the tents and rugs of camp life.

➔ Approaching Pisidian Antioch, Paul walked beneath snowy Anamas Mountain. This crew weeds sugar beets.

740 Paul G. Almasy, Three Lions

"Work with Your Own Hands"...Greeks in Thessaloniki Heed Paul's Advice

Preaching here, Paul converted a "multitude." After his departure, many accepted the widespread delusion that the world was shortly to end and stopped work. In answer, the Apostle wrote: "If any would not work, neither should he eat" (II Thessalonians 3:10). These tanners peg down hides for drying.

christened the gloomy defile "The Gates of Judas." *

I stood here and knew that on a certain day some 1,900 years ago I could have met face to face the Apostle Paul, staff in hand, trudging through the gateway to the west, carrying a message that would change the world.

Antioch Claims Oldest Christian Church

The Gates are called Gülek Pass because for centuries a Turkish family of that name sat astride this passage. With authority from Ottoman Turkish sultans, the Güleks told me, they collected tolls from caravans. In return they were required to keep the route free from bandits.

Turkey's southernmost city, Antioch, a day's drive from Tarsus, is famed in early Christian history for two things: It is the place where men were first called Christians. And it is the city whose congregation sent St. Paul on his missions. It also claims the oldest Christian church, a cave with a secret entrance where St. Peter preached the words of Jesus.

St. Peter's cave remains, but the glories

* See "Crusader Lands Revisited," by Harold Lamb, National Geographic Magazine, December, 1954.

of Roman Antioch, as of so many places, lie buried. A newly dug pit on a hillside let me down into one of the man-deep aqueducts that carried running water to the marble homes and baths of this great city (page 730).

Across the Anatolian plain I followed St. Paul, visiting the dead and living cities where the Apostle established his first recorded group of churches. Scarcely half a dozen Christian families, Armenians, live in Moslem Konya, the Iconium of New Testament times (page 737).

At Iconium Paul and Barnabas preached in the synagogues. But some devout Jews resented their teachings and stirred up the populace.

Riots took place, and the missionaries fled to near-by Lystra. But troublemakers from Iconium followed and again stirred up the people. Paul was stoned and left for dead. At Derbe, now another buried Roman ruin, Paul was at last able to gather a little group of believers without being persecuted.

To these people of the plain St. Paul later wrote his Epistle to the Galatians (so called because Gauls had invaded the area three centuries earlier). Its theme shows him intervening from afar on behalf of his Gentile converts: "And if ye be Christ's, then are ye Abraham's seed, and heirs according to the promise" (Galatians 3:29).

Paul and Barnabas also established a church in the rich city of Pisidian Antioch (not to be confused with the Antioch to the south). I drove to the site of the ancient city in the blistering heat of noon. Its temples, colonnades, and public squares are long since gone. On their sites, in the foothills of the Sultan Mountains, I found the menfolk of modern Yalvaç village sheltering beneath a mammoth tree.

Yalvaç's houses are patched together of wood, mud, and stone. An open aqueduct, not nearly so grand as the Roman channel of Paul's period, brought cool water from the mountain. Here and there an ancient column had been ruthlessly thrust into the hodgepodge construction of a stable. At one muddy corner spring water still dribbled through a worn and broken Roman fountain stone.

I climbed a rickety staircase to watch some little girls knotting rugs on a hand loom. But

In This Greek Stream the "Seller of Purple" Was Baptized

Here, near Philippi, Lydia "attended unto the things which were spoken of Paul." Later Paul and Silas were thrown into jail (page 747). When an earthquake opened the doors, "the keeper . . would have killed himself, supposing that the prisoners had been fled. But Paul cried . . Do thyself no harm: for we are all here." The jailer believed and was baptized (Acts 16:14-33). These villagers transplant tobacco seedlings.

← This Roman Bridge May Have Echoed the Footsteps of the Apostle

Page 742: Lebanese shepherds, tending sheep and goats within sight of the Mediterranean and distant Beirut, pass beneath a ruined seaside road that served caravans in Biblical times. In his early travels, Paul followed this route between Antioch and Jerusalem.

Yalvaç had me thinking less about Turkish rugs than about a memorable paragraph from my friend H. V. Morton's famous book, *In the Steps of St. Paul:**

"Asia Minor was once as highly organized as Europe is to-day," he wrote. "Yet a few centuries . . . have seen the highest pillars fall to earth, have witnessed the destruction of aqueducts . . . and . . . the silting up of harbours that once sheltered the proudest navies of the ancient world. I cannot understand how any traveller . . . can see a Corinthian capital lying in the mud without feeling that such things hold a lesson and a warning and, perhaps, a prophesy."

Roman Capitals Litter Turkish Beach

I turned southward into the province of Antalya. At one ruined Roman port I went swimming among Corinthian capitals fallen into the Mediterranean, washing off an accumulation of Anatolian dust. I sat in the Roman theater and climbed the half-buried stadium St. Paul must have known at Perga. And I imagined Paul's revulsion, in Roman cities, at hearing the screams of men and beasts dying in Roman arenas.

St. Paul had once boarded a ship in the beautiful port of Attalia, which crouched in the lee of the snow-covered Toros Mountains. Here, in the modern port of Antalya, I hoped to find a boat west to Izmir, or Smyrna, as it was known in St. Paul's day.

Three vessels rode at anchor in the teacup-sized harbor (page 735). One creaking old craft, a descendant of the coastal merchantmen on which Paul must have sailed, was bound for Izmir. She would stop at or pass near many of the places where Paul had landed—Patara, Rhodes, Cos, Miletus, Samos—picking up or discharging odd bits of cargo as she made her way.

Over Turkish coffee the grizzled captain outlined his voyage for me, and I was much tempted. But the journey would require weeks. Reluctantly, I pushed on to Izmir overland.

U. S. Navy Ships Visit Izmir

Units of the United States Navy lay sheltered in the harbor at Izmir, southeastern headquarters of the North Atlantic Treaty Organization's land forces. Across the decks of American destroyers I surveyed the shoreline of old Smyrna. New houses, hotels, and office buildings lined the quay.

Some 35 miles southeast of Izmir lie the ruins of Ephesus, a city once sacred to the Greek goddess Artemis (page 748). Her temple, longer than a football field, was one of the Seven Wonders of the World. The double row of Ionic pillars surrounding it was 60 feet tall. Among its statues were works by the foremost sculptors of the Greek world, including Praxiteles, Phidias, and Polyclitus.

Under Roman influence, Artemis was identified with Diana, and worshipers came from all over Asia Minor to hail the fearful statue of the goddess at the temple's center. "Great is Diana of the Ephesians!" they shouted for two hours one day during a riot arising from St. Paul's missionary work.

Yet Paul had phenomenal success during his years here, both with the Ephesians themselves and with merchants who visited the port from Greek and Roman cities.

So profound, in fact, was the impact of Christianity on this Roman commercial center that the city's soothsayers, magicians, and stargazers joined an uprising of silversmiths—who were bitter because of declining sales of votive images of Diana.

A mob seized two of Paul's companions. Paul himself was hidden by his disciples and slipped away to Macedonia.

Christian pilgrims to Ephesus today spend

← Fishermen Dry Nets at Saida, the Sidon of the Bible

Chief city of ancient Phoenicia, Sidon sent forth the evilly clever Jezebel as bride to Ahab, King of Israel. Homer called the Sidonians the "cunningest craftsmen," a compliment to their dyes, exquisite silver, and glasswork. Christ, who traveled here, judged them wicked but capable of repentance.

When Paul was en route to Rome as a prisoner, his ship touched at Sidon, whereupon his centurion guard, Julius, "gave him liberty to go unto his friends to refresh himself" (Acts 27:3).

Today the Lebanese city remains an important commercial center. The Trans-Arabian pipeline reaches the sea close by. © National Geographic Society

Looking upon the Marble Parthenon, Athena's Temple on the Acropolis, Paul Cried . . .

In Athens Paul's "spirit was stirred in him, when he saw the city wholly given to idolatry. Therefore disputed he . . . in the market daily with them that met with him." His listeners included Epicureans and Stoics, who asked amongst themselves, "What will this babbler say? . . . He seemeth to be a setter forth of strange gods."

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. . . "*Ye Men of Athens . . . God . . . Dwelleth Not in Temples Made with Hands*"—Acts 17:22-24

Invited to speak on Mars' Hill, a few steps from the Acropolis, Paul said: "As I passed by . . . I found an altar with this inscription, TO THE UNKNOWN GOD. Whom therefore ye ignorantly worship, him declare I unto you. God that made the world . . . hath made of one blood all nations . . . in him we live, and move, and have our being."

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Paul May Have Thought of the Cilician Gates when He Spoke of "Perils in the Wilderness"

For 3,000 years armies and traders have poured through this pass in the Toros Mountains of Turkey. Alexander the Great threaded the Gates, and Paul passed this way from Syria to the plains of Asia Minor.

much time among the ruins of the Church of St. John, and in the tiny chapel believed by many to stand over the site of the house of the Virgin Mary.

We know that Jesus, from the cross, entrusted his Mother to the care of St. John. There is a local tradition that the beloved Apostle brought her to Ephesus to escape the persecution of Christians in Jerusalem—perhaps to escape Saul himself!

Vision Leads Paul to Europe

I tried to reach the ruins of Alexandria Troas and of Assos, not far from where the current of the Dardanelles floods into the Aegean Sea. These were ports Paul knew. Between them he once chose to walk while his fellow missionaries sailed, for he apparently wished to be alone.

But rough roads prevented my following him by car. After three flat tires and a blowout on the "highway," my driver declined to attempt the rugged trails to these ruins.

"These tires," he said, squatting in the dust to apply yet another hot patch to an inner tube, "are going to have some very bitter things to say to us Turks in the next world. 'You used us very badly,' they are going to claim when we all come together for final judgment."

In Troas, Paul received a vision. A "man of Macedonia" appeared to him.

Some scholars have conjectured that the man was Luke, who later wrote the accounts that have come down to us as the Acts of the Apostles in the Bible.

It seems evident that here at Troas, Paul met Luke, "the beloved physician," and took him into his fold of missionaries. It is at this point in the narrative that Luke writes for the first time in the first person: "And after [Paul] had seen the vision, immediately we endeavoured to go into Macedonia" (Acts 16:10). Macedonia today is northern Greece.

Paul accepted the vision as his signal to cross the Aegean Sea from Asia Minor, and so he set foot for the first time in Europe.

I wondered whether the little Roman harbor of Neapolis, where St. Paul landed, was as charming then as the modern port I visited, now named Kaválla. If so, he must have stepped ashore with a light heart.

There would have been in Paul's time, however, no warm, snufflike perfume of tobacco pervading the streets. Kaválla today is the heart of the Greek tobacco industry, and 15,000 men and women labor in the warehouses where the tiny leaves of "Turkish" tobacco are sorted and baled for shipment.

The first Macedonian I met bore the improbable name of Romeo. He had, of course, a sister named Joulietta.

Romeo was one of those impassioned young Greek guides who consider no effort too great for the reward of viewing yet another inscribed stone from his country's glorious past. So we discovered dozens of Greek and Roman tombstones and columns along the route of St. Paul from Kaválla.

We trod the very steps of St. Paul over the hill to ruined Philippi, for here a stretch of the Roman highway, the Via Egnatia, still echoes to foot traffic.

Outside Philippi's walls Paul and his missionaries baptized a well-to-do woman named Lydia, together with her household, thus making their first Christian converts in Europe. The crystal stream in which this ceremony took place still bubbles along through tobacco fields near the ruins (page 741).

Earthquake Opens Prison Doors

Paul and Silas, his fellow missionary on this journey, were whipped and flung into prison in Philippi. "Suddenly," St. Luke tells us, "there was a great earthquake, so that the foundations of the prison were shaken: and immediately all the doors were opened, and every one's bands were loosed" (Acts 16:26). After the prison miracle, Paul left Philippi with dignity, following the Via Egnatia that closely parallels the present road.

In Thessalonica, 75 miles southwest, Paul had more trouble; opponents again stirred up the authorities against him as many Greeks and some Jews came to be baptized.

But in modern Thessaloníki I found one of St. Paul's most devoted disciples. He was the rotund old archimandrite of the Monastery of Vlatadon, which overlooks the city's beautiful but quiet harbor. St. Paul, he told me, had very probably preached on the exact site of his monastery. A pagan temple that once stood here, he said, was a likely place for Paul to have sought out a crowd of Gentiles.

Unfortunately, Father Pangratios had twisted his ankle on the steps of his garden. He lay grimacing with pain in bed. Nevertheless, on the subject of St. Paul, he became almost carried away.

As the stories of Paul's life and the fiery language of his epistles came flooding back to

memory, the old priest thrashed about in a fit of oratory beneath his quilt. He swept the air with loving gestures; he tossed his head, his hair flying like a horse's mane. Only when he struck his sore foot with the other did he wince and fall back on the pillow, giving Romeo a chance to catch up on the interpretation.

Apostle to the Gentiles a "Man's Man"

St. Paul was a man's man, Father Pangratios said, a real human being who wanted badly to live, even though he professed time and again to be ready to die in order to meet his Saviour.

"How else do you account for the fact that Paul always ran away when trouble started? Why did he claim to be a Jew among Jews, and a Roman among Romans? He wanted to live, to fight, to accomplish. He was a great campaigner, a man who understood people because he experienced human emotions deeply himself. His letters are masterpieces of love because he was a great lover of humanity!"

As we left, the old Thessalonian sank back in his rumpled bed and called imperiously to a servant for his Bible. He was going to read again the two Epistles to the Thessalonians.

Under the accusation by rioting Thessalonians that they had "turned the world upside down," missionaries Paul and Silas stole out of the city by night. To encourage the new flock, Paul sent back his favorite disciple, Timothy, a Greco-Jewish youth of Asia Minor, whom Paul addressed in a letter as his "dearly beloved son."

I followed Paul and Silas next to Beroea—

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Veroia, it is called now—and saw the stones on which they may have stood to preach. In Berœa the Jews welcomed Paul's message with open hearts, accepting Jesus as the Messiah. But Thessalonians followed to foment discord, and the Apostle fled again, this time to Athens.

Athenians Talk of Politics

Paul found Athens living on the glories of its past. Conversation in the market place centered on philosophy as well as business, while the thinkers of the day sought to perpetuate the spirit of their illustrious predecessors, Socrates, Plato, and Aristotle.

The modern Greek turns to politics for his conversation. Every Greek, the Greeks told me, considers his own political ideas of prime-ministerial caliber: "If I could just run this country for 24 hours!"

In sidewalk cafes on Constitution Square the amateur politicians sip Turkish coffee and consume uncounted glasses of cold water. They are inclined to sprawl over two or three chairs to provide a firmer foundation for their weighty pronouncements. They interrupt their discussions only to scan the late editions of the political papers as they come pouring from the presses.

When I was there, they were vociferously solving the flaming issue of the day—Cyprus.

Sophisticated Athens did not give Paul much of a hearing, though he talked in the Agora—the Constitution Square of his day—with anyone who would listen. His main speech to the Athenians, delivered on the rock called Areopagus, or Mars' Hill, was cut short by the assembled sages. He must have stared up at the Parthenon, with its gold-and-ivory statue of Athena, and pitied the city (page 744).*

Paul went to Corinth, and there founded a congregation that was at once his pride and his despair. His two letters to the Corinthians in the New Testament tell eloquently how he suffered on behalf of this cluster of sinners who had accepted Christianity.

Corinth had come to symbolize wealth, expensive living, night life, and immorality. So infamous was it that the modern Greek still quotes a proverb, to be spoken with a shrug

Ephesus Built the Library of Celsus Some 80 Years After Paul's Visit

Greek legend says that Amazons, the mythical female warriors, founded Ephesus. History reports that the goddess Artemis, or Diana, brought fame and fortune to the eastern Mediterranean city. Ephesians erected to Diana a richly decorated marble temple that ancients considered one of the world's seven wonders. Magic so governed Ephesian life that artisans grew rich making and selling amulets to charm away sorrow or ensure happiness.

Opposing the black arts, Paul worked two years in Ephesus. "And many that believed came, and confessed, and shewed their deeds." Burning books of sorcery, "they counted the price of them, and found it fifty thousand pieces of silver" (Acts 19:18-19).

In time, the harbor silted up, and malaria-ridden Ephesus sank into oblivion. Its temples fallen, its glories swept away, the ghost town stands in ruins some 35 miles from Izmir, Turkey.

This library honored Celsus, a Roman governor who was buried on the site. Wall niches held books scattered long ago.

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* See "Athens to Istanbul," by Jean and Franc Shor, National Geographic Magazine, January, 1956.

when referring to luxuries unattainable: "Not everyone can sail to Corinth" (page 752).

Paul tutored his little covey of Christians in the Jewish quarter of the city, preaching on the Sabbath and working during the week as a weaver of cloth.

There was no canal across the Isthmus of Corinth in those days as there is today (page 753). Instead, slaves transferred cargoes to oxcarts and moved them across the narrow neck of land from ship to ship. Sometimes the ships themselves were hauled from sea to sea over a track with rollers.

One does not need to be wealthy to enjoy the luxuries of modern Corinth (Kórinthos), a town twice destroyed by earthquake.

Before departing for Malta, I sat in a little sidewalk cafe with Greek friends. As Christian Corinthians promenaded quietly by in the street, we discussed the revelries of Roman Corinth, and indulged in a delicacy of its modern counterpart: little bites of *kokoretsi*, a highly seasoned mélange of lamb broiled over charcoal.

En route to Malta, the Biblical Melita, I reread St. Luke's account of the last voyage of St. Paul recorded in Acts.

With other prisoners, in one of the many ships that carried grain to Rome, Paul sailed into the clutches of a Mediterranean storm. For 14 days the ship was battered on a maddened sea, until not only the prisoners but also the soldiers and crew had lost hope. Paul alone maintained faith, for again he had had a vision and knew that he would live to see Rome.

He cheered his despairing shipmates and told them: "There shall be no loss of any man's life among you . . . we must be cast upon a certain island" (Acts 27:22, 26).

Malta Remembers the Apostle

The diminutive island of Malta was the happiest surprise on my entire trip in the lands of the Apostle Paul.

Half the Maltese men I met, it seemed to me, were named Paul. Malta is fiercely proud that the Apostle converted the island 1,900 years ago.

Mention of St. Paul's name lighted the eyes of everyone I talked to. Church after church carried his name, and nowhere did I find greater reverence for the saint, nor a greater profusion of mosaics, frescoes, statues, and portraits portraying his life.

Certainly the most startling discovery of my long journey was made here, in Valletta's richly decorated Church of St. Paul Shipwrecked. On the high altar, encased in gilt and silver, stood a relic venerated as a bone from the right arm of St. Paul (page 757).

The arm brings to mind the founding of the Maltese Christian Church. On the day St. Paul struggled ashore from the wreckage of the grain ship, friendly Maltese lighted a fire for the passengers and crew. As Paul laid some sticks on the fire, a viper attached itself to his hand. He shook it off without ill effect, and the miracle set the stage for the conversion of the entire island.

Along the Appian Way to Rome

When springtime opened the Mediterranean again to navigation, prisoner Paul landed on Italian soil. He would have seen the volcanic cone of Vesuvius innocent of even a plume of smoke. Yet a few years later it was to explode and bury alive the city of Pompeii.

One wisp of steam was rising from Vesuvius when I visited Naples and the near-by harbor of Pozzuoli (Puteoli), where St. Paul came ashore. From here he walked to Rome along the Via Appia.

We do not know the result of Paul's appeal to Caesar. Ancient sources suggest that he was exonerated of charges of sedition against the Roman state.

Later, after the terrible fire of Rome in A.D. 64, it became common talk that Nero himself had ordered the city burned so he could build palaces and marble streets where before had been slums and alleyways. Nero, fearing an uprising, cleverly cast blame on the followers of the new religion. He had uncounted Christians dragged into the arena and killed to pacify the maddened, burned-out mob. It is generally believed that Paul died some years later, during Nero's continuing persecutions of the Christians.

From the accounts of early writers, we have a picture of St. Paul and St. Peter being led from a Roman prison during the persecution. Beneath a church near the Roman Forum, in a musty dungeon said to be their cell, I imagined the two Apostles taking farewell of each other—St. Peter the Apostle to the Jews, and St. Paul the Apostle to the Gentiles.

Peter is led away to Nero's Circus, there to be crucified, hanging upside down on the cross by his own wish. St. Peter did not consider

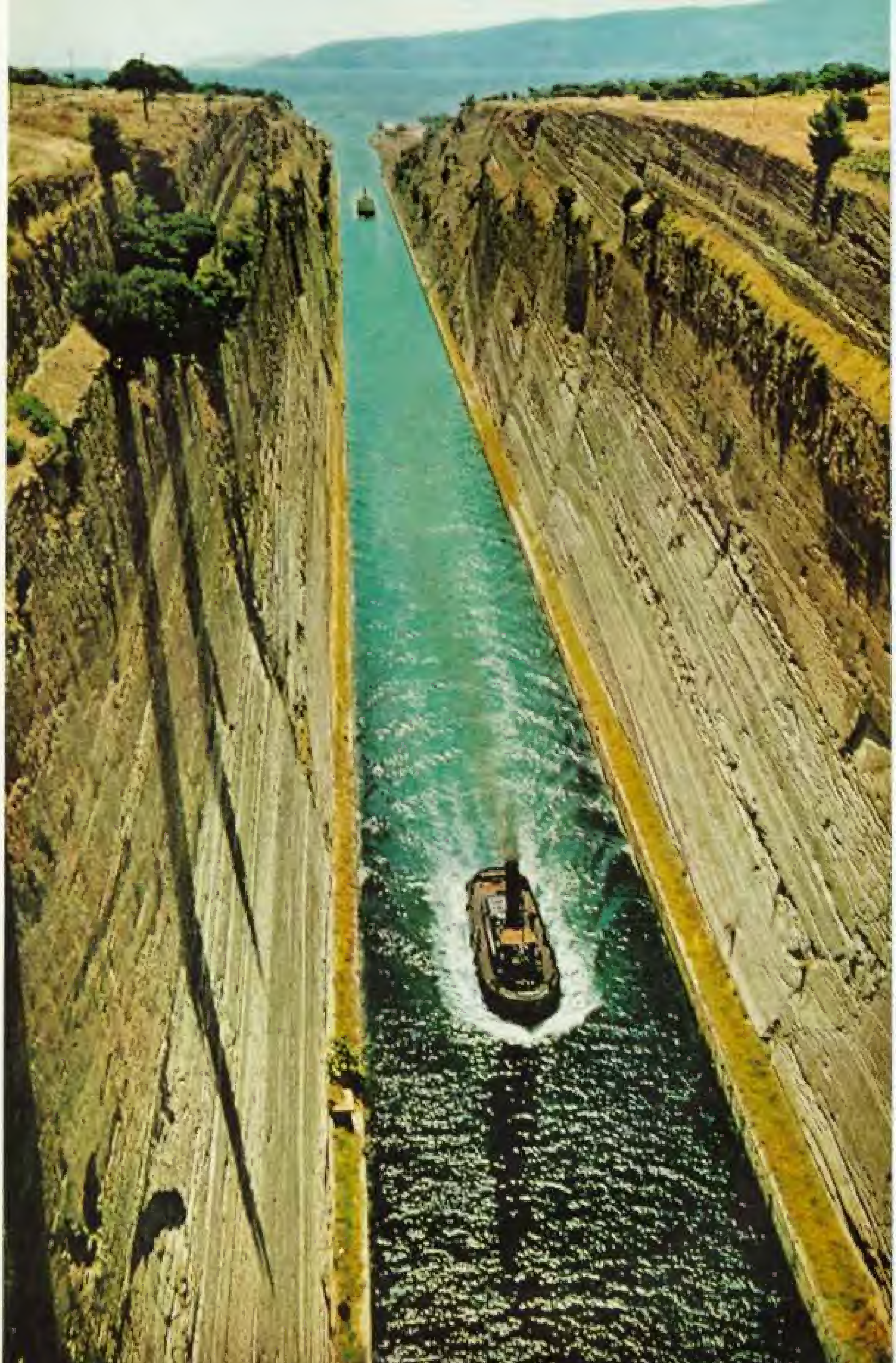
(Continued on page 759)

"All They Which Dwelt in Asia Heard the Word"—Acts 19:10

"I will . . . that the younger women marry, bear children, guide the house, give none occasion . . . to speak reproachfully," Paul advised in I Timothy 5:14. This woman and her daughter live in Sak, Turkey, near Paul's Tarsus.

↑ **Paul, Who Preached in Corinth, Must Have Looked upon Apollo's Doric Temple**

→ Page 753: Corinth Canal, bypassing the Peloponnesus, shortens the Athens-to-Pátrai route by 200 miles. Nero, perhaps in Paul's lifetime, turned the first sod of a projected waterway. Greece finished the job in 1893

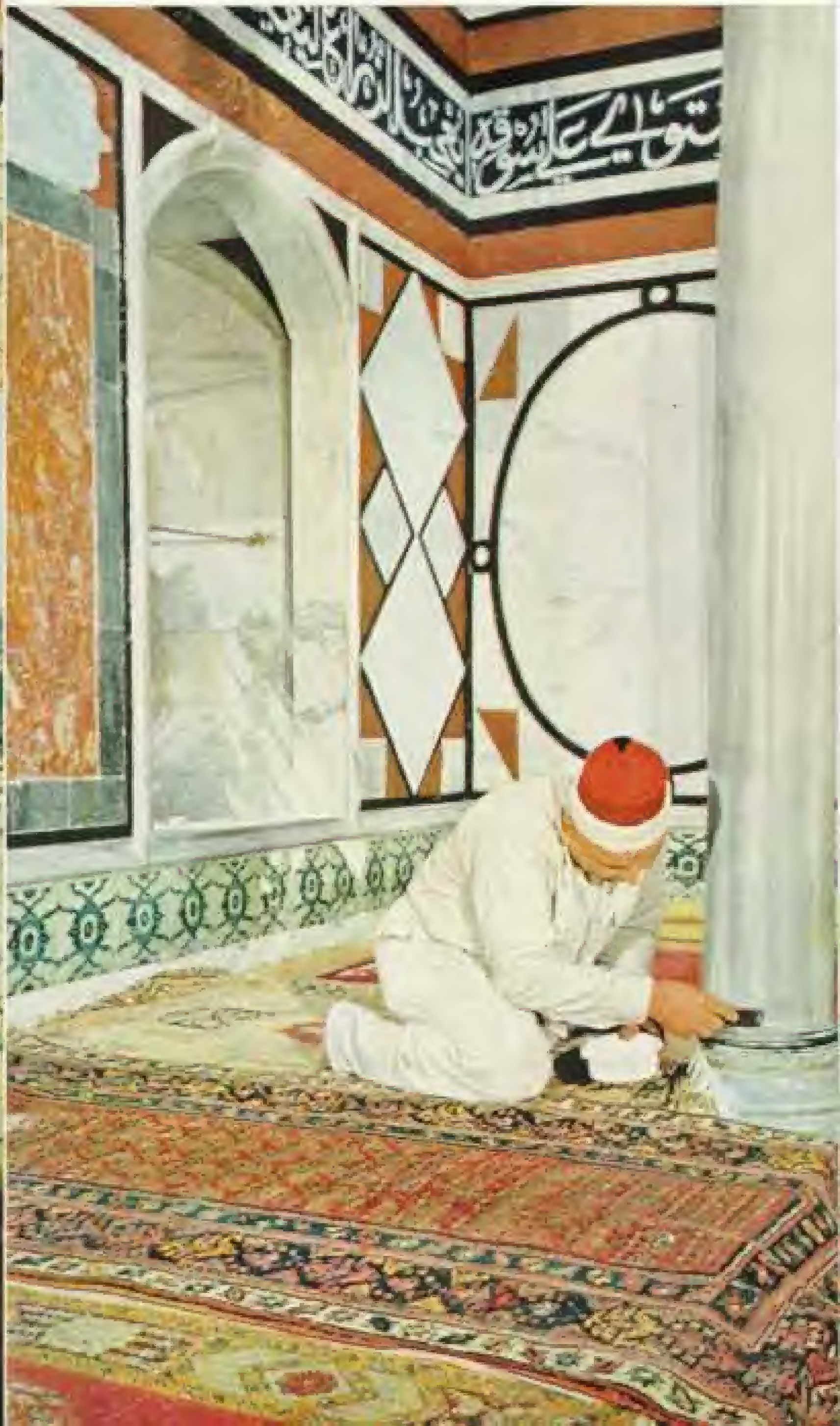


← **Acre, on Israel's Shore, Is the Biblical Ptolemais, Where Paul "*Saluted the Brethren*"—Acts 21:7**

Paul's days of freedom were numbered when he landed here en route to Jerusalem, for imprisonment awaited him. He guessed as much: "I am ready . . . to die . . . for the name of the Lord Jesus" (Acts 21:13). Centuries later Crusaders took Acre and built these sea walls.

Page 754, lower. Back in Jerusalem, Paul may have visited a spot near the present Church of the Dormition (center). In an "upper room" close by, Jesus celebrated the Last Supper with His disciples. Church and distant lands lie in Israel; the walled city in Jordan.

↓ Walls of Acre's Mosque of al-Jazzar wear marble taken from Roman ruins at near-by Caesarea, where Paul was imprisoned for two years. Arabic frieze quotes the Koran.



↑ *"We Being Exceedingly Tossed with a Tempest"*—Acts 27:18

"Be of good cheer," the saint comforts his shipmates; "there shall be no loss of any man's life . . . For there stood by me this night the angel of God" (Acts 27:22-23). Soon thereafter the ship ran aground on Malta. During his three months on the island Paul healed the sick. Maltese honor the Apostle with this painting in the Church of St. Paul Shipwrecked, in Valletta.

↓ Bone and Chain Are Treasured as Relics of the Apostle

In Rome Paul "was suffered to dwell by himself with a soldier that kept him . . . bound with this chain" (Acts 28:16, 20). Preserved for centuries by the Roman Catholic Church, the chain is kept in the Basilica of St. Paul's-Without-the-Walls (page 758). The armbone, in a case of silver and gilt, is a prized possession of the Church of St. Paul Shipwrecked.

himself worthy to die as his Master had died.

But because St. Paul was a Roman citizen, he may have been beheaded. Outside the Roman walls the Church of St. Paul of Three Fountains marks the place where, tradition says, water sprang up as his head struck the ground three times in falling.

Not far away the magnificent Basilica of St. Paul's-Without-the-Walls enshrines what many believe to be the Apostle's final resting place. At the high altar a Benedictine priest allowed me to open the grille which permits one to lean forward and read, carved on an aged pavement, the Roman letters of Paul's name. Here was the end of my pilgrimage.

Overhead, facing me on a sweeping archway, a mosaic in colors and gold portrayed St. Paul and St. Peter on either hand of Christ. Before me, four rows of columns advanced to the distant doorway. A pool of sunlight flooded in across the marble floor.

Through the doorway, I could see a stone statue of St. Paul (opposite page). Beyond, my thoughts carried me back across 12,000 miles traversed by St. Paul the missionary, the Apostle to the Gentiles, the man of God. In the farthest distance, I saw again St. Stephen's Gate in Jerusalem. In a sense, that was a beginning, and this was an end. But in another sense, this was a beginning.

← St. Paul in Stone Stands in Rome

Page 758: In Romans 1:1 the man from Tarsus describes himself as "Paul, a servant of Jesus Christ, called to be an apostle." Thus he lives in history. This statue before the Basilica of St. Paul's-Without-the-Walls pictures the Apostle as a militant evangelist. In the pediment's mosaic he sits on Christ's left. Peter, to His right, holds the key to the kingdom of heaven.

According to one tradition, Paul and Peter were martyred on the same day in the year 67. Peter was crucified in Nero's Circus; Paul was beheaded outside Rome's walls along a road now called Via Ostiense.

Constantine the Great, the first Christian Emperor, found entombed beside the same road a body believed to have been Paul's. He placed the remains in a stone coffin and built over it a small church, the first St. Paul's-Without-the-Walls. Fire in 1823 destroyed its larger successor, but spared the tomb.

→ Many authorities believe the Apostle still lies here beneath the altar of the rebuilt St. Paul's. The letters PAULO, thought to have been inscribed at the order of Constantine, mark the slab. Through the round hole, now closed, the devout once lowered objects to touch the coffin.

National Geographic Map Traces Bible History on a Modern Background

HUMAN history, from Noah to the nationalization of the Suez Canal, lies charted and annotated on the new map, Lands of the Bible Today, sent to National Geographic Society members all over the world with this issue of their Magazine.*

Along this corridor linking three continents man first moved from Stone Age to Bronze Age, from caves to houses. Here have been born wars, religions, and ideas that shaped civilization from its earliest beginnings.

Historical notes locate such antiquities as the earliest known coins (Sardis), the first true writing (Sumer), and the world's oldest continuously inhabited city (Damascus). Within the map's borders lie all Seven Wonders of the Ancient World, located by an index at the left margin. A note at Kale, Turkey, marks the home of the original Santa Claus—3,700 miles from the North Pole.

Another points to desolate Khirbet Qumran, in the Wilderness of Judah, where Bedouin shepherds in 1947 found the 2,200-year-old Dead Sea Scrolls—a cache of Biblical manuscripts hailed by scholars as the most important discovery of Holy Land archeology.

Yet these historical notes are presented against an up-to-date geographical background. For example, a note about the Sea of Galilee, where Jesus "rebuked the winds and the sea," straddles a line marking a 1,068-mile-long pipe carrying oil from Saudi Arabia to the Mediterranean Sea.

Border Guards Bar Route of Exodus

Saints and heroes of the Old and New Testaments stalk the map from edge to edge.

Near Memphis, Egypt, in the southwest, is the probable birthplace of Moses, who was rescued from bulrushes along the Nile and educated in Pharaoh's court. An inset of the Exodus traces the tortuous 40-year journey by which he led the Israelites out of Egypt to Canaan.

On the main map a modern highway from 'Aqaba to 'Amman in Jordan replaces the ancient highway of kings, over which Moses begged permission to lead his people through Edom in one of the most plaintive appeals in history:

"Let us pass, I pray thee, through thy country: we will not pass through the fields, or through the vineyards, neither will we drink of the water of the wells: we will go by the king's high way, we will not turn to the right hand nor to the left, until we have passed thy borders" (Numbers 20:17).

Their plea was refused. The Israelites, braving the wilderness again, passed between Edom and Moab on their way to the Promised Land.

A modern traveler following Moses would meet a similar rebuff. In fact, should he try to follow the route of the Exodus, he would be stopped ten times by armed guards at the modern national boundaries that divide the Bible Lands. Notes on Palestine and Jerusalem recount the recent history that produced the strained truce now maintained along Arab-Israel frontiers.

Crossroads of the Ancient World

At this world crossroads, inevitably, are found the footprints of some of history's greatest travelers, notably St. Paul (page 707) and Marco Polo, eastward bound from Venice to China in the 13th century. Another was Ibn Batuta, a remarkable Moslem born in Tangier, whose insatiable thirst for new sights carried him from Africa to what are today Russia, India, Ceylon, China, and Sumatra.

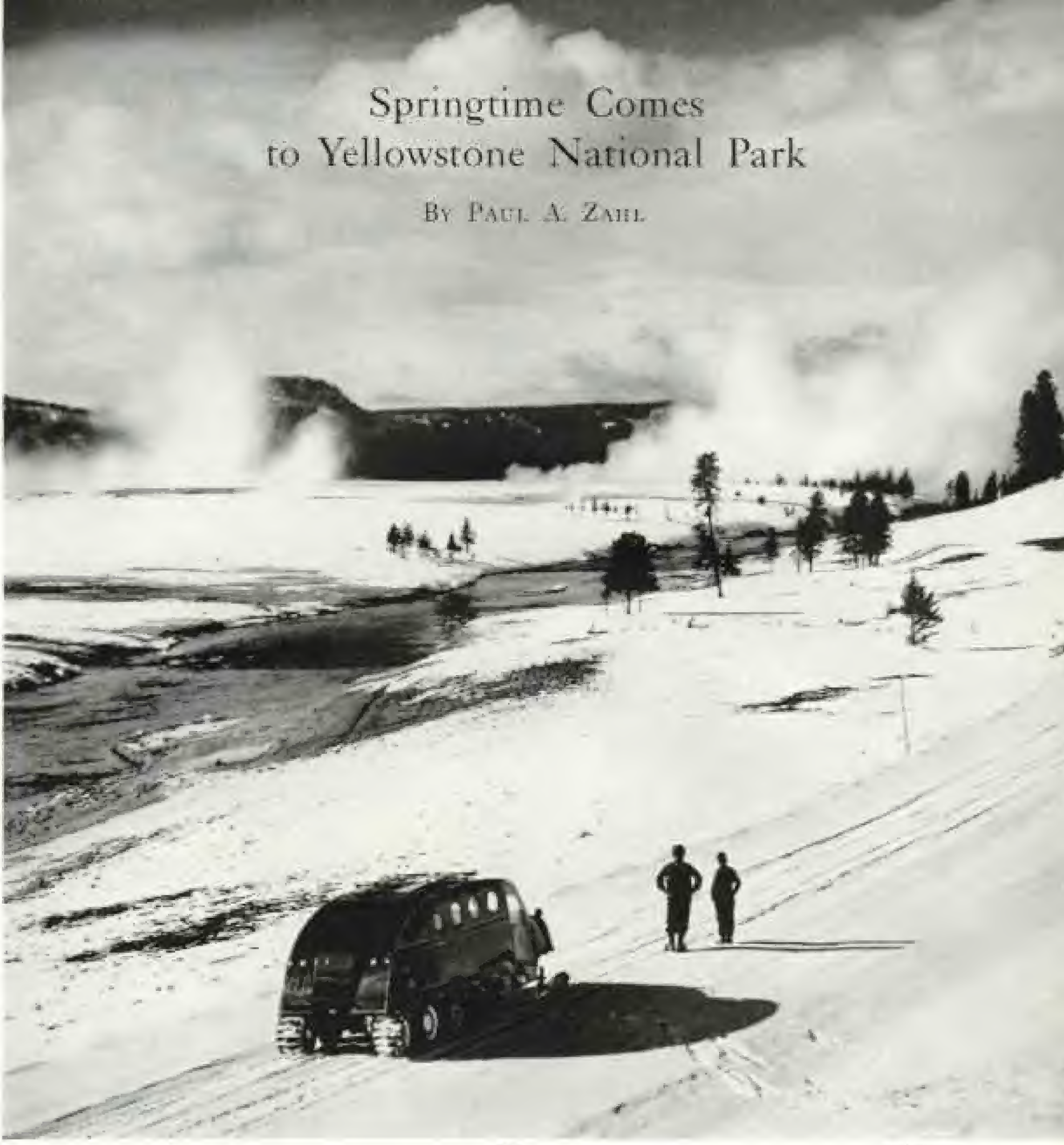
Trade routes still cross the Bible Lands through the Suez Canal, opened in 1869 and nationalized by Egypt in July, 1956. Egypt's move had world repercussions—for reasons plainly visible on the map. Tower-shaped symbols marking oil fields stud the land around the Persian Gulf from Saudi Arabia to Iran. In this part of the world lie some 70 to 75 percent of the world's known oil reserves. Europe is the biggest consumer of this petroleum, and more than half of it reaches there by tanker through the Suez Canal.

Throbbing pipelines crossing the Syrian Desert supplement the canal route. Tankers pick up oil from the longest pipeline near Saida, the Biblical Sidon, where Jesus once visited the Mediterranean coast.

* Members may obtain additional copies of the map, Lands of the Bible Today (and of all standard maps published by The Society), by writing to the National Geographic Society, Washington 6, D. C. Prices, in the United States and elsewhere, 50¢ each on paper; $1 on fabric. **Indexes to place names, available for this and most other maps, 25¢ each.** All remittances payable in U. S. funds. Postpaid.

Springtime Comes to Yellowstone National Park

By Paul A. Zahl



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With Color Photographs by the Author

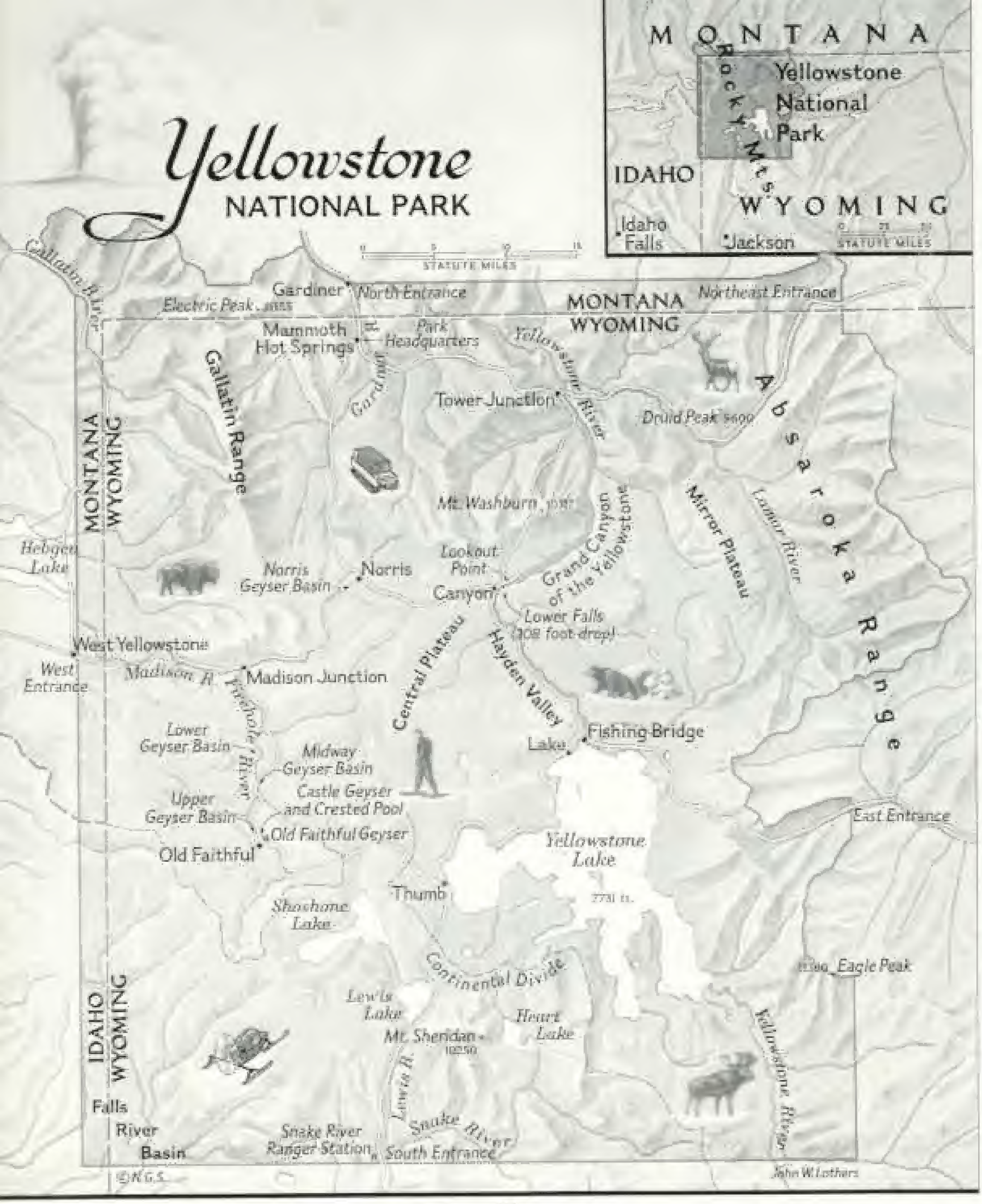
EACH summer more than a million Americans visit Yellowstone National Park, but few ever see its familiar features wrapped in wintry white. Fewer still have seen the marvelous transition from winter to spring.

One morning last April I set out to explore this changing face of Yellowstone, especially in terms of the park's abundant wildlife. Belying the calendar, a lake I drove past on the way from Jackson, Wyoming, was still frozen. High banks of snow closed in on both sides of the plowed road, and a few miles from the park's southern boundary a wall of white blocked all further passage.

I cranked down a window and sniffed the aromatic scent of pine on the crisp, cold air. The silence was absolute.

As I savored this solitude, the distant roar of a motor broke the stillness. Good! Felix Rudd had received my radio message and was coming to carry me on into the park.

A little red-white-and-blue vehicle on three ski runners skimmed noisily out of the woods in my direction, and a kindly face smiled from the fuselage. Felix, the winter care-



Oldest of the Country's National Parks, Yellowstone Bestrides the Continental Divide

taker of a near-by ranch, hopped out and tested the snow with his heel (page 765).

"There's no time to lose," he announced. "This crust is hard now, but later in the day it may become too soft to support us."

Felix's wingless plane was as earthbound as my car. But, as farmers, sportsmen, and winter dwellers throughout the northern Rockies have learned, such propeller-driven snowplanes can speedily reach frozen wonderlands that are otherwise accessible only after punishing hours on snowshoes.

We transferred my bundles to the snow-

(Continued on page 767)

In Yellowstone's Grand Canyon, Winter Solitude Wraps Thunderous Lower Falls

Few visitors ever see the park in its mantle of frozen white. Here the author pauses at Lookout Point.

Road-clearing Plow Tosses April Snow into the Yellowstone River

To prevent cave-ins, caretaker Clifford W. Hartmann sheds snowshoes and clears guest cabin roofs near Old Faithful Geyser. Deep snows make much of the park a wheelless world from November to May.

Flightless Snowplane Can Do 70 Miles an Hour; It Cruises at 30

Author Zahl (right) transfers equipment from his car to Felix Budd's homemade creation for an eight-mile ski ride to the Snake River Ranger Station (page 774). An aircraft engine drives the aluminum and fabric machine.

plane, and I parked the car for my return several days later. The plane's throttle went down, the motor responded, and the propeller bit the air. But for a moment nothing happened. Then Felix wiggled violently, shaking the whole vehicle, and we whizzed off across the snow.

"Had to break the ice on the runners to get a start," he hollered.

Eighty-inch Snowfall Isolates Rangers

An hour later I was drinking coffee at the Snake River ranger residence near Yellowstone's south entrance (map, page 762).*

"You think this is a lot of snow?" laughed Supervisory Park Ranger Robert H. Sharp. "A month ago we couldn't see out that window. Had 80 inches this winter."

Bob Sharp, his wife Betty, and their three small boys had been snowbound here since the previous November. At the moment the youngest of the brood, two-and-a-half-year-old Eric, was staring at me with a strange curiosity. "Who is this creature?" his big eyes seemed to ask.

Except for occasional snowplane travel, the Sharp family, together with Park Ranger Claude W. McClain and his wife Joan, had spent the winter isolated from fresh vegetables, the corner drugstore, pediatricians, and people in general.

"How do you manage it?" I asked.

Betty Sharp gave a sigh that seemed to span six months of snowy isolation.

"Sometimes canned food gets monotonous," she said. "And we're all looking forward to having the snowplow open the road so we can drive to Jackson for dinner and a movie. But the children—this is their world; they hardly remember that another exists."

"What about school?" I asked.

Bob explained that the National Park Service had assigned him this winter outpost while the children were still of preschool age. Next year the post would go to a ranger without a family, or to another couple with no school-age children.

"Someone's got to be at these snowbound stations," Bob philosophized. "Weather reports, snow measurements, ski patrols, wildlife observations, maintenance. We don't have much time for getting bored.

"And if these boys don't turn out to be ski champs someday, I'll be surprised."

Bob Sharp's expectations had a sound basis, I observed when we set out next day for a look around. Jeffrey, who had just turned six, four-year-old Tod, and even little Eric accompanied us as far as the Snake River, 150 yards from the house. The skill of these youngsters on skis and quarter-size snowshoes was almost unbelievable (page 775).

Moose Like Steam-heated Spots

McClain, Bob, and I crossed the ice-free river on a hand-propelled cable car, while the boys settled down to wait for us.

"If it's moose you're after, you've come to the right place," Mac assured me as we headed for an area of hydrothermal flats hugged in a curve of the river.

The basic heating plan of these meadow flats, Bob explained, is the same as for all the park's "hot spots." Water and steam are forced upward from hot rock far below the earth's surface through a labyrinth of channels, cracks, and crevices. In the more famous basins farther north water and superheated steam trapped under high pressure periodically burst forth to create geysers.

If the underground plumbing is such as not to encourage the development of pressure heads, the escape may be in the form of continuous steam jets, or of hot springs with fantastic terrace formations, or of wondrously colored pools or bubbling fountains.

The over-all winter effect of such thermal activity is to convert some of the park areas into snow-free oases in an otherwise cold, white world—areas sought out by many of the park's inhabitants as a source of warmth during winter's sub-zero weather.

We had been in the meadow flats for no longer than half an hour when, in a thicket perhaps fifty yards ahead, two pairs of eyes stared at us with the profoundest intensity. With them were mulelike ears and angainly

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Page 766

Scalding Water of Morning Glory Pool Casts a Mantle of Vapor on the Biting Air

Shaped like its floral namesake, the hot spring is one of the most popular attractions in Upper Geyser Basin. Incrustations on the rocks are mud sediments.

Park Naturalists Norman R. Herkenham (left) and Merrill David Beal join the rest of the Herkenham family on this winter inspection. In summer they interpret the area for visitors.

* See, in the National Geographic Magazine: "The West Through Boston Eyes," by Stewart Anderson, June, 1949; and "Fabulous Yellowstone," by Frederick G. Vosburgh, June, 1940.

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Elk Break a Trail up Lamar Valley. They Pass Druid Peak in Single File

bodies set on high "stockinged" legs. It was a cow Yellowstone moose, *Alces alces shirasi*, and her year-old calf. The youngster, stopping frequently, sauntered unconcernedly away, while its mother kept a watchful and suspicious eye on us (page 771).

Yellowstone has a relatively stable moose population of several hundred. The whole North American continent is estimated to contain some 300,000, representing four distinct types. Fourteen thousand of these are in the United States proper, and the remainder in Canada and Alaska.

"Don't get closer to a moose than the distance between you and the nearest tree." Mac warned, as I focused on the cow. "You might have to do some pretty fancy running."

Keeping this in mind, we hastily took some pictures and then beat a retreat.

With the Sharps and McClains I had tasted utter isolation in a wheelless world. An approach to the park from the north, I found, gave more mobility.

The main road southward from park headquarters at Mammoth Hot Springs had already undergone its first snowplow run of the season, and Park Superintendent Edmund B. Rogers permitted me to use it with his men. Because of the hazard of rockslides, slippery pavements, and sudden storms, the

769 David M. L. Gordon, National Park Service

Small Bands of Stragglers Paw Through Snow in Search of Winter Forage

road would not be safe for the public until about the first of May.

One morning Park Naturalist Merrill David Beal and I set out from Mammoth to investigate a cavern at the edge of Yellowstone's Grand Canyon. In December Dave and another park naturalist had seen a black bear wintering in this same rocky den.

Traveling some thirty miles through the park on snow-clear but still icy roads, Dave and I reached the canyon area, but could get no nearer to the canyon itself than half a mile. So we left the car, put on snowshoes, and started walking across country.

Great patches of snow covered much of the canyon's sculptured walls. But the falls were perhaps more impressive than in any other season. A gigantic arch of snow and ice, which during the depths of winter covers most of the cataract, had recently collapsed, revealing the great waterfall plunging 308 feet into the whitened gorge (page 763).

The den, located at the very brink of the canyon's north rim, was barricaded with snowdrifts. Was the bear still dreaming of spring, or had it already emerged?

Tracks on the surrounding snow might have answered the question—unless a recent snowfall had already covered them. We watched and listened. Finally Dave stepped out of his

snowshoes and began working down the snow-covered slope toward the den's opening. At the cave's mouth Dave said some taunting words to the hypothetical occupant and even tossed in a few handfuls of snow. But either the bear was still slumbering, or it had already abandoned its winter home.

Wisely, Dave decided not to press for an answer. I closed my camera case.

The closest I got to a bear was while tracking buffalo in the Hayden Valley, a prairie-like basin through which the Yellowstone River winds. By April 20 the valley road had been cleared for about half its length, and a medium-sized snow caterpillar, known locally as a weasel, was trucked in for use on a buffalo "hunt." Actually the hunt was part of the Park Service's wildlife management program, and its aim was to assay the springtime status of the valley's bison herds.

As elsewhere in the park, April has more of a winter than a spring connotation. Hayden Valley was still covered with deep snow, and bare earth could be seen on only a few windswept ridges.

Vanishing Bison Stage a Comeback

Somewhere in that expanse of cold whiteness were buffalo. At the controls of the bouncing snow vehicle was District Park Ranger Joe J. Way; with him as observers were Assistant Chief Ranger Harold O. Edwards, Park Biologist Walter H. Kittams, and myself.

As every American school child knows, millions of buffalo once roamed the plains. They were the fur, hide, and protein mainstay for untold generations of Plains Indians, as well as for early settlers and railway builders. Without buffalo the opening of the West might have been slowed by decades.

But there were unhappy consequences. By the beginning of the present century the herds were all but gone, and the species was tottering on the brink of extinction. Today, thanks to the foresight of both private and public conservation forces, the buffalo population of the United States and Canada is up again to a safe 20,000. Of these, some 1,200 are in Yellowstone—each a living reminder of North America's pioneering past.

In close proximity, however, the buffalo is anything but a sentimental symbol. He is a big, tough animal, weighing as much as 2,500 pounds, that knows nothing of the contribution of his forebears to the settling of our

Gray Winter Coat Replaces Mule Deer's Summer Brown →

Page 771: Long mulelike ears earned this western deer its name. In cold weather the animals seek the park's lower ranges. This doe makes friends with caretaker Hartmann (right) and Mrs. J. B. Keithley, wife of another winter keeper.

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country. He does know, however, that the western plains are a good place to live and that human beings ... well, the buffalo is an undependable critter and easily stampeded. So-called rogue bulls, especially, are not to be tampered with.

The weasel rose above a hummock, and abruptly we came upon a small herd of some twenty of the huge brown creatures nosing in the snow for remnants of last season's grass. In an instant the herd broke and stampeded into deep drifts (pages 776-777).

The more vigorous buffalo finally plowed their way through, but one of the largest of the animals got stuck. The more he struggled the more firmly his belly and limbs became fixed in the snow. Finally fatigue overtook him and he could move no more.

Ranger Edwards and I hopped out of the weasel for a closer look. I'll never forget the rage of that exhausted beast. His nostrils were spouting vapor; his small eyes, bloodshot and full of fear, glared at us; and the great body heaved as the animal gasped for air.

"Let's not get too close," Edwards cautioned. "Snow or not, these fellows always have enough reserve for one more charge. This one's had a hard winter. See the ribs?"

We returned to the weasel. As Joe Way eased the vehicle nearer, the animal plowed a great trench through the drift in one last spasm of violent effort, finally making it over the ridge and disappearing.

About a mile farther we stopped on the summit of another ridge. Below us, split into two

(Continued on page 779)

A Shiras Moose, with a Calf Near By, → Considers Whether to Charge

Though plainly ruffled, this cow decided not to attack (page 768). Several hundred moose, largest members of the deer family, live in Yellowstone National Park. They frequent marshy meadows and lake shores in summer, feeding on aquatic plants. In winter they live largely on foliage, twigs, and bark. This subspecies was named for the late George Shiras 3d, noted wildlife photographer and Life Trustee of the National Geographic Society.

♠ Nomadic Elk Ignore Steaming Geysers

In winter, grazing animals congregate in Yellowstone Park's hydrothermal basins, where grass is exposed by melting snows. Castle Geyser (left) erupts about once a day for half an hour. Steam at right rises from Crested Pool.

←Page 772, lower: A 10-point elk rests on steam-heated range. A buffalo forages in the distance.

→Vapor clouds, enlarged by winter cold, shroud Old Faithful's 140-foot waterspout. The geyser sends aloft some 10,000 gallons of scalding water in four-minute eruptions occurring once in 63½ minutes, on the average. Snow fence keeps animals away. Henry D. Washburn, surveyor general of Montana, discovered and named Old Faithful in 1870. "It is the most lovely inanimate object in existence," a member of his expedition wrote.

Ranger Bob Sharp Trains His Three Boys on Skis and Snowshoes

In autumn most of Yellowstone's 25 permanent rangers and their families move to park headquarters at Mammoth Hot Springs. But the Sharps spent six snowbound months last winter at Snake River station. They saw 80 inches of snow and temperatures of minus 42° F.

The second lowest temperature ever recorded in the continental United States—minus 66° F.—was observed near West Yellowstone Ranger Station in 1933. The record, 70° below zero, occurred at Rogers Pass, Montana, in 1954. Snag Airport in Yukon Territory holds the North American record of −81° (1947). The world's official record, 90° below, was set at Oimyakon, Siberia, in 1933.

Six-year-old Jeffrey Sharp here uses a barracks roof for a ski slope.

Page 773, lower: Eric Sharp demonstrates his skill at two-and-a-half years.

← Betty Sharp Teaches Her Sons at Home

A corps of 575 rangers guards the Nation's parks, monuments, and historical sites. Seasonal employees triple the number in summer.

Rangers with school-age children seldom get winter duty at a snowed-in station.

When Jeffrey, Tod, and Eric (left to right) reach school age, the family will move to Mammoth Hot Springs or West Yellowstone station. Here they get kindergarten guidance from mother. Seen through the window, father shovels snow.

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♠ Buffalo Roamed North America 2,000 Centuries Ago

Properly called bison, these immigrants from Asia grazed from Oregon to Georgia. Once there were millions; hunters all but exterminated them. Yellowstone's herd numbers about 1,200.

↟ A Herd Grazes Near a Steam Bath

The same hot spring that melts the snows from pastures may lure careless buffalo to a scalding death. Thin crusts of mud and silica deposits bordering the pools sometimes give way and topple animals into the hot water.

↞ Digging through snow to grass, the buffalo prefers to root with his muzzle rather than use cloven hoofs. Ice and snow crust pose no problem; he smashes them with his massive head. The buffalo sheds his heavy coat in spring and grows another by autumn.

↠ Fighting free of a drift, a buffalo glares balefully at the park biologist's weasel. Caterpillar treads take the versatile machine on a survey for a count of the herd.

Winter's Snow Survey Foretells Summer's Water Supply

Ranger Dale H. Nuss weighs snow collected by thrusting the tube down to frozen earth. Depth and density determine spring and summer runoff from the mountains—information vital to farmers and hydroelectric-plant operators.

groups, was the valley's primary herd of some 150 to 200 buffalo. One group was moving at a curiously rapid rate.

"Hold it," biologist Kittams said, adjusting his field glasses. "There's a grizzly chewing on a carcass just behind those stampeding buffs!"

Sure enough, a great brown animal almost the size of one of the bison cows was ripping and tearing at its kill. The closeness of the carcass to the fleeing herd implied that a straggler or a calf may have just been brought down by the powerful carnivore.

For a while we watched; then Joe Way started the weasel. We were still a long distance off when, without once looking toward us, the bear scampered away and disappeared into the cover of the woods near by.

Old Faithful Outdoes Itself in Winter

As fascinating as the park's pageant of animal life are its geological wonders. Once he has seen its soaring plume, what visitor can forget the sight of Old Faithful erupting? First, the uncertain puffing from the geyser's cone, then the preliminary gushings and tossings, and finally the dramatic ascendance of liquid streamers, each rising higher than the last, until a 140-foot pillar of scalding water shimmers like a thing alive.

Over roads recently plowed but not yet freely negotiable, I had driven the 50 miles from Mammoth, passing the Norris Geyser Basin, then the Lower and the Midway Basins, to arrive finally at the Upper Geyser Basin, where Old Faithful performs at an elevation of 7,367 feet above sea level.

As my car crunched to a halt near a high snowbank less than 200 yards from Old Faithful's steaming cone, I felt that I had entered Katmai's Valley of Ten Thousand Smokes, or perhaps that I had come into the midst of an industrially smoking Ruhr Valley.

Cold air, settling from high, snow-clad plateaus, had a curious effect on this hydrothermal area. Steam jets hardly noticeable in mild weather now showed as high white plumes; springs and pools admired in summer for the clarity of their water and the gorgeous coloring of their sides and bottoms were now obscured by fog wisping and billowing from their simmering surfaces (page 766); geyser cones steamed in the wintry air as if they were actually erupting.

In the meadow in front of Old Faithful Inn grazed a herd of about fifty Rocky Mountain elk, or wapiti (*Cervus canadensis nelsoni*). Some of the bulls still had antlers; others, I knew, had but recently shed theirs.

For at least twenty minutes I sat in the car watching these majestic creatures as they munched contentedly on the meager remnants of last summer's grass.

Suddenly water began to play from Old Faithful's steaming cone. The effect of the cold air was immediate. In an instant the waterspout was obscured in clouds of uprolling steam. Higher and higher the billows climbed. The tower of churning mist rose hundreds of feet (page 773).

As the cold-weather spectacle subsided, I got out of the car and walked toward the elk herd. One old bull, retreating at my approach, retained but a single antler; another had lost both, probably within hours, for the pedicels where they had been attached to the head were still red with blood.

The struggle for survival through the bitter winter is a hard one; yet the protected elk herds of Yellowstone are on the increase, and efforts are being made to keep the park's summer population down to about 15,000 in order to prevent overgrazing. During winter, large numbers of the animals graze in the Lamar and Yellowstone Valleys (page 768).

Elk Crowd Close to Nature's Radiators

With seasonal Ranger Bert McLaren, I spent many hours exploring the Old Faithful area. Hoofmarks by the thousands around nearly every hot spring and pool and at the edge of nearly every geyser cone told the story of elk that had crowded close to these "radiators" on bitter nights.

Winter temperatures here can drop to minus 40 or 50° F.; 66 below is the park's record. On the bottom of one crystalline pool I saw the bones of an elk that must have come too close to the edge in its search for warmth and plunged into the scalding water.

Later I paid a final visit to Old Faithful. Although it was now May, snow had been falling steadily, transforming the steaming Upper Geyser Basin into a panorama of total white. A thousand plumes of steam mingled with the falling snow.

As I drove away, starting the long journey home, the spring sun came out warm and bright. I looked back. Already the whiteness on Old Faithful's steam-heated flats was disappearing. The seasons mix in curious ways in Yellowstone National Park.

Sky Survey Charts the Universe

By Ira Sprague Bowen, Ph.D.
Director of Mount Wilson and Palomar Observatories

DAYBREAK comes early on Palomar Mountain.

On this particular morning, May 11, 1950, there was a light frost on the cedars and sparse grasses that grow more than a mile above sea level on the California mountaintop.

The rising sun outlined first the 135-foot-high silver dome of the world's largest telescope, the great 200-inch Hale. In a twinkling it caught a smaller dome close by that houses the wide-seeing Big Schmidt telescope, as remarkable in its own way as the Hale.

Star Portraits in Red and Blue

This daily miracle of sunrise on Palomar Mountain was lost on George O. Abell, the young astronomer of the National Geographic Society–Palomar Observatory Sky Survey. He was deep below the dome of the Big Schmidt in his darkroom, developing two 14-inch-square photographic plates made through the telescope in the hours just before dawn. One plate was sensitive to red light, the other to blue.

If all had gone well during his lonely vigil, if there were no faults in the emulsion, if the delicate focus adjustment of the Big Schmidt had been precise, and if there had been no failure in tracking the guide star, then the chances were good that George Abell would have something.

He would have captured, in incredible detail and clarity, an area of the sky as large as the bowl of the Big Dipper. He would have penetrated space to an approximate depth of 6,000,000,000,000,000,000,000 (six sextillion) miles—one billion light-years.

If the area covered by the plates was typical, he would have fixed, for men to study and try to understand, hundreds of thousands of individual stars and probably an even greater number of galaxies—entire systems of stars in space.

Abell gave the plates a cursory but practiced examination. They were good. He switched off the lights and moved across the hall to his small office.

Above his desk on the wall hung a dome-shaped chart marked with squares and oblongs, each representing a section of the sky, and together covering some three-fourths of the whole celestial sphere.

Unlike everything else in his trim office the chart was smudged and well worn. It had been on the wall a long time. Every square and oblong had been penciled in—save one. It showed white and bare (opposite).

Abell picked up his blue pencil and quickly closed the square with the hen tracks of celestial positions: right ascension, 13 hours 36 minutes; declination, plus 48°. Then he pulled on his heavy mackinaw, flipped the lights, slammed the door to the dome, and strode off across the field toward the "monastery," where tired Palomar astronomers sleep after their nightly labors.

If his step was unusually springy as he moved across the field, and if he made a little too much noise as he entered the monastery that bright frosty morning, I think George Abell can be forgiven.

After nearly seven years of work, shared by all of us at Palomar, he had completed observations for the National Geographic Society–Palomar Observatory Sky Atlas.*

Wide Eye of Palomar Scans the Skies

The 48-inch Big Schmidt, the telescope that made the Sky Atlas, is actually a gigantic wide-angle camera. Its name honors the late Bernhard Schmidt, the German optical pioneer who invented a correcting lens that made it possible to photograph large areas of the sky with virtually no distortion.

Whereas the 200-inch Hale telescope at Palomar sees an area of sky only as large as a quarter of the full moon, the Schmidt's wide

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Our Universe Unfolds New Wonders," by Albert G. Wilson, February, 1952; and "Mapping the Unknown Universe," by F. Barrows Colton, September, 1950.

"eye" encompasses a section equal to 200 full moons. In its cone of vision it captures stars a million times fainter than the human eye can see. It could photograph a candle flame 10,000 miles away.

When tests on the newly completed Big Schmidt were finished in 1949, we were deluged with suggestions from astronomers, each with a project for the telescope. To accomplish all of them separately would have required years. Instead, we decided to concentrate our efforts on one all-inclusive goal—a survey of the entire visible sky.

A definitive atlas of the heavens would embrace most of the other projects and problems. Distributed to observatories everywhere, it would offer the big telescope's matchless scouting power for other astronomers to follow.

Because of the magnitude of the Sky Survey, we of the California Institute of Technology, which operates the Mount Wilson and Palomar Observatories, needed outside help and support. The National Geographic Society, famed for its map making, was the logical place to turn. The Society joined us enthusiastically, providing generous financial and technical assistance.

In the end the survey took nearly twice as long as we had originally planned. Nights, weeks, even months of abnormally bad seeing delayed us. But slowly, year by year, the squares of the Sky Survey's master plan were marked in as completed.

From that night in the summer of 1949 when the first survey plate was made (it was of the beautiful North America Nebula in Cygnus, and became something of a Sky Survey trademark) until the plate numbered 1,758 was finished last May, astronomers have eagerly awaited the atlas from Palomar.

The nearly 100 universities and observatories here and abroad that have received the first volumes of the atlas have been unstinting in their praise. For the execution of what has been called the most extensive map ever conceived by the mind of man, Mount Wilson and Palomar Observatories must take full responsibility, both for its merits and for its possible shortcomings.*

The responsibility is shared by, among others, Dr. Milton L. Humason, the Secretary of the Observatories; Dr. Walter Baade, Dr. Rudolph Minkowski, Dr. Allan R. Sandage, Dr. Albert G. Wilson, Mr. Robert G. Harrington, Mr. Abell, the late Dr. Edwin P. Hubble, and myself.

The lion's share of the credit must go to Dr. Minkowski. His planning and general supervision of the survey are beyond praise. He personally inspected with a hand magnifier every square inch of the more than 3,000 plates taken. Many retakes were necessary. His insistence on the highest standard was largely responsible for the uniformly excellent quality of the atlas.

As Mr. Abell points out in the summation that follows, the Sky Survey is an encyclopedia of the future, holding facts yet unlearned of the farthest reaches of space.

* See "Completing the Atlas of the Universe," by Ira Sprague Bowen, NATIONAL GEOGRAPHIC MAGAZINE, August, 1953.

George Abell Fills In the Sky Survey's Last Gap

Each chart has 879 squares representing heavenly areas photographed by the 48-inch Schmidt telescope for the National Geographic–Palomar Observatory Sky Survey, a seven-year project. Lower chart shows date each area was first photographed; upper records delivery of prime-quality plates. Blank spaces in both represent extreme southern skies, which Palomar could not chart.

J. Baron Roberts, National Geographic Staff

Exploring the Farthest Reaches of Space

By George O. Abell
Astronomer, National Geographic Society–Palomar Observatory Sky Survey

A NEW universe, vaster and more filled with star systems than ever believed, unfolds to astronomers with the completion of the National Geographic–Palomar Sky Survey.

Charting the heavens to the incredible distance of a billion light-years, the survey has expanded known space at least 25 times.

New comets and asteroids have shown up within our own solar system. We know more of our home galaxy, the Milky Way. Hundreds of millions of other galaxies, near and far, have been mapped.

Survey Changes Concept of Universe

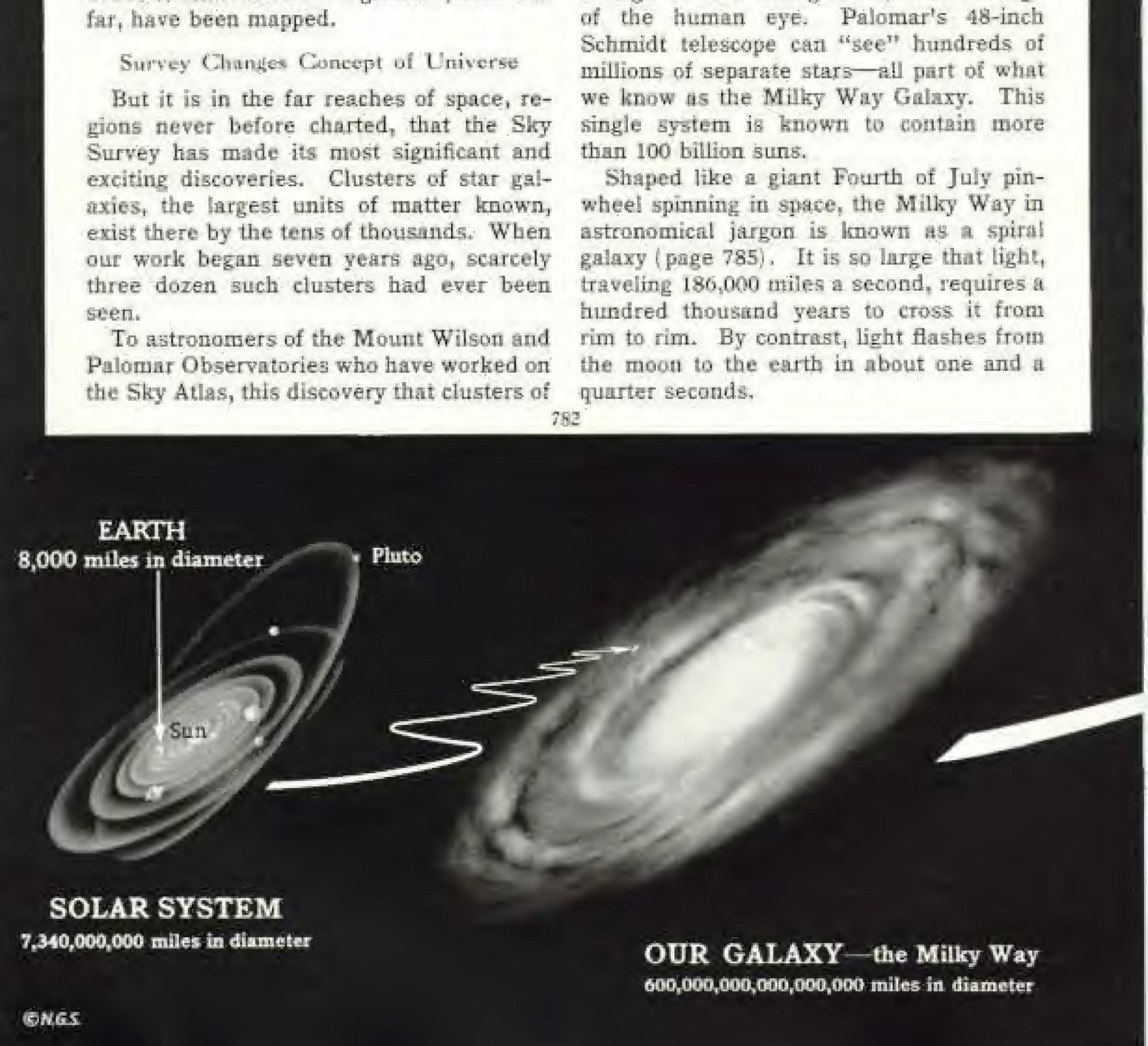
But it is in the far reaches of space, regions never before charted, that the Sky Survey has made its most significant and exciting discoveries. Clusters of star galaxies, the largest units of matter known, exist there by the tens of thousands. When our work began seven years ago, scarcely three dozen such clusters had ever been seen.

To astronomers of the Mount Wilson and Palomar Observatories who have worked on the Sky Atlas, this discovery that clusters of galaxies are all but innumerable has provided the greatest of many thrills. It has changed our whole concept of the universe, proving it far more complex than we had thought.

To appreciate what these clusters mean, we must understand what galaxies themselves are like.

As we look upward on a dark night the stars seem numberless. Yet in the entire heavens only about 6,000 stars are bright enough or near enough to be within range of the human eye. Palomar's 48-inch Schmidt telescope can "see" hundreds of millions of separate stars—all part of what we know as the Milky Way Galaxy. This single system is known to contain more than 100 billion suns.

Shaped like a giant Fourth of July pinwheel spinning in space, the Milky Way in astronomical jargon is known as a spiral galaxy (page 785). It is so large that light, traveling 186,000 miles a second, requires a hundred thousand years to cross it from rim to rim. By contrast, light flashes from the moon to the earth in about one and a quarter seconds.



CLUSTER OF GALAXIES

On the photograph above, taken with Palomar Mountain's 200-inch telescope, the artist has drawn a wavy line to convey a feeling of the inconceivable depth of space. Leading from his drawings of the solar system and our own galaxy (opposite page), this line points to a distant spiral galaxy, member of the Perseus Cluster, which resembles the Milky Way. Other galaxies, appearing as blobs of light, shine through and beyond the stars of our own system. This setting enables us to visualize our home galaxy, the Milky Way, not as the starry arch seen in the night sky, but as one of myriad great pinwheels spiraling in space. The Sky Survey has revealed thousands of such clusters, greatly expanding our knowledge of the universe.

Half a century ago most astronomers believed this one system to be the whole universe. But gradually, since Galileo first turned his telescope to the skies in 1609, odd hazy bodies were discovered that differed from single stars. Their edges were fuzzy; some had oval or elliptical outlines, while others were disk or spiral shaped.

Philosopher Guesses Correctly

As long ago as 1755, the philosopher Immanuel Kant speculated that these might be other galaxies like our own, far beyond the Milky Way. But it was not until very large telescopes were built—in fact until the 1920's, after the 100-inch reflector became available at the Mount Wilson Observatory—that Kant's guess was proved true. Many of the nebulous patches of light are really far-distant systems of billions of suns.

We look out past the stars in our own galaxy to see them, like looking past drops of rain on a window to the lights of other houses down the street. On some Sky Survey photomaps we can count as many galaxies as we can stars in our own system. The Big Schmidt has captured on many of its plates 50,000 and more galaxies in an area of sky no larger than the bowl of the Big Dipper.

That these distant "island universes" tend to form still larger systems, archipelagoes of galaxies, had been shown by research in recent years, both at Mount Wilson and Palomar and elsewhere. Yet when the Sky Survey began, only a few dozen isolated clusters of galaxies had been located and photographed.

With the first Sky Survey plates, astronomers who studied them began finding new clusters in astounding numbers. All early estimates were too low. Thousands, then tens of thousands, were counted.

Many are only faint blurs of light on the photographs. But when the 200-inch Hale telescope is turned to the skies, those blurs blossom into remote clusters of galaxies, some containing hundreds of members.

Over the past two years, between periods spent on Palomar Mountain actually making the Sky Survey plates, I have counted and catalogued 2,712 of the "richest" or biggest clusters discovered by the Big Schmidt. By making such a catalogue possible, the Sky Survey is furnishing clues to the size and make-up of the entire universe. Just as by counting stars in various directions astronomers learn more about the shape and structure of the Milky Way Galaxy, counting clusters can perhaps tell us whether or not all of space is uniformly filled with cosmic matter.

Clusters at the outermost frontiers charted by the Sky Survey, dim as they are, are of utmost importance in measuring the true distance from us of those frontiers. Dr. Milton L. Humason of Mount Wilson and Palomar, seeking objects at the borders of visibility, came to me one day with a strange request.

"What we need are 'smudges,' George. Keep your eye out for them."

The Sky Atlas is a happy hunting ground for smudges. One of them, when resolved by the eye of the 200-inch Hale telescope, proved to be the most distant celestial object ever seen by man. This cluster lies far more than a billion light-years away. To reach the earth, its light has been traveling through space for more than ten million centuries.

The remoteness of a far-off galaxy can be measured only by the brightness of its light to an observer on earth. The apparent brightness of a light, by a basic law of physics, diminishes by the square of its distance from the observer. Thus, if the sun were twice as far away from the earth as it is, it would seem only one-fourth as bright.

In the case of the far-off galaxies, it is somewhat like standing on a seashore and seeing a dim light out across the water. The light may be a weak masthead light on a near-by boat or a million-candle-power lighthouse beacon 20 miles away. Not only must we measure its apparent brightness, but we must know also its true brightness or luminosity.

Cosmic Distances Multiplied

Luckily we know by a direct method the true brightness of some near-by galaxies in our part of the universe. We assume that other large galaxies, wherever they are in space, have about the same over-all luminosity.

In a cluster, galaxies range from bright giant systems to dim dwarfs. Choosing the brightest, we measure the amount of light reaching us from those galaxies, and thus can compute the distance to the cluster. By revealing tens of thousands of new clusters, the Sky Survey is making it possible for us to measure distances in all directions.

It may be of interest to describe briefly one of the more direct methods used to determine the distance to the near-by bright galaxies. In the 1950's an inaccuracy in the cosmic distance scale was discovered that had caused

probably the most colossal underestimate ever made by man.

In the Milky Way certain peculiar stars that pulsate steadily can be seen, waxing and waning in brightness.

From years of study of these important stars, the Cepheid variables, astronomers had calculated their true brightness. They found also that their rate of pulse, the time it takes them to change from bright to dim and back again, corresponds closely to their maximum brightness.

Fortunately, Cepheids can be seen in some other galaxies as well, such as the famous Andromeda Galaxy. By observing their pulse rate, astronomers could assign them a true brightness, and from that could compute the distance to the galaxy.

Shortly after the survey began, Dr. Walter Baade of Palomar found with the 200-inch telescope that the real or absolute brightness of the Cepheids in Andromeda was four times greater than had been thought previously.

Astronomers, checking the Cepheids in our own system with modern techniques, found that they, too, were four times brighter than had been believed. Thus the basic yardstick of space expanded in length: All galaxies, not Andromeda alone, were twice as far away as had been originally computed. At one stroke distances in the universe were doubled, and the volume of visible space became eight times greater.

Even today the problem of cosmic distances is not completely cleared up. The correction to the most distant galaxies seems closer to three times than twice. Thus the Sky Survey, which was thought to reach out to something more than 300 million light-years when it began, now gives measurements of more than a billion light-years to remote clusters.

Survey Offers Clues to Creation

For ages men have questioned: How did the universe begin? Here again we expect the Sky Survey to help with the basic problem.

There are two conflicting theories that seek to explain the behavior of all that we see in the heavens. One holds that all matter was once closely packed together in a "super-dense" state. Then some tremendous explosion started this primeval matter flying outward in space.

The alternative theory holds that the universe is in continuous creation. As galaxies rush away in the expanding universe, others

785 Mount Wilson and Palomar Observatories

Spiral Galaxies: Blazing Star Systems

Pinwheel formations, their arms trailing rotating hubs, comprise about 80 percent of known galaxies.

Above: In the face-on portrait of galaxy NGC 3194, Palomar's 200-inch mirror shows stars never before seen as individuals. Satellite galaxy shines below it. ✦ Seen edge-on, galaxy NGC 4565 reveals a dark band of cosmic dust rimming the wheel.

Mount Wilson and Palomar Observatories

↑Red Plate Displays the Milky Way's Starry Host ↓Blue Takes a Thin Census

Sky Survey astronomers photographed each celestial area twice, on red-sensitive emulsion (above) and blue-sensitive (below). Interstellar dust blacked out many star images on the blue plate. An identical red exposure pierced the barrier and recorded more stars, revealing the amount of dust. Luminous clouds of hydrogen were invisible on blue plate but dazzling bright on red. Both photographs show a section of Sagittarius (the Archer, ninth constellation of the zodiac), a region in the Milky Way.

form to take their place. To create the galaxies, stars must be born. New matter must appear constantly in space, rather than have exploded all at once in some past epoch.

The Sky Survey will aid science to weigh these theories. Counting the clusters of galaxies, for example, may reveal whether matter is distributed evenly throughout space, or whether its density varies.

New evidence comes from the survey to support the basic concept of an expanding universe. A quarter of a century ago astronomers at several observatories, in analyzing light from distant galaxies, discovered the phenomenon of the "red shift"—that the light reaching us from those bodies is shifted toward the red end of the spectrum, showing that the waves of light are longer than they should be.

In 1929 the late Dr. Edwin P. Hubble at Mount Wilson found that the farther away a galaxy is, the greater its red shift is, in direct proportion.

This most important discovery led to an almost incredible realization: That distant galaxies are racing away from us and from each other at tremendous speeds, that the whole universe seems to be expanding rapidly.

Finding more and more remote galaxies to measure has taken long years. Locating new bodies at ever greater distances, first with the 100-inch and then the 200-inch telescope, has been like searching the heavens through a pinhole. Now, however, the Sky Survey has spread out the celestial sphere like a huge treasure chart.

Cluster Moves 38,000 Miles a Second

With the survey as a guide, Dr. Humason and Dr. Allan R. Sandage are measuring the speeds of more and more distant galaxies.

They have found evidence of the expanding universe at the farthest observable limits. The most distant galaxies yet measured reliably for red-shift velocity are moving away at some 38,000 miles a second, a fifth the speed of light itself!

A few months ago Dr. William A. Baum, also working at Palomar, applied independent techniques in observing very remote galaxies. Using special photoelectric equipment to detect the color of light entering the 200-inch telescope, he has estimated that one of the Sky Survey clusters, known as Cluster 1448, is receding at 75,000 miles a second—40 percent of the speed of light.

The Sky Survey also is finding new galaxies closer at hand.

Suppose a hunter were looking across the South African veld. He would see large animals grazing miles away. He would see birds flitting through treetops perhaps a hundred yards away. The tiny insects, however, though they swarmed about the hunter in far larger numbers, would be noticeable only when they were within a few feet.

So it is with galaxies, on a vastly larger scale. Giant luminous clusters can be seen at great distances, but faint dwarf galaxies must be relatively close to us to be seen at all.

Blink Microscope Tells Star Temperatures

This instrument presents rapidly alternating views of red and blue photographs of the same star field. Blue plate (above) accentuates the blue of hot stars; red emphasizes the red of cooler ones. Comparing a star's brilliance on both plates, the operator determines its color and hence its temperature. This graduate student at California Institute of Technology searches for very hot blue stars on the Sky Survey plates. Some of these hot stars are white dwarfs, which pack masses as great as the sun's into one-millionth its volume. Scientists believe they are stars grown old, collapsed, and so dense that electrons are squeezed from the atoms, leaving only solid nuclei.

J. Baylor Roberts, National Geographic staff

The survey has discovered swarms of these dwarfs. It now appears that they, like the insects in nature, outnumber giant systems like our Milky Way Galaxy.

Unbelievably vast clouds of dust hang like ghostly curtains in the sky, hiding many of the stars that lie beyond them.

Such dust clouds leave dark or empty-looking holes in the Milky Way. Astronomers call these "dark nebulae." Were it not for such clouds of interstellar particles, the Milky Way would be bright enough to read by at night.

More often the dust in space is not so obvious, but dims starlight insidiously without clearly revealing its own presence. Such interstellar matter was largely responsible for astronomy's early error in measuring the brightness of the Cepheids.

Gas Clouds Glow in Space

Clouds of diffuse gases also float in the space between the stars. In contrast to interstellar dust, this gas is almost totally transparent; it becomes visible only when extremely hot stars lie in or near it. Ultraviolet light from such stars is changed into visible light by the gas. This is the familiar process of fluorescence. "Bright nebulae," gas clouds glowing in the sky, are the fluorescent signs of space.

The Sky Survey has discovered many such clouds. It shows that others, such as the North America Nebula in Cygnus, are far larger than formerly thought.

Astronomers now believe that stars are probably being born from these clouds of interstellar gas and dust, contracting and gradually becoming warmer, until they blaze out with light.

All stars, including our sun, shine by atomic energy. The energy comes from nuclear processes deep in their interiors, where temperatures range up to many millions of degrees.

The color of a star reflects its temperature. The hottest stars are blue, while the coolest are a deep red. Sky Survey plates, taken in both blue and red light, give astronomers a way of measuring the temperatures of stars directly from the photomaps.

At Lowell Observatory near Flagstaff, Arizona, as well as at Mount Wilson and Palomar, this is already being done. Pairs of survey prints, one in red, the other in blue, are sandwiched between glass plates and compared beneath an instrument called a blink microscope (page 787).

What the astronomer sees in this instrument is first one picture and then the other in rapid succession. As the microscope blinks from the blue print to the red print and back again, any variation in the stars within its field becomes immediately apparent. Some appear to grow and shrink, for the blue plate exaggerates the brightness of hot blue stars and shrinks the cool red stars. The red plate does just the opposite. The color—and thus the temperature—can be determined by how much a star image changes in size.

Just as the stars and nebulae group into galaxies and the galaxies form clusters, so, too, stars often form groupings within the Milky Way Galaxy. The most spectacular are the "globular clusters," containing hundreds of thousands of stars. Thirteen very faint globular clusters were found in the Sky Survey, among them the most distant celestial objects associated with our galaxy.

Other star clusters are open and formless, occurring in regions of the galaxy containing much interstellar dust and gas. Some seem very young, others very old. By studying such new and old groups—and scores of them were turned up on the survey—we learn how stars may evolve, changing in size, brightness, and color as they age.

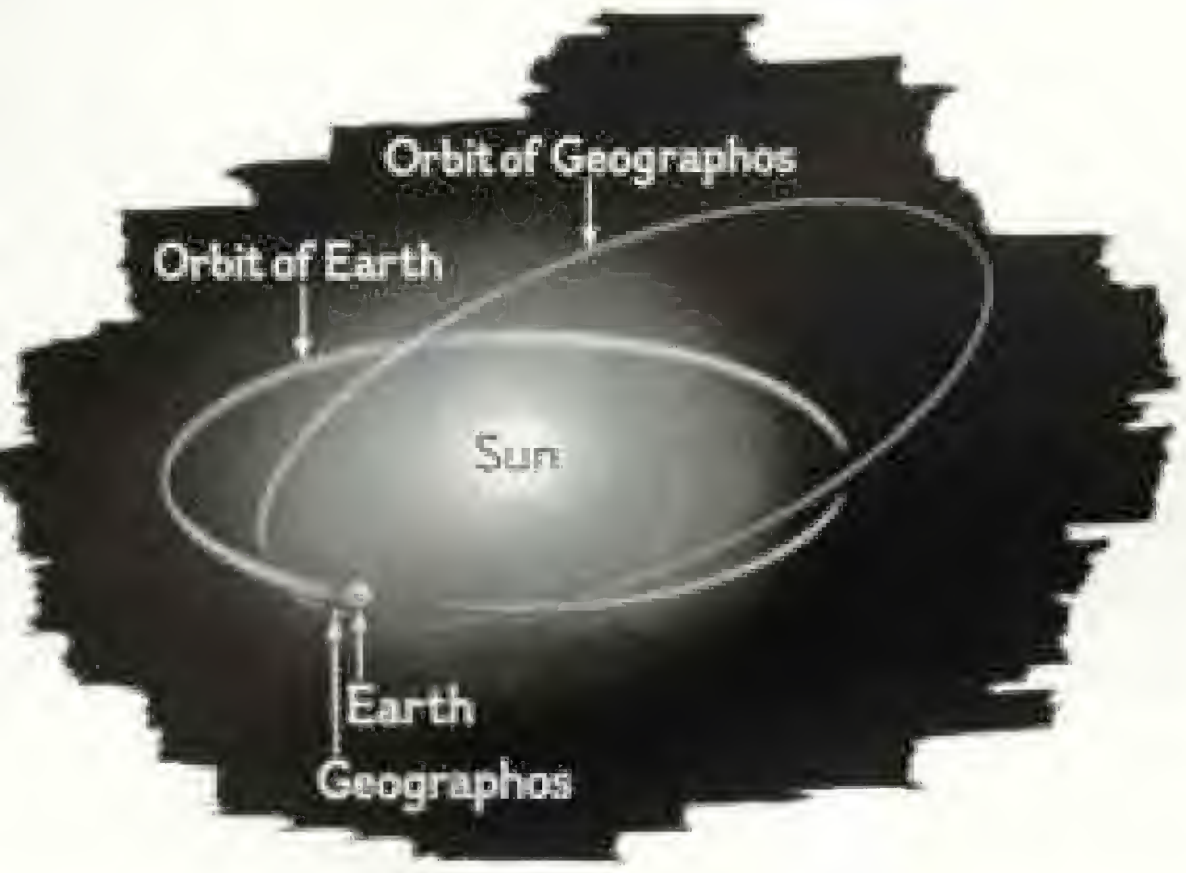
"Baby Planets" Circle the Sun

The purpose of the Sky Survey was to explore our galaxy and the distant reaches of the universe. We were not especially concerned with our home system—the sun, the other planets, and the moon. Indeed, the Big Schmidt with its tremendous light-gathering power cannot be used when the moon is above the horizon; the light quickly fogs the plates.

Here and there on the Sky Survey plates, however, appear tiny dashlike lines. They were made by near-by objects moving across the sky with great apparent speed relative to the stars beyond. Having moved in space in the time it takes to change plates, they seem also to jump back and forth when red and blue star maps are compared under the blink microscope.

These objects are the asteroids, "baby planets" circling the sun in regular orbits. Only a few ever approach the earth closely.

On the night of August 31, 1951, a remarkable near-by asteroid was discovered on a Sky Survey plate by Dr. Rudolph Minkowski and Dr. Albert G. Wilson. Probably not much more than a mile in diameter, the



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Gilbert M. Emerson

The Sky Survey Discovers Geographos, a Flying Rock One Mile Wide

On August 31, 1951, Dr. Rudolph Minkowski and Dr. Albert G. Wilson noticed a bright dash on a routine time exposure. Examination proved the streak was the track of an asteroid, or baby planet. One theory holds the asteroids are fragments of a missing tenth planet, which broke up, leaving the wide gap between Mars and Jupiter. Astronomers value asteroids approaching close to Earth as yardsticks to measure the solar system.

Palomar scientists named the new wanderer Geographos in honor of National Geographic's part in the survey. Astronomers figure its year at 17 months.

←Geographos is one of a handful of asteroids whose orbits swing inside Earth's. Its plane is inclined 13° to ours. Diagram forecasts the two bodies four million miles apart in August, 1969, their closest for the century.

↓Photograph, a 50-minute exposure, shows Geographos's track as a thin shaft of light at lower right.

Mount Wilson and Palomar Observatories

J. Baylor Roberts, National Geographic Staff

Shipping Addresses of the Sky Atlas Cover the World

The 1,758 photographs encompass three-quarters of the heavens and would form a map the size of a tennis court. Nearly 100 universities and observatories will receive sets. These men at California Institute of Technology address the fourth shipment in a series of nine. Five others will go out in the next two years.

tiny traveler was subsequently found to be following an orbit crossing that of the earth (page 789).

Very few other such asteroids are known in the entire solar system. The new celestial object is of great scientific interest because it can help astronomers measure distances in the solar system more accurately.

Dr. Samuel Herrick and Mr. Charles Hilton, of the University of California at Los Angeles, whose determination of the orbit of the new asteroid predicted its first return in 1954, report that in 1969 it will swing within four million miles of the earth, closer than the approach of any other asteroid of known orbit. Drs. Wilson and Minkowski have named it Geographos, "the geographer."

The name is appropriate, not only because of the National Geographic Society's association with the Sky Survey, but also because Geographos may be of aid in future cartography of the skies.

Comets, loose swarms of small solid particles and thin gases, likewise travel around the sun, but in highly elongated orbits. In the seven years of Sky Survey observations, eleven new comets have been found, all quite by accident. One was remarkable in having two tails, nearly at right angles to each other.

A comet has been aptly described as the "nearest thing to nothing that anything can be, and still be something." It would take perhaps a trillion such bodies to match the amount of material in the earth.

New Frontiers in the Universe

With this report to the members of the National Geographic Society, the astronomers who have worked on the Sky Survey have sought to show some of the fields in which this gigantic map of the heavens has contributed—and will continue contributing—to our knowledge of the universe.

Over the next two and a half years, as fast as we can reproduce them, copies of the Sky Atlas will be distributed to observatories throughout the world. Astronomers everywhere will have the opportunity to delve into its treasures. Their discoveries will in turn yield new problems and avenues of research. The way to the distant frontiers of the universe has only just been opened.

Tasmania, Australia's Island State

The Look of the English Countryside Greets Nostalgic Britons in a Land Made Prosperous by Rich Soil and Abundant Power

By Howell Walker

Foreign Editorial Staff, National Geographic Magazine

With Illustrations from Photographs by the Author

TASMANIA lies about as far from Great Britain as one can travel. Yet this heart-shaped island between mainland Australia and Antarctica reminds Englishmen of home.

The elms, oaks, poplars, and willows; hawthorn hedgerows and golden daffodils—all originally brought from the mother country—are as English as Wordsworth; and the hop fields, the red brick oast houses full of drying hops, and the white stone farm cottages seem to have been transplanted from Britain. To traveling Britishers, even the weather suggests home.

Tasmania once a Peninsula

Suppose the northern half of the Florida peninsula should sink beneath the sea. The southern half, become an island, would lie in relation to the United States almost exactly as Tasmania does to the rest of Australia. Moreover, the two islands would nearly match in size (map, page 794).

Tasmania once extended from the mainland as Florida does today. Eons ago a sinking of the land or a rising of the sea formed this bit of land 130 miles off the southeast corner of Australia. The ensuing isolation set apart many of the animals and plants, as well as the now extinct aborigines, as distinct primitive types.

Tasmania, mountainous home of about 315,000 people, is a big little island. On a good day you can fly all over it; but on the ground in some areas men have struggled 12 heartbreaking hours to make one wretched mile. Those men best know why a third of the island remains practically inaccessible, largely unexplored, and very like God made it.

You do not have to travel far from Hobart to learn this. In fact, a quick trip up Mount Wellington, in the capital's back yard, will do the trick. To make it even easier, you can drive to the 4,166-foot summit, as I did, in a car (page 792).

When I faced east and looked out over a city of some 97,000 persons, I turned my back on thousands of square miles of unsurveyed territory. In that wilderness—and nowhere else on earth—lurk such rare carnivorous marsupials as the wolflike Tasmanian tiger and the Tasmanian devil (page 795).

Dutch navigator Abel Tasman discovered Tasmania in 1642, but it remained wild and relatively unknown until 1804. In that year the island became a British penal colony. Soon sailors, whalers, sealers, and boatbuilders made the new settlement of Hobart a favorite haven of the southern seas.

Certainly Hobart developed more rapidly as a whaling base than as a convict settlement. In those riotous times of savage appetites, vicious thirst, and violent diversion, the city lived boisterously, dangerously. Today it is a peaceful, almost hushed, community of sea-minded folk who, from their homes or places of business, watch the coming and going of many ships.

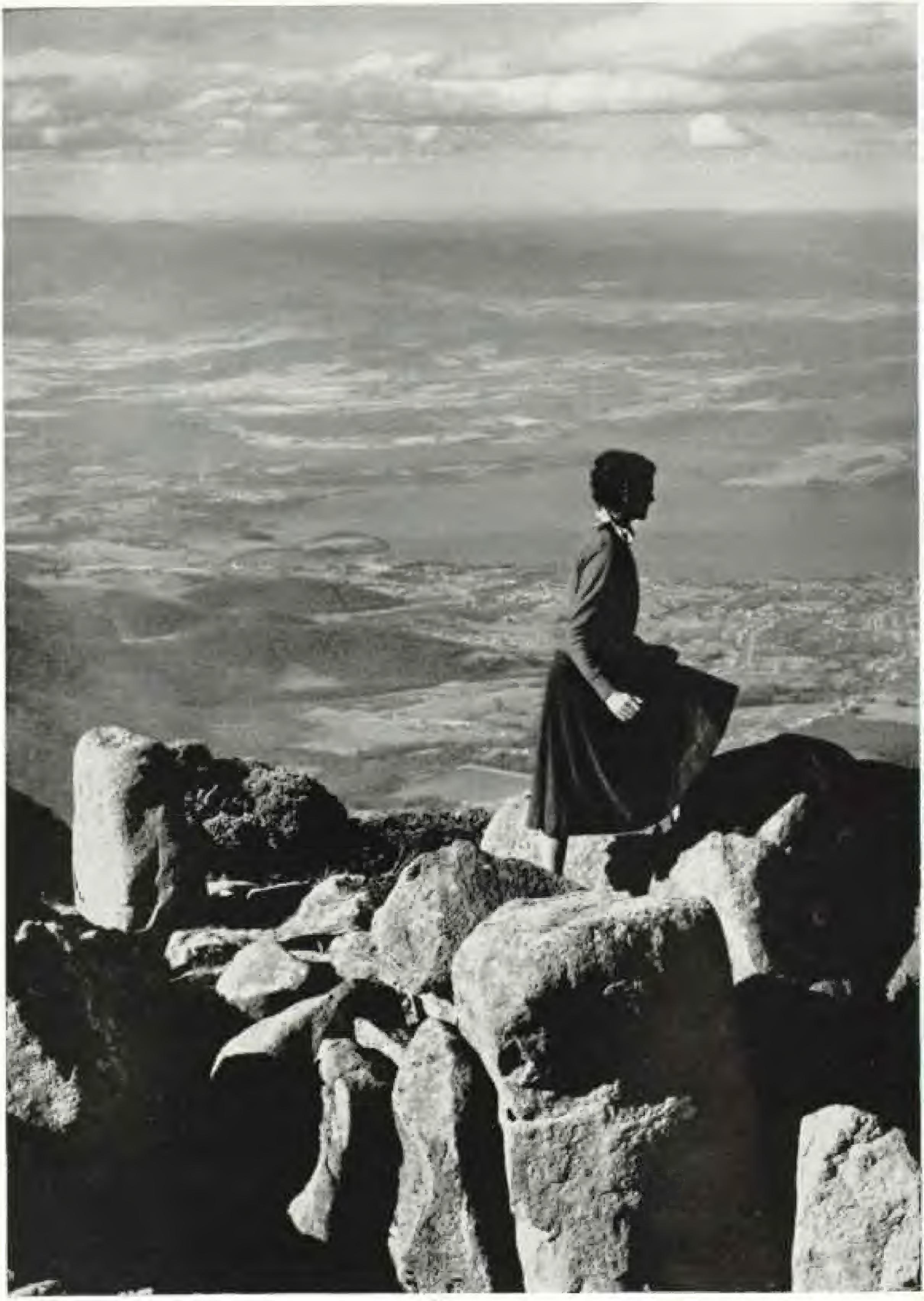
Industry Thrives in Island Capital

It surprised me to find that quiet Hobart also leads a vigorous industrial life. One day I walked through the Australian Commonwealth's largest chocolate-making factory, located in what must be one of the world's pleasantest industrial sites. Cadbury's, as everyone calls it, stands on an exclusive River Derwent peninsula among 246 landscaped acres, with a golf course and modern homes for many of its 1,000 employees.

Not far from Cadbury's a huge electrolytic zinc works looks like a town in itself. Overseas ships dock at the company's wharves to load more than 110,000 tons of pure zinc each year. The metal is used mostly for galvanizing iron.

In the same industrial area I visited wool stores, silk and textile printers, and heavy-duty foundries.

Standing among all this workaday activity, I could look directly across the River Derwent to a restful spot among the trees where



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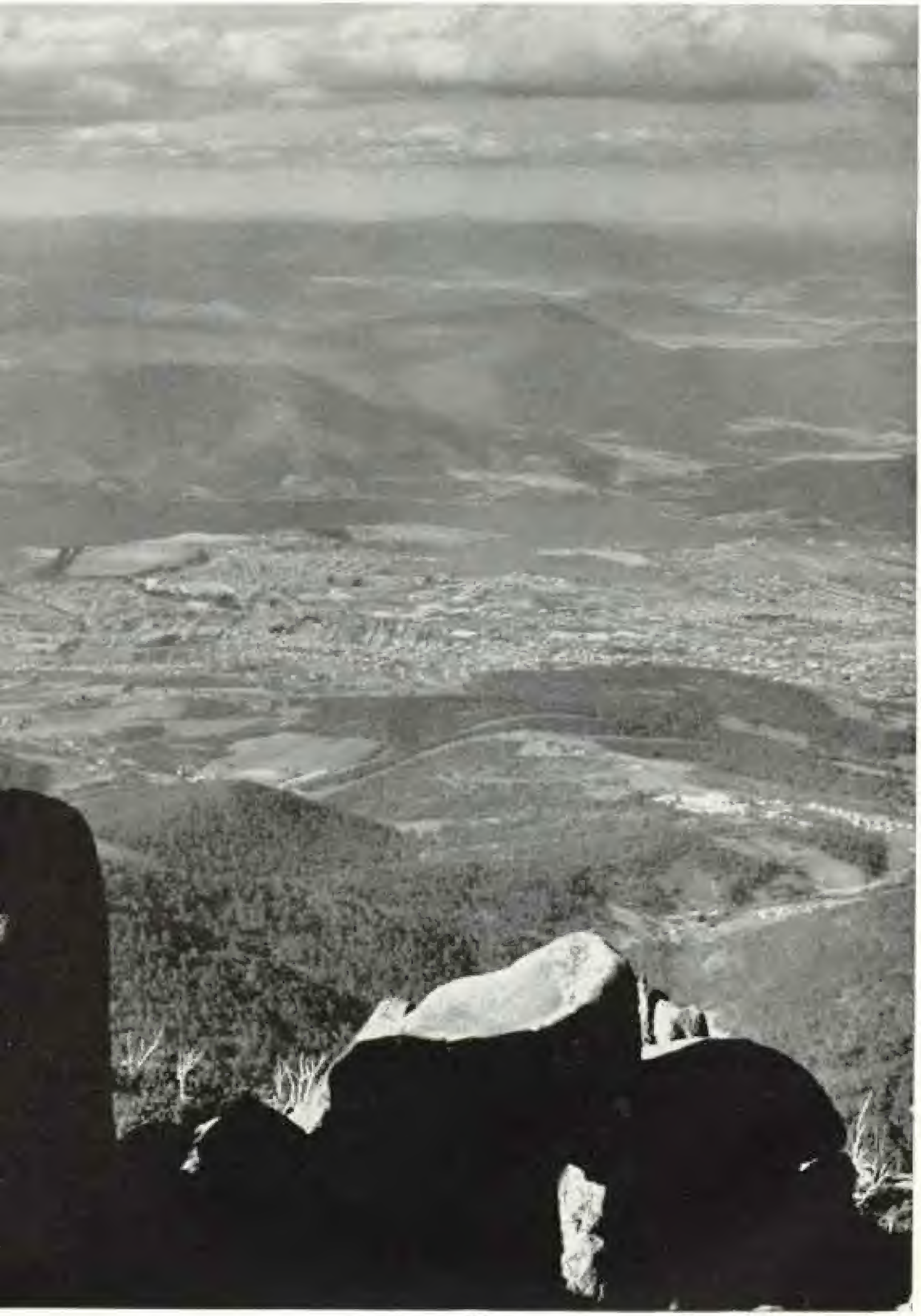
Mount Wellington Offers a Hawk's-eye View of the Broad Derwent Estuary



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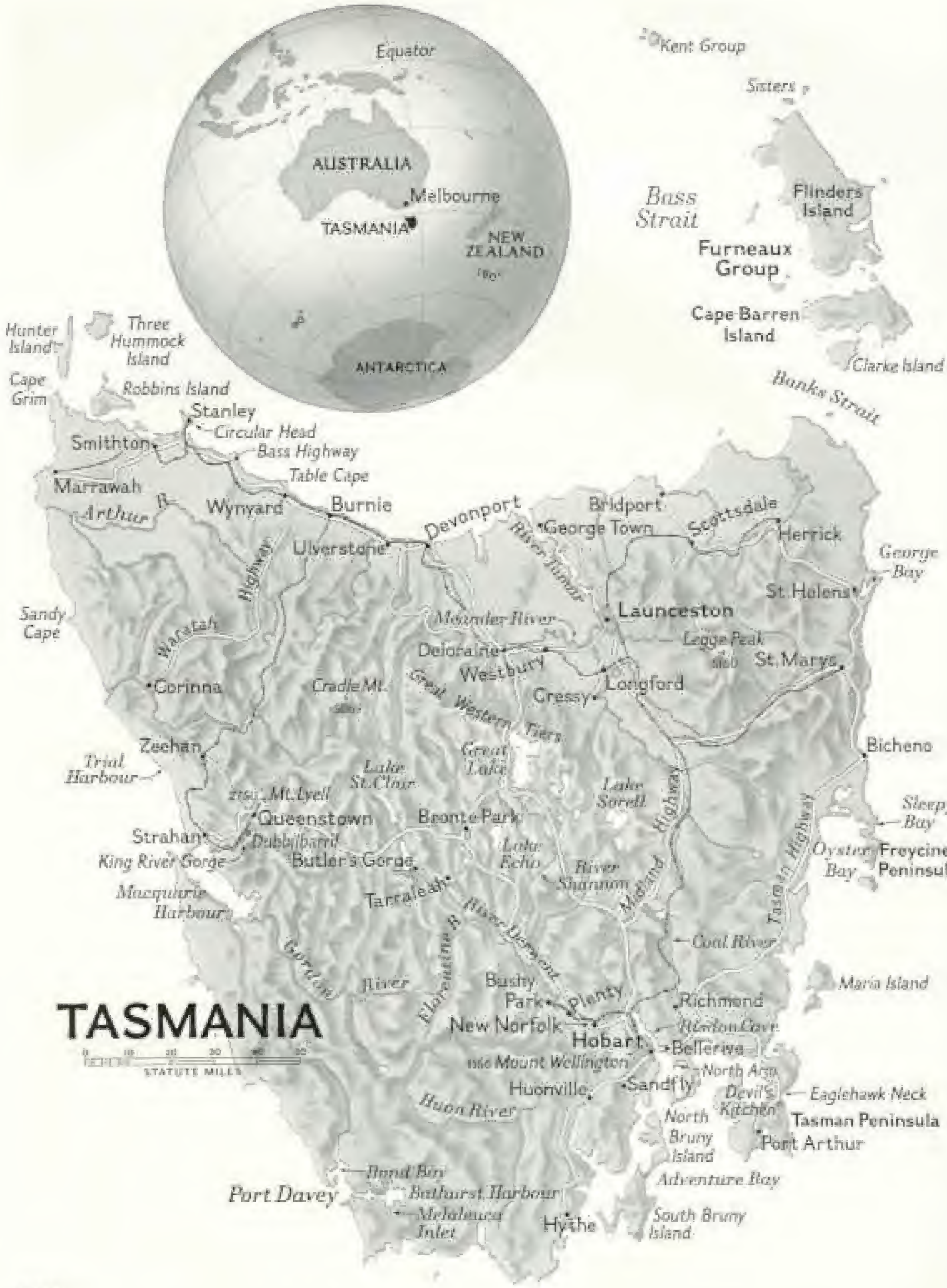
Hobart, Tasmania's Capital and Deepwater Port, Occupies the West Bank



130 Miles of Water Separate Tasmania from the Australian Mainland

Bass Strait covers the shelf that once joined island to continent. Tasmanians number some 315,000; most of them inhabit the coastal lowlands. The rugged central plateau remains largely unsettled, and the area inland from Port Davey has been called the "forgotten fifth" (page 810).

rises a solitary monument to a noble failure. Great Britain's first attempt to settle Tasmania, at Risdon Cove in 1803, lasted less than a year before the settlers abandoned it in favor of Hobart.

Until 1943 only ferries linked the shores of the Derwent at Hobart. That year saw the completion of an unusual bridge. It consists of 24 concrete pontoons joined in a smooth arc 3,807 feet long. Its entire length floats on the water. The bridge curves literally upstream to withstand current and wind. A high-lift span at the west, or Hobart, end lets the largest ships pass.

Hobart Waterfront Busy, Aromatic

Around Hobart's wharves, two blocks from the city's heart, I wandered for the pleasure of seeing ocean liners, freighters, and warships rubbing briny elbows with fishing smacks and yachts.

I watched a trawler come alongside with a load of live, coral-colored crayfish (page 805). A schooner near by was discharging lumber that smelled fresh as a bush sawmill. From a quayside factory drifted the steamy aroma of berry fruits cooking for jam.

One Hobart taxi driver, caught in a traffic snarl, commented to me, "This place is getting more like New York every day."

If so, it still has a long way to go. Hobart is not a city of impersonal bustle; rather it has the genial, easy-going ways of a pleasant small town. Even brief acquaintances greeted me with first-name friendliness. Once I asked a stranger for directions, and he finished by inviting me to tea.

And over a cup of tea, to be sure, the Lord Mayor and I talked of Hobart's early architecture. Convict-raised structures recall Tasmania's tragic first half century as a grim, distant prison at least three sailing months away from England. On the other hand, the Lord Mayor called these buildings the city's greatest asset and most notable feature. In effect, they make Tasmania the architectural treasure island of Australia.

The old stone buildings stand out with ageless dignity amid modern shops and glass-walled offices. They include Parliament House and waterfront warehouses dating from whaling days; the elegant Theatre Royal, opened in 1837; and a brewery which, since 1832, has been converting a mountain stream into one of Australia's favorite beverages.

At first Tasmania was a jail in itself. The prisoners did not languish behind bars; they worked on Government projects. Being human, some took advantage of their relatively free state and had to be confined.

Thus arose the need for a penal settlement —Port Arthur, established in 1830 at the southeastern corner of the island. Today mellow ruins of hand-worked brick and stone belie the misery endured here by some 50,000 convicts. Many were transported for life from England to Tasmania for such offenses as stealing a handkerchief or a bushel of barley. I came across the record of a young carpenter, sentenced to life for "privately skating"! On someone's private ice, I suppose.

At Port Arthur forced labor constructed a model prison, arsenal, commandant's residence, and a church designed by one of the prisoners. But, like the penal system itself, they now lie in ruins. Transportation of convicts to Tasmania ceased in 1853. In 1877 Port Arthur was completely abandoned.

I saw it on a golden summer day. Grass carpeted the floor of the roofless church; plants squeezed through pink bricks in the crumbling hospital wall (page 815); and wild roses softened the cornerstones of the shell that was a penitentiary.

Tasmanian Devils Live Up to Their Name

Coal-black fur and fierce expression earned a forbidding title for these carnivorous marsupials, which exist only in Tasmania. The badger-size animals have been known to ambush and kill large sheep.

← Tasmanians Honor Discoverer Tasman

More than three centuries before the British liner *Goolie* sailed up the Derwent estuary to Hobart (above), Dutch explorer Abel Tasman, commanding the ships *Heemskirk* and *Zeehaen*, sighted the island and named it Van Diemen's Land in honor of his sponsor, the Governor General of the Dutch East India Company. Later it was renamed Tasmania in his own honor.

Here Netherlands-born Piet Marée, who emigrated to Australia after World War II, shows his daughter a model of the *Zeehaen*. Artist, author, and photographer, he runs a studio and teahouse near Ulverstone. One of his pupils carved the wooden bust of Tasman.

Gothic Arrives in Hobart, Tasmania, with England's Queen

Elizabeth II, accompanied by her husband, the Duke of Edinburgh, was the first reigning monarch ever to visit Tasmania, one of Australia's six States.

The royal party, making a world tour, reached the island on February 10, 1954, for a 4½-day visit. Touring by plane and car, the Queen and the Duke inspected cities, farms, and wild mountain scenery.

Tasmanian flag (foreground) flies in welcome. The sailors wear the uniform of the Royal Australian Navy.

Sailboats Race on River Derwent

A lavish regatta, commemorating the island's discovery in 1642, is staged each year as Tasmania's national birthday celebration (page 812). Sir John Franklin, a governor of Tasmania, who later met death in the Arctic while seeking the Northwest Passage, originated the celebration in 1838.

Ten miles north of Port Arthur an isthmus called Eaglehawk Neck formed a natural bottleneck for convicts trying to escape. In addition to armed guards on the spot, ferocious dogs, chained across the narrow stretch, frustrated runaway prisoners. Nevertheless, a few swam to freedom and lived quietly or took to bushranging, robbery, and violence.

Farther north along the east coast I explored Freycinet Peninsula. The woods were wildly gay with red and white heath flowers. From salmon-colored granite cliffs rising steeply around Sleepy Bay, I watched the sea turn from indigo blue to palm green as it washed over submerged rocks, then lunged, roaring and frothing, at the roughhewn coastline.

Except for an inland jog at St. Marys, an old mining town and center of the State's coal industry, the Tasman Highway north of Bicheno divides forest and seashore. I followed it to St. Helens, which looks more like a bird sanctuary than the fishing village it is. Black swans by the hundreds, gulls, pelicans, oyster catchers, cranes, herons, and cormorants, bald coots, ducks, and plovers congregated on George Bay.

Across the mountainous northeast corner of Tasmania I drove through well-farmed fields around the little market town of Scottsdale, spending the night at Bridport on Bass Strait. This restless channel separates the island State from the mainland of Australia.

Prosperity Began with Sheep

I enjoyed knocking around the rugged countryside and changeless villages of Tasmania, but it was a pleasant change to enter a city.

Launceston, half the size of Hobart, is the island's only other city and its chief port in the north. For a parklike place with a wild gorge in the back yard, it manufactures an astonishing range of items, including clothing, disinfectants, canned fish, breakfast food, tools and jigs for automobiles and aircraft, boats, thermostats, bedding, tennis rackets, leather, tallow, paint, and ice cream.

Tasmania's richest sheep-grazing district lies to the south of Launceston, which has become a wool-processing center.

In one of the four woolen mills I watched production of sweaters, blankets, carpets, and men's heavy socks. Most of these socks were pink, and I asked why.

"Because Tasmanian workmen like that color," said the manager.

I started to ask why again, but checked myself. Why, one may as well ask, are blue jeans blue?

The Midland Highway links Launceston and Hobart. This main north-south road passes through the principal pasturelands, the most Australia-like part of the island. Here spread wide, flat, grassy plains with occasional eucalypts bending in the wind; long straight fences range far from homestead and shearing shed.

Sheep, before anything else, brought a lasting economy to the island. With fortunes from fine wool, men erected the handsome brick and freestone mansions one sees so often in Tasmania. Earlier estates like Brickendon, near Longford, date from the 1820's, when the colony was just a teen-ager. Then bushrangers raided properties and drove off livestock. So the Brickendon homestead was built around a large courtyard into which stock could be driven in such an emergency. Across one end of the yard I saw the heavily constructed gates that kept the animals in and the bushrangers out.

Water Makes Tasmania Powerful

Tasmania got off to a good start with sheep, and the grazing business still contributes substantially to the island's prosperity. But today more Tasmanians work in factories than on the land. Industries have moved over from the mainland, or from much farther afield, at a rate that alarms those Tasmanians who want to keep the island as they've always known it—quiet and unspoiled.

For the inevitable change, I'm afraid, Tasmania can blame only itself. As they say down here, the industry behind all industries is production of electric power; and tiny Tasmania, less than a hundredth part of Australia's area, contains 50 percent of its water

Page 799

Queen Elizabeth Unveils a Memorial → Marking Hobart's 150th Anniversary

Tasmania had to wait 162 years for its first permanent white settlement. In 1804 an English contingent camped among gum trees at this spot.

Now the home of some 97,000 people, metropolitan Hobart sits beside its excellent harbor under the bulk of 4,166-foot Mount Wellington.

To see their Queen, men and boys shinny up the mass of craft moored at Victoria Dock. The Duke of Edinburgh stands opposite the Queen. Two members of Hobart's Sesquicentenary Committee attend the royal couple.

800

Flat-topped Circular Head Towers Above the Village of Stanley

Residents refer to their mesalike bluff as "the Nut." They have quarried it for foundation stone.

power. Plenty of rain and a high central plateau with large lakes send electricity to 9/10 of every 100 homes.

Naturally, such convenient power brings industry to the island. Since World War II, for example, 560-odd enterprises have sprung up. I visited newsprint, fine paper, and textile mills; zinc, brass, and copper makers; the only aluminum ingot plant in Australasia; and the Commonwealth's only carbide works, where men brewed cozy pots of morning tea on the crust of the cooling product.

In the central highlands I saw the growing network of dams, reservoirs, canals, power stations, and pipe and transmission lines. Some communities, like Bronte Park, began as work camps under canvas and have grown into towns with shopping centers, banks, post offices, schools, churches, and theaters.

At Butler's Gorge an engineer walked with me along the crest of Clark Dam, which supplies Tarraleah Power Station (page 818). We gazed 200 feet down the immense concrete face.

"Couple of months ago a young woman fell from where we're standing to those rocks

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in the stream bed," the engineer told me.

I could only say, "What a terrible death!"

"Oh, no," said the engineer. "She survived."

True. The same woman later served us lunch. She appeared perfectly well—and pretty, too.

Valley of Pastoral Peace

Below the dam the flow swells into the River Derwent, which tumbles roughly out of the mountains, then levels off to wind through farmlands, passing an occasional village deep in bucolic peace.

A mile west of the town of New Norfolk the river skirts the hop fields and apple orchards of the Warner estate (page 803). I stopped here one day to photograph a red brick oast house with a weather-gray shingle roof, and met friendly James Warner and his family.

As I look back on my stay among these island folk, Jim Warner personifies the Tasmanian attitude toward visitors interested in the little State. He introduced me to high Government officials and humble hop-pickers, eased my way to the roof of a Hobart jam factory to make the picture of Queen Elizabeth II on page 799, and spent a week of his annual vacation traveling with me. To be brief, Jim did everything I asked of him except show me a duck-billed platypus in the wild, and I'll give him full marks for trying to do even that.*

Where Hops and Apples Thrive

Warner told me that the Derwent Valley grows about 87 percent of Tasmania's total hops production. Green hops look somewhat like Brussels sprouts and grow on 18-foot-tall vines trained on strings stretched from the earth to overhead wires (page 817). Kiln-dried hops give beer its characteristic flavor. Since beer is a popular beverage in Australia, the demand keeps farmers hustling.

In the Warners' fields I saw whole family units, including babies, turn the work into a happy outing. At noon they stopped to eat picnic lunches among the aromatic vines.

As I finished photographing a family group, the daughter came to me and said, "Mummy wants to know when your book's coming out."

"Not for a year at least," I said.

"Stone the crows!" the mother cried. "We'll all be dead by then!"

Jim Warner supervises the hops department of the Warner estate, and his brother Frank manages the apples. Both crops are harvested in March and April, by far the busiest time of the year in the Derwent Valley. Frank showed me a tree that once yielded better than a ton of apples—between 45 and 50 bushels.

For a glimpse of the island's most extensive orchards, I drove 20 miles southwest of Hobart to the Huon Valley. Orchards border the highway into Huonville, the apple capital; they grow down to the riverbanks and up the hillsides, surround numerous packing sheds, and all but take over the town.

* See "Australia's Patchwork Creature, the Platypus," by Charles H. Holmes, National Geographic Magazine, August, 1959.

Tasmania Is Called the Apple Isle for These Good Reasons

In export value to Tasmania, apples rank next to wool (page 809). Average yield is five million bushels.

Doughty Capt. William Bligh of *H.M.S. Bounty* brought the State's first apple trees. Today the Huon Valley, 20 miles southwest of Hobart, produces the biggest crops. Orchards spread for miles around the market town of Huonville. Trucks cart the fruit to Hobart wharves, and refrigerator ships carry it to world markets.

This young man, working on the estate of Frank and James Warner, a mile west of New Norfolk, picks a variety called Tasman's Pride. Autumn's apple harvest begins in mid-February and continues into May.

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Excursion Boat Ruffles the Derwent

Bucolic beauty, peace, and quiet impress travelers on the 15-mile cruise from Hobart to New Norfolk. Derwent Valley shows them some of the island's oldest and finest farms.

Here hop vines (center) climb strings to reach horizontal wires 18 feet overhead (pages 816-17). Dried in oast houses, or kilns, the hops help to flavor beer.

Rails beside the highway (left) carry pulpwood to a mill around the river bend.

A broad swath through the timbered hills marks the course of a power-transmission line (page 818).

To earn money during summer holidays, these Australian mainlanders pick raspberries in the fields near Sandfly.

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Wicker Lobster Traps Suggest Wasps' Nests

Tasmanians bait and sink these baskets in coastal waters to snare the clawless crayfish (opposite). New Englanders prefer a boxlike pot made of laths. This Stanley fisherman has hauled his boat ashore for repainting.

Truck after truck, laden with cases of apples, crawls away through the hills toward Hobart. Apples spill onto the streets. Apples replace flowers on dining-room tables. Children eat apples as they play games or ride bicycles. I kept apples handy in the car to top off picnic lunches.

Edging into a long convoy of loaded fruit trucks, I followed them to Hobart's docks. Ships of all sizes and flags crowded the wharves. Most of the vessels were swinging crates of apples into their cold holds.

Tasmania's very first apples were planted on off-lying Bruny Island by a seafaring man associated more often with breadfruit and mutiny. Capt. William Bligh's botanists in 1788 set out several trees at Adventure Bay.

Bruny, 31 miles long north and south, varies in width from 500 yards to 10 miles. On a map the island takes the shape of a scrawny kangaroo. The well-scattered population numbers some 600. They raise apples, cattle, and sheep, or fish and cut wood for a living.

A resident farmer, Tom Smith, drove me around the island in his Ford. Where sharp winds sing in the tall dune grass and the sea whispers to the long, sandy beach, we found a colony of penguins. It seemed almost improper to find them here, solemnly walking about in the relatively warm air instead of enjoying bitter Antarctic weather.

Tom introduced me to John McLean who, after a lifetime at sea, settled into the cottage he built overlooking Adventure Bay (page 813). He called himself Bruny's unofficial historian and showed me the manuscript of a story he was writing about Truganini, an aboriginal woman born on the island early in the last century. She died in 1876, the last full-blooded Tasmanian aborigine.

The dark-skinned aborigines of Tasmania were a mixture of various racial types similar to those on the mainland. Early British colonists found them struggling with a way of life like that of Europe's prehistoric cave men. The white man's coming hastened their dwindling numbers toward extinction.

Plenty Trout Made History

Back at New Norfolk Jim Warner invited me to ride a few miles up the Derwent to a place called Plenty in a restful setting of ponds and poplars. Here is a hatchery that made history. First to hatch trout in the Southern Hemisphere, it sent the ova of brown and rainbow species to Australia, New Zealand, and even Java. Plenty also stocks the accessible rivers and lakes of Tasmania.

Today visiting anglers rate the River Shannon among Australasia's best trout-fishing grounds. Its first half mile, flowing from 3,333-foot-high Great Lake, has been described as the world's shortest but most exciting trout stream.

Here around the end of November the fish come in thousands to gorge on myriad caddis flies learning to use their new-formed wings. That's when the "Shannon rise" is on. Anglers from everywhere in Australia, and sometimes from as far away as Britain, converge at Great Lake's little outlet.

Skirting the lake's western shore, I coasted downhill to Deloraine on the north. The small farming town sits neatly astride the Meander River, which does indeed meander through a marvelously fertile countryside—a patchwork of chocolate soil, bright-green oats, and buff-colored paddocks.

Hawthorn hedges heavy with red berries, sweetbrier, and dry stone walls border rolling fields where sheep and cattle fatten. Random eucalypts make islands of shade, and purposeful lines of pines break cold winds off the Great Western Tiers. Areas cleared for cultivation only a century ago suggest long-settled, mellow English landscapes.

I stopped to photograph a woman in a faded red blouse and gray flannel skirt. She was digging potatoes.

"You're making a mistake," she warned as I focused. "I'm from the city. Just out here for fun. Any farmer would spot my poor form."

Tasmania grows about a fourth of all Australia's potatoes. And the northwest littoral yields 80 percent of the island's output. Potato farms stud the reddish-brown soil between the shore and undeveloped back country. Table-top capes, quiet coves, sea-loud headlands, and soft sand beaches alternate along this coastal belt.

The northwest's biggest industry grew up at Burnie. Beside a port that can take the largest ships, Associated Pulp and Paper Mills, Limited, manufactures fine writing and printing paper from timber milled in the district. The plant also produces wallboard, greaseproof paper, and vegetable parchment.

After the intricacies of papermaking, the

Call It What You Will, Crayfish Spells a Feast

Frenchmen label this gourmet's delight *langouste*. Floridians call it crawfish. Others say spiny lobster. Tasmanians freeze and export this species, *Jasus lalandii*, for sale in the U. S.

Frank Burke

open road westward seemed refreshingly ingenuous. I drove to Wynyard and on to near-by Table Cape. It was good to stand there in the stinging salt wind and look with pleasure in any direction: waves lathering the cliffs; black-and-white cows in a wet, green meadow; a wall of loose mossy stones; the coastline fading vaguely into the gray of sea and sky.

From Table Cape I could just make out the promontory named Circular Head, now sometimes called "the Nut." This massive rock rises sharply out of the sea from the side of a five-mile-long peninsula. Under the flat-topped bluff squats the village of Stanley, with its old stone homes and terraced streets. Part of the Nut was blasted away to make a foundation for Stanley's wharves, from which villagers ship fish and timber (page 800).

At Stanley I watched Oscar Etchell weave a crayfish pot, starting from scratch with wire stays, cane, and *manuka* (tea-tree) saplings. The finished trap looked like a well-ventilated wasps' nest with a hole in the top. Through this aperture would pass some of the most delicious crayfish in the world (pages 804-5).

Coastal Quest for Muttonbird

Reg Needham, a Tasmanian acquaintance, was waiting for me at Cape Grim, the northwestern corner of Tasmania (page 814). Earlier, in Burnie, we had arranged to meet here to see some of the island's wildest coast and hunt for a muttonbird (*Puffinus tenuirostris*), a species of shearwater.

Nesting muttonbirds burrow into wind-blown hills near the sea. So we climbed around the tussocky slopes, searching for something like a jack rabbit's hole. At last Reg found a burrow with a lived-in look. Into it he probed with a long piece of wire to see whether anybody was at home. Yes, sir. Now to reach in up to the shoulder and bring out the quarry. Since I had gloves, I volunteered. Out came a dark, fluffy ball with untried wings and bent beak.

Such fatty fledglings, I am told, make the best eating; however, after photographing this one, we returned it to the burrow.

"Well," a friend said later, "you're lucky there were no snakes in that hole."

Tasmania has only three snake species: Australian copperhead, whip, and tiger. All are poisonous.

Some Tasmanian roads end abruptly—because there is nowhere else to go. The Bass Highway meets such a fate at Marrawah on the west coast. I reached this small dairying community after miles of dark swamp and incredibly dense tea-tree forest—all weird, lonely, silent, almost frightening.

But a Government project now under way between Marrawah and Smithton will clear 37,000 acres of trees standing thick as bristles in a brush. Tall, slender trunks grow so close together that a man can hardly worm his way through them. Heavy modern equipment is removing the forest and draining the fertile land, largely for dairy farming. This clearing job may last until 1966.

As yet, no automobile road connects the northwest coast with the major mining districts to the south. So I drove my car up something like an old-fashioned grease rack and onto a railroad flatcar. Jim Warner—he never missed an opportunity—introduced me to the engineer, who invited me into the cab of his diesel locomotive for the trip to Zeehan.

Port's Permanent Population: One Hermit

Occasionally the engineer stopped the train to let me photograph a gorge or cliff or prominent peak. In this wild region I had hoped to catch a glimpse of the Tasmanian tiger or Tasmanian devil, but these rare marsupials did not show. The Tasmanian tiger is, in fact, so seldom seen that some naturalists believe it now extinct.

Getting my auto off the flatcar at Zeehan was entirely up to Jim and me. We accomplished it with the aid of a couple of planks.

Firm local faith keeps Zeehan, onetime "Silver City," from the nebulous status of a ghost village. Once Tasmania's third largest town, it now has barely 700 residents. The mining district of Zeehan shipped quantities of silver-lead ore through a small port at Trial Harbour which is no longer a port; nor is it entirely abandoned. One perma-

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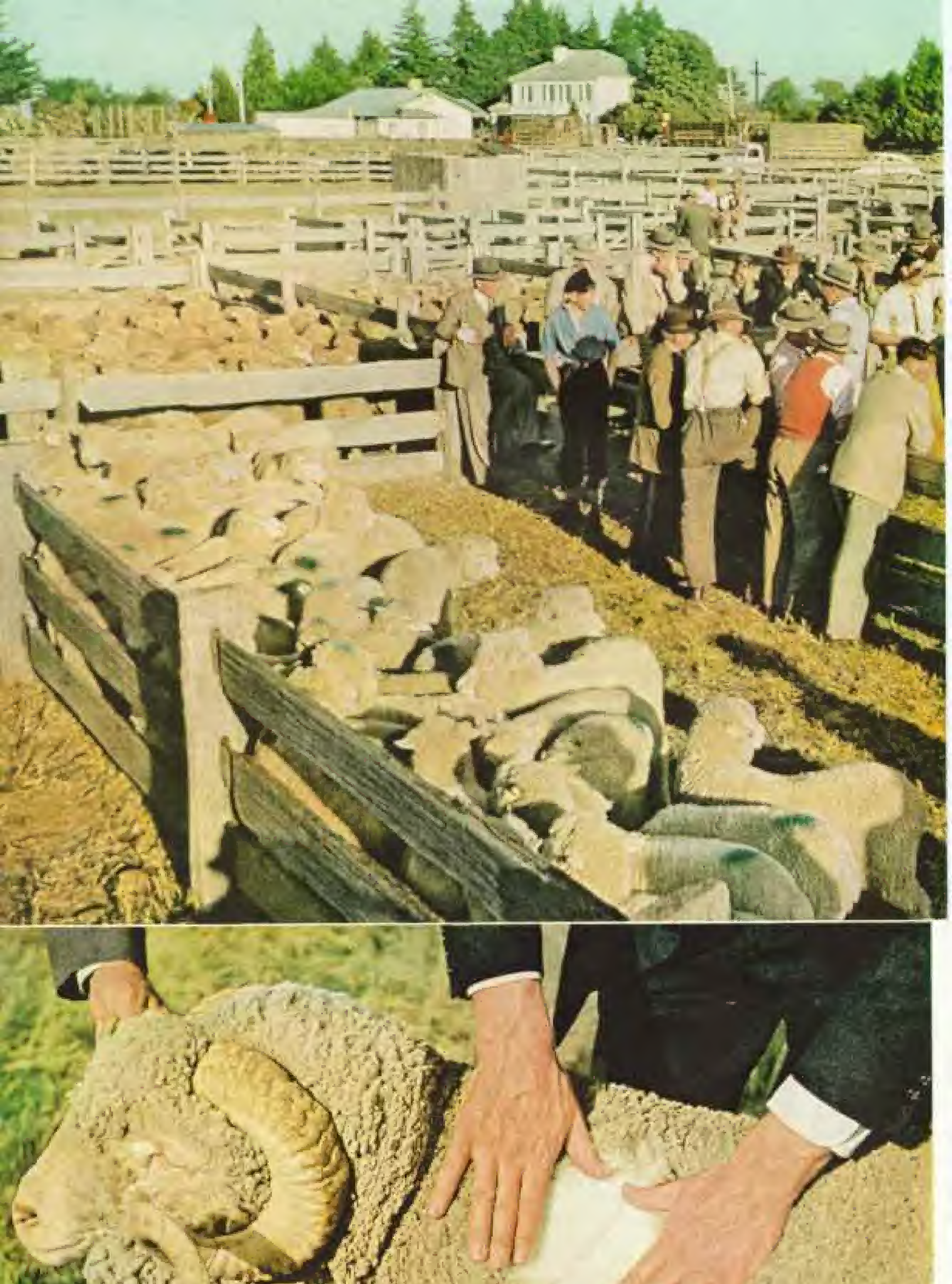
Page 806

← Two Slender Branches Point the Way for the Downfall of a Giant

These lumberjacks in the Florentine Valley work about six feet above ground on two-by-fours inserted into the trunk of a 250-foot gum (*Eucalyptus regnans*). Having undercut the tree, they pause for a reading to help judge the line of fall. The tree hit the target area precisely—20 yards from the loggers' cabin. The wood was hauled to a mill near New Norfolk and ground into pulp for newsprint.



Tasmanian Wool Brings Eager Buyers and Record Prices at Westbury

Sheep came ashore with Tasmania's first settlers.

Fine-fleeced Merino sheep originated in Spain, where their export was forbidden for many years.

One pioneer breeder, Elizabeth Forlonge, emigrated to Tasmania in the 1820's with 100 Merinos. She described their wool as "fine enough to weave into an angel's fold." Today the Forlonge strain runs through most of the island's purebreds.

Stockyards such as this bring $14,500,000 a year to Tasmanians for their 20 million pounds of wool. Their flocks number about 7½ million animals.

Page 808, lower. The hands of Roderic O'Connor expose the rich fleece of a Merino stud ram that cost $2,500. Breeders tell of another Merino ram, President, that brought some $8,000 in 1896. The clip from the Connorville estate near Westbury has often set price records for Australian wool.

A mounted shepherd, helped by his dogs, drives a flock of crossbred ewes down a country road near Longford.

nent resident—a hermit—stubbornly stays on.

It is at Queenstown, Tasmania's chief mining center, that the island's resemblance to England breaks down. No question about it, Queenstown is unique.

This copper-mining community lies deep in a valley surrounded by a hundred coppery hills, all denuded by forest fires or wood cutters, scarified by sulphur fumes, and eroded by endless rains. Colors change from mauve to oxblood to orange to mustard to pink with the passing of wind-driven clouds; the barren earth flashes to life in the sun and blushes in bumpy nakedness against blue sky. Just as suddenly it fades into dirty gray mists, and the rains begin again, to maintain an average of more than a hundred inches a year.

Someone described the region as "hell with the fires out." I found it exciting but eerie, fascinating, haunting, verging on the unreal. Dramatic and Dantesque, it looks as if it might start steaming at any moment.

Copper Keeps the West Alive

High above the town I stood in a windy drizzle at the edge of an opencut copper mine. Fifty-foot steps terrace the sides of the vast crater. Drills and dynamite loosen the ore scooped up by electric shovels and dump it into 20-ton trucks. Unloaded into a heavy-duty crusher, it drops down a shaft tunneled through the earth to a station 750 feet below.

From here the ore goes by electric train to the concentrating plant and smelter. The Mount Lyell Mining and Railway Company, Limited, annually treats 1,600,000 tons of ore to produce 8,500 tons of electrolytically refined copper.

The Queenstown area has a population of some 4,500; one in every three persons works for the company. Copper, in fact, keeps the district alive. Profits from copper built the only west-coast port, at Strahan, and copper links it to Queenstown by road and rail.

For the 22-mile trip to Strahan I rode the narrow-gauge line that makes use of rack and pinion to lift copper and passengers over grades as steep as one in sixteen. Forty-eight bridges and countless breath-taking views of the King River Gorge, edged with dripping forest and mossy banks of fuchsia gone wild, make it a railway journey unlike any other in Australia.

After rattling past such unaccountably named sidings as Dubbilbarril, the train stops at Strahan's station with unmistakable finality. Due west the open sea reaches 11,000 miles around the world to Patagonia.

To the south extends an island fastness still largely impervious to man. I flew over some of it with Lloyd Jones, an experienced light-plane pilot and a superb photographer.

Only Two Families in "Forgotten Fifth"

Jones particularly wanted to show me the Port Davey area. Only two families live in this "forgotten fifth" of Tasmania. Denis King works a tin mine near Melaleuca Inlet, and Clyde Clayton, who married a King girl, fishes out of Bond Bay.

Lloyd Jones and I both had cameras and used them. He, however, likes an aerial photograph to look as if he had made it on the ground. Consequently I was often peering up at hanging valleys, facing flatly into sheer mountainsides, or flying over water as low as a seaplane about to touch down.

I saw the lonely King settlement, but not Clayton's. Jones did not want to fly over these families because they might think we had come to drop mail or provisions. Their only links with civilization are infrequent boats and planes, weather reluctantly permitting. Along the desolate coast storms have forced ships to shelter for as long as 17 days.

Clouds attacking relentlessly from the west turned us back at Port Davey. Gaunt, gray mountains towered over primeval forest; cliffs climbed high above deep black tarns; mist floated in the valleys and swirled around precipitous bluffs. Bursts of rain raked our plane.

Minutes later we landed at Hobart in time for a luncheon at Parliament House.

Even in the warmth of the dining room I still felt the cold impact of the flight just ended. Mist and mountains of the forgotten fifth continued to whirl past my eyes. Wind roared about my ears.

Thus it gave me a start to hear someone at the table say: "Tasmania is getting too industrial for its own good . . ."

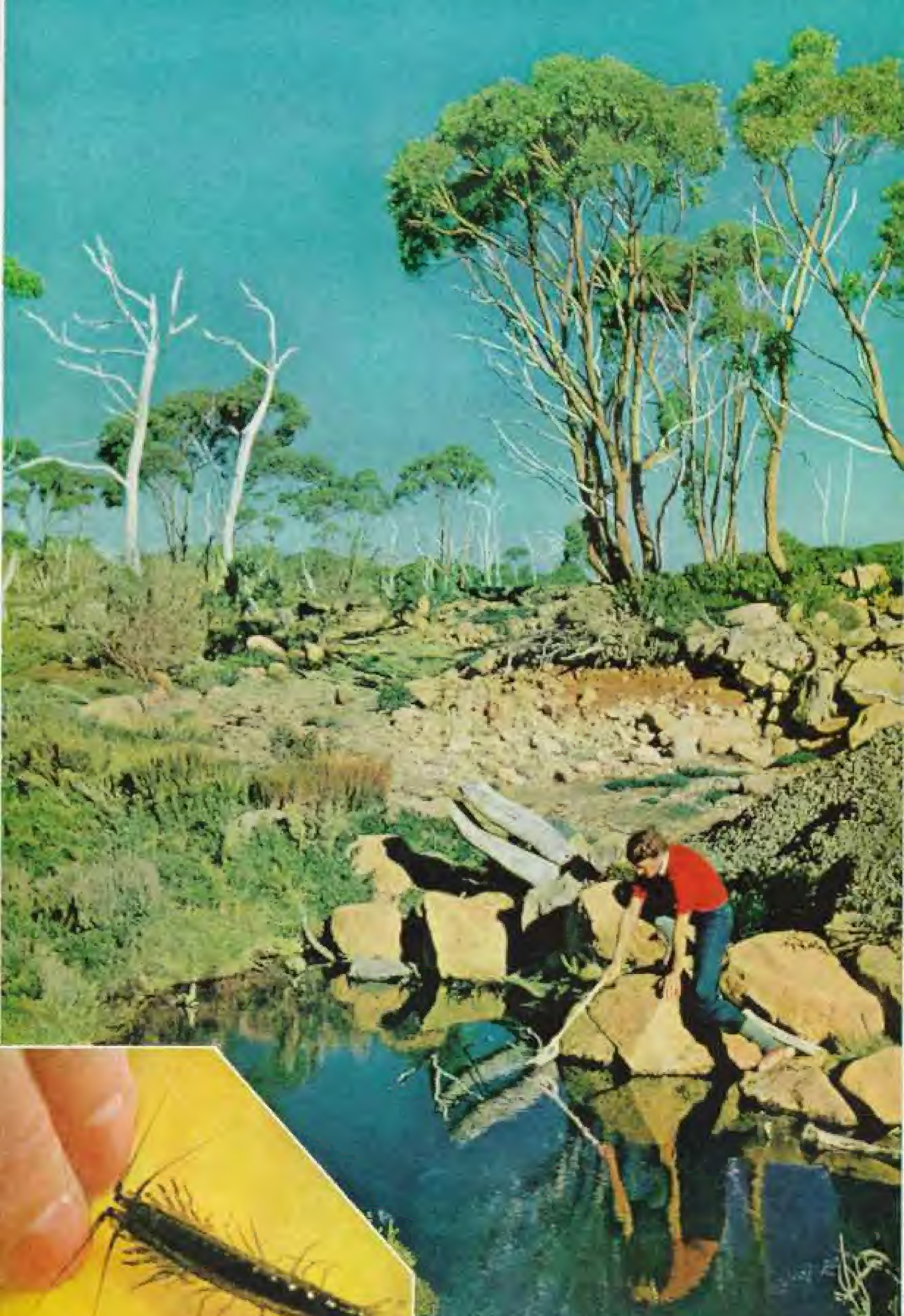
He preferred the island as God made it.

Page 811

Net Dipped into a Mountain Pool ➔ Fishes Out a Living Fossil (Inset)

Mountain shrimp (*Anaspides tasmaniae*) stubbornly defy the march of evolution. Many of their close relatives have been found in Carboniferous rocks laid down some 200 million years ago.

These graceful gum trees grow in a wild setting high in central Tasmania.



Ocean-going Ships Moor at Hobart's Front Door

Nature gave Tasmania one of the world's finest harbors, the Derwent estuary.

Wider and deeper than Sydney's more famous haven, the port has comfortably handled the largest liners, including the *Queen Mary* and the *Queen Elizabeth*.

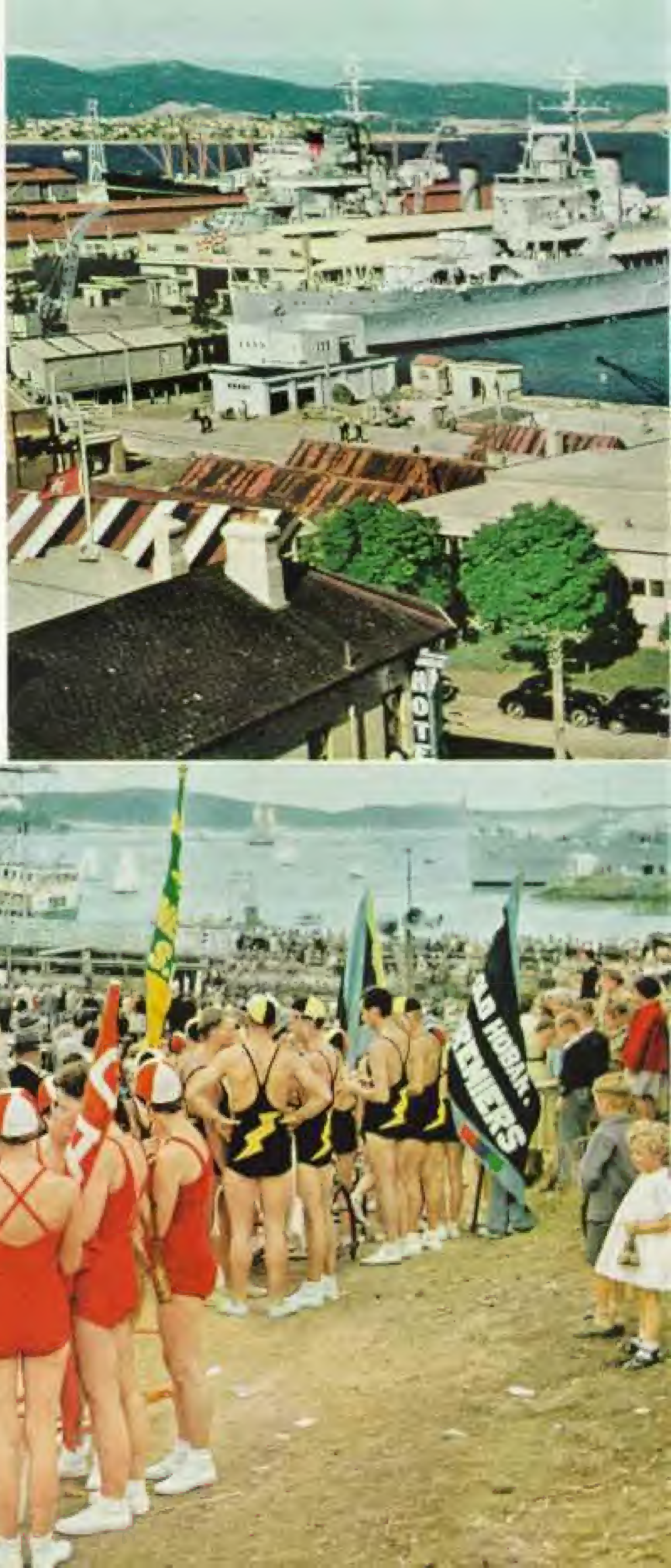
During World War II the troop-laden *Ile de France* and the aircraft carrier *Saratoga* anchored by these piers.

This view, taken from an office building, shows naval, cargo, and passenger vessels docked within two blocks of the city's heart.

Across the harbor suburban Bellerive appears at left, the hills of North Arm at right.

Lifesaving Teams Meet in Hobart

Sailing races, swimming, diving, and wood-chopping contests enliven the annual Royal Hobart Regatta.



813

Bruny Island Monument Honors Heroes of Discovery Days

When John McLean (right) retired from a life at sea, he settled on this island off the Tasmanian coast and built a home overlooking Adventure Bay. With these inscriptions he kept alive the memories of Cook, Bligh, and other navigators who put into the bay.

↓ Waves Boil in the Devil's Kitchen

Tasman Peninsula contains some of the island's most spectacular scenery: water-sculptured arches, lofty pinnacles, and sheer cliffs known only to sea birds. Much of the rugged coast is inaccessible, but visitors drive right up to the lip of Devil's Kitchen. This solitary visitor looks down into restless depths of the Tasman Sea.

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↑ Grim Is the Name of This Bleak Cape

Muttonbirds burrow among the tussocky slopes, and sheep occasionally browse on the wind-whipped grass, but few persons visit this remote and almost roadless northwestern corner.

Sailors avoid these treacherous waters. Matthew Flinders and George Bass, first to circumnavigate Tasmania and establish it as an island, named the rocky point Cape Grim. The year was 1798.

Flowering Plants Adorn → a Ruined Prison's Wall

This forbidding building reminds visitors that Tasmania once was a British penal colony.

Some 30,000 convicts served terms at Port Arthur for offenses ranging from petty theft to murder. Established in 1830, the prison was abandoned 47 years later. This group approaches the prison hospital.

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♣ April Is Autumn in Tasmania

Many deciduous trees—willows and poplars, oaks and elms—were brought from England. Along with hawthorn hedgerows and sweetbrier, they give island landscapes the look of the English countryside.

This April view of Bushy Park, Derwent Valley, follows close upon the hop harvest. Trellises are bare; ventilators of the oast houses look like church belfries.

Bonneted young woman, accompanied by her son, has pulled a hop vine loose from its wire support near New Norfolk. Now she strips the fragrant cones.

An experienced worker picks about 250 pounds of hops in eight hours; a beginner may do half as well.

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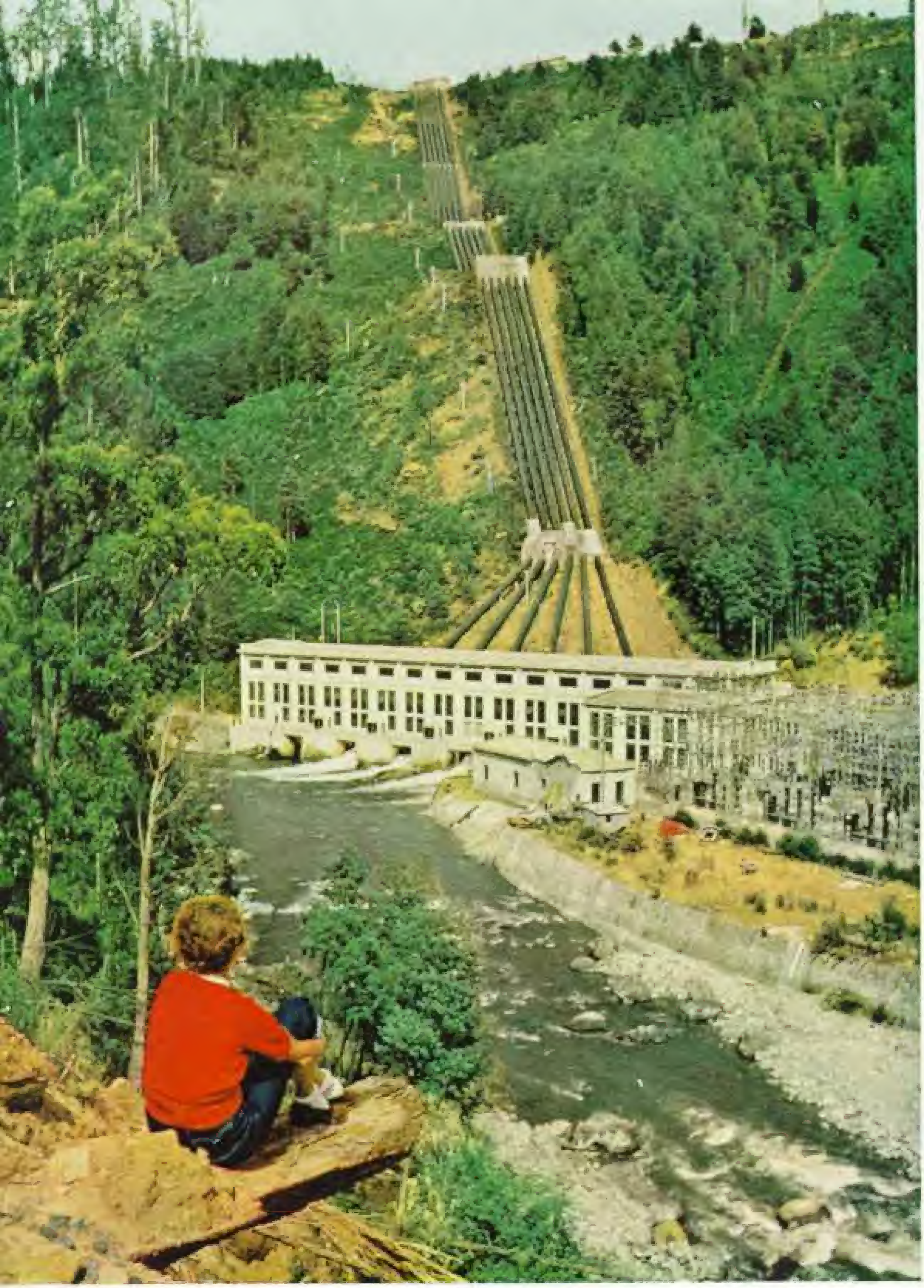
Families Turn Work → into a Happy Outing

Tasmania grows about 80 percent of Australia's total hops production. Harvesting begins around the first of March and continues six weeks or more.

Some 4,000 men, women, and children, usually in family units, do the picking. Joking and laughing, they make the work seem like play and lunch appear like a picnic. Tea breaks interrupt labor twice a day.

These hops, recently supported by the overhead wires, are plucked from the vines, dumped into cloth bins, and finally stuffed into burlap bags. Weighed on the spot, they are taken to oast houses for drying.

At the beginning of spring farmers stretch strings for the vines to climb up to the wires



Water Racing Through Six Huge Pipes Drops 1,000 Feet into Tarraleah Power Station

Thanks to rain and terrain, 96 homes in every 100 use electricity in Tasmania. Water from Clark Dam spins the turbines of this plant. Current goes to smelters, canneries, and other industries.

Florida's "Wild" Indians, the Seminole

Descendants of Warriors Who Fought the U. S. Army to a Standstill, These Tribesmen Still Acknowledge No Treaty with the Government

By Louis Capron

With Illustrations by National Geographic Photographer Willard R. Culver

SHRILL yips of the Indians came clearly across the darkness to where I stood at the edge of the wood, my back toward a palmetto clump, facing a half circle of snarling, barking dogs. Across the field a fire blazed, throwing into sharp silhouette a circle of dancing figures. Nearer at hand stood two clan camps, where cooking fires still glowed wanly. A lantern shone faintly in one of the shelters, and an old woman puttered beside it.

This was the Cow Creek band of Florida's Seminole Indians. I had just slogged over miles of flooded land and was waiting now for permission from the medicine man to see my first Green Corn Dance.

Medicine Man Lays Down the Rules

"You wait here," Sam Tommy had said when we reached the outskirts of the dance area. "Be right back."

The Florida Seminole guard their mysteries jealously, and there were plenty of stories of unpleasant things that had happened to whites who had tried to visit them unbidden. Because some of the Indians were my friends, I had permission of a sort, but I could easily imagine what might take place if the wrong person found me.

Eventually, however, the dogs tired and went away, and Sam Tommy came back.

"Okay," he said. "You can come in. But you got to do just like the medicine man says."

Soon I was sitting on a log opposite the medicine man, hearing from him what I could do and what I could not do, where I could go and where I could not go. He was making sure I would not violate any of the taboos of the annual sacred event.

This adventure took place in the early 1930's, when the rules were stricter than now, and when the Seminole were even more wary-eyed with suspicion and distrust. Since then I have never been quite so uneasy. But the interest that was behind that first step across the line into Seminole country has continued to grow during a quarter-century of contact with the tribe.

Two hundred years ago there were no Seminole; there were only groups of Indians, mostly Creeks or relatives of the Creeks, who moved into the Spanish territory of Florida to get away from the white settlers of Georgia and South Carolina. They were the wild Indians, the ones who wouldn't be tamed. Today the Seminole are still, in name and fact, "wild" Indians, the last of that once plentiful category in the United States.

Years ago I said something to Sam Tommy about Seminole meaning "runaway."

"No!" he said emphatically. "Deer, *se-mi-no-lee*; panther, *se-mi-no-lee*. That mean 'wild!' *Es-te se-mi-no-lee*, 'wild people!'"

The Florida Seminole are a free people with whom the United States Government has had no treaty since the undefeated tribesmen disappeared in the Everglades and Big Cypress Swamp more than a hundred years ago.* And they are a surprising people. In costume they are unique. Until recently, their religious rites were the least known of all Indian ceremonies in the United States. Historically, they fought probably the bloodiest and most tenacious of all the Indian wars—and won it.

People who have seen the Seminole in their brilliant costumes all over southern Florida are always astonished to learn that there are

* See, in the National Geographic Magazine: "Haunting Heart of the Everglades," by Andrew H. Brown, February, 1948; and "South Florida's Amazing Everglades," by John O'Reilly, January, 1940.

The Author

For more than a quarter of a century, Louis Capron, of West Palm Beach, Florida, has been a friend and confidant of the Seminole Indians, and today he is recognized as one of the outstanding authorities on their customs and culture. The Smithsonian Institution, in 1953, published his paper entitled *The Medicine Bundles of the Florida Seminole and the Green Corn Dance*. He is also the author of two books for young people, *White Moccasins* (Henry Holt, 1955) and *The Gold Arrowhead* (Howell, Soskin, 1948).

Brave in a Skirt Poles His Family Through the Everglades →

In the late 1700's groups of Indians from tribes belonging to the Creek Confederacy moved from Georgia into Florida. The migration earned them the name Se-mi-no-lee, meaning "wild," for these people preferred their own way of life to that of the white man.

Pressed southward by settlers, the Seminole assimilated runaway slaves and additional Creeks. They were estimated to number about 4,000 in 1835, when the United States launched a full-scale campaign against them. Fighting lasted almost a decade. Indian prisoners of war were moved west; their descendants now live in Oklahoma.

When hostilities finally ended, about 150 Seminole were left in the Everglades, where they remained aloof until recent times. Today some 975 Indians occupy four reservations and several commercial and squatter camps.

This father wears a knee-length "long shirt," a style dying out among younger men. His canoe is a hollowed cypress log (page 832).

820

← Billy Bowlegs Scales a Garfish

Having fought the white man to a standstill, the Seminole won his right to live on lands no one else wanted: sun-baked pine flats, cypress swamp, saw grass marsh, and palmetto barrens. Here he supports himself with hunting, fishing, and gardening on small hammocks, or marsh islands (page 826).

To earn cash for luxuries, the Indian works at an assortment of odd jobs. This oldster on the Brighton Reservation boils garfish, then collects the scales (right) for sale to manufacturers of costume jewelry.

→ Mary Billie Coppedge and her daughter welcome a spotted fawn to Big Cypress Reservation.

now only about 975 men, women, and children in the entire tribe. These are the closely interbred descendants of some 150 indomitable fighters who resisted every form of force and persuasion to move them west. After more than a hundred years of intermarriage and almost total isolation from the rest of the world, they still speak two languages so different that many of them cannot understand their blood brothers. Only about a third of them command enough English to get along in the white man's world.

Three United States Government reservations and a State reserve are set aside in Florida for the Seminole. The smallest, on which the Indian agency is located, is near Dania, and consists of less than three-quarters of a square mile. The Brighton Reservation, northwest of Lake Okeechobee, occupies a triangle roughly 10 miles on each side. The Government reservation in Big Cypress and the adjoining State reservation take in some 240 square miles (map, page 825).

The Cow Creek Seminole, who speak a dialect of the Creek language, live on the Brighton Reservation and to the north and east of Lake Okeechobee. They constitute about a third of the nation and make their living by working on farms and ranches.

The Mikasuki, who speak an entirely different language, live south of Lake Okeechobee, in the Dania Reservation, along the Tamiami Trail, and in Big Cypress Swamp. Theirs are the commercial camps. The women make dolls and costumes and do beadwork for sale (page 836). The men carve miniature wooden canoes, spoons, and birds. They garden for themselves on the hammocks, trap, hunt, fish, and guide hunting parties. Frogging is an important industry; the legs find a ready market in Miami.

Indians Make Good Cowpunchers

Some of the Indians work as filling-station operators and truck drivers. Others pick beans and tomatoes, harvest potatoes, and punch cattle.

"You can't beat 'em as cowhands," Wylie Holland, foreman on the big Scott ranch, said to me. "They'll stay with the animals right through a hurricane."

Florida's Indians have not always been "wild." The period of the Seminole wars was a retrogression. From agriculturists and stock raisers, who held Negro slaves in a benevolent tenant-farmer status, they became hunters and fishermen, leaving their fertile acres for swamps with only a few hammocks rich enough for limited gardening. They exchanged substantial dwellings and storehouses for small thatched platforms, hardly buildings at all, but suitable for their new lands. They gave up their fine horses for dugout canoes. From the prospering citizens the British and Spanish knew and welcomed, they became fugitives, avoiding and hating the people who had treacherously betrayed them and robbed them of everything, but accepting runaway Negroes as allies.

Andrew Jackson Invades Florida

The First Seminole War was not really a war at all. Andrew Jackson, provoked by what he felt was interference in United States affairs by Indians and Spaniards, invaded the territory of Florida in 1818 and destroyed a number of Seminole villages. Then, about a year later, Spain ceded Florida to the United States for some $5,000,000.

The Second, or "great," Seminole War was another story. It lasted from 1835 to 1842, took some 3,000 lives, and cost $30,000,000. Nearly every regiment of the Regular Army took part, besides sailors and marines and 50,000 volunteer troops and militia. Opposing them were about a thousand determined Indian warriors.

The war was full of astonishing circumstances. In the fall of 1836 Gen. Thomas S. Jesup arrived in Florida and organized a tremendous campaign. He took the field with 8,000 troops and went far south into Indian territory. In three months Jesup accounted for four Indian warriors killed and fewer than a hundred women, children, and Negro slaves captured—hardly a remarkable record for 8,000 troops three months in the field!

He then tried a council. Most of the Indians agreed to emigrate to Oklahoma on Jesup's promise that they could keep their slaves. They gathered in large numbers at Fort Brooke, in Tampa, to embark. But Jesup weakened and let in slave traders, who hoped to seize the tribe's Negroes as runaways, regardless of their true status. Both Indians and Negroes disappeared overnight, leaving empty ships anchored in Tampa Bay.

Then Jesup tried a desperate plan—to get the Seminole in under a flag of truce and take them prisoner. He did this three times, netting almost a thousand prisoners.

The war flamed and died and flamed again.

Yellow Paint Says a Warrior Is Ready to Die

Red war paint signifies blood; green under the eyes makes "for see better at night." Yellow, the color of death, means a man has lived his life and will fight to the finish. Here Josie Billie powders the face of Chief Charlie Jumper in old-time style.

Wheel of Life Decides Man's Fate; Josie Billie Demonstrates Its Use

Seminole lore says a sick man's soul wanders the color paths of this wheel, which represents the earth. Spirits of the dead lure the soul on; the medicine man calls it back. Should it reach the east, the man dies and his soul goes west by way of the red spoke.

824

Indian Builder Shingles a Chickee with Fronds of Cabbage Palmetto

A Seminole village draws together the members of one family: mother and father, unmarried children, and married daughters with their husbands and offspring. Sleeping quarters surround an outdoor living area and its hub, the cookhouse (pages 826-827).

Although the Seminole loves his water-fretted land, he cherishes no particular village site as a lifetime home. Families move often. If chickees fall into disrepair, occupants abandon them and build elsewhere.

A homeowner usually raises his own framework of cypress posts but leaves the thatching to men more skilled in the work.

This roofer on Brighton Reservation nails palmetto fronds to crossbars. He cuts his thatch fresh every day, since the material must be green and flexible.

←The fronds are broken with a hatchet (blurred by motion) to make thatching material that will lie flat to shed rain.

By one means and another more Indians were moved west, until there were only about 300 left in the deepest recesses of the swamps. Then the Government gave up and decided to let them stay. Roughly, it had cost a white life and $10,000 for every Indian moved or killed.

The Government got a better bargain in the "Billy Bowlegs War" that followed. Billy was a fighting man—one of the bitter-enders—whose ferocious nature was hidden under the peaceful cloak of husbandry. The last of the Seminole chiefs, he had a little garden and a banana patch deep in Big Cypress. In December of 1855 a party of Army surveyors who were camped near by decided to have some fun with him. They tore up his garden and whacked down his banana plants "to see how Old Billy would cut up." When he came to protest they pushed him around and laughed at his rage.

That night Billy called out the Seminole Nation. He attacked the surveyors' camp just before daylight. The lieutenant in command and several of his men were wounded.

For more than two years there was a desultory war of raiding parties on both sides, with whites and Indians killed and property destroyed. Finally the whites bought peace with $6,500 for Billy Bowlegs, $1,000 for each of four subchiefs, $500 for each Seminole warrior, and $100 for each woman and child. Then the Government moved 164 more Indians west. That left about 150 to increase to today's 975.

Mother-in-law Hated All Whites

Now that the old wars are finally receding in Indian minds, the Seminole are changing again. Their traditions, their ceremonies, their mysteries, guarded so carefully in their isolation, are dying as the Indians emerge more and more into an overwhelmingly white world.

Only the old people cling to the past. The last die-hard I knew was the mother-in-law of the Cow Creek medicine man. That was unfortunate for me, because she was in a position to spike my guns—and she used to

825

Florida's Swamps and Barrens: the Seminole's Retreat

A third of the nation lives on Brighton Reservation. Though 295 square miles are set aside for the Indians' exclusive use, some maintain commercial camps near Miami or beside the Tamiami Trail.

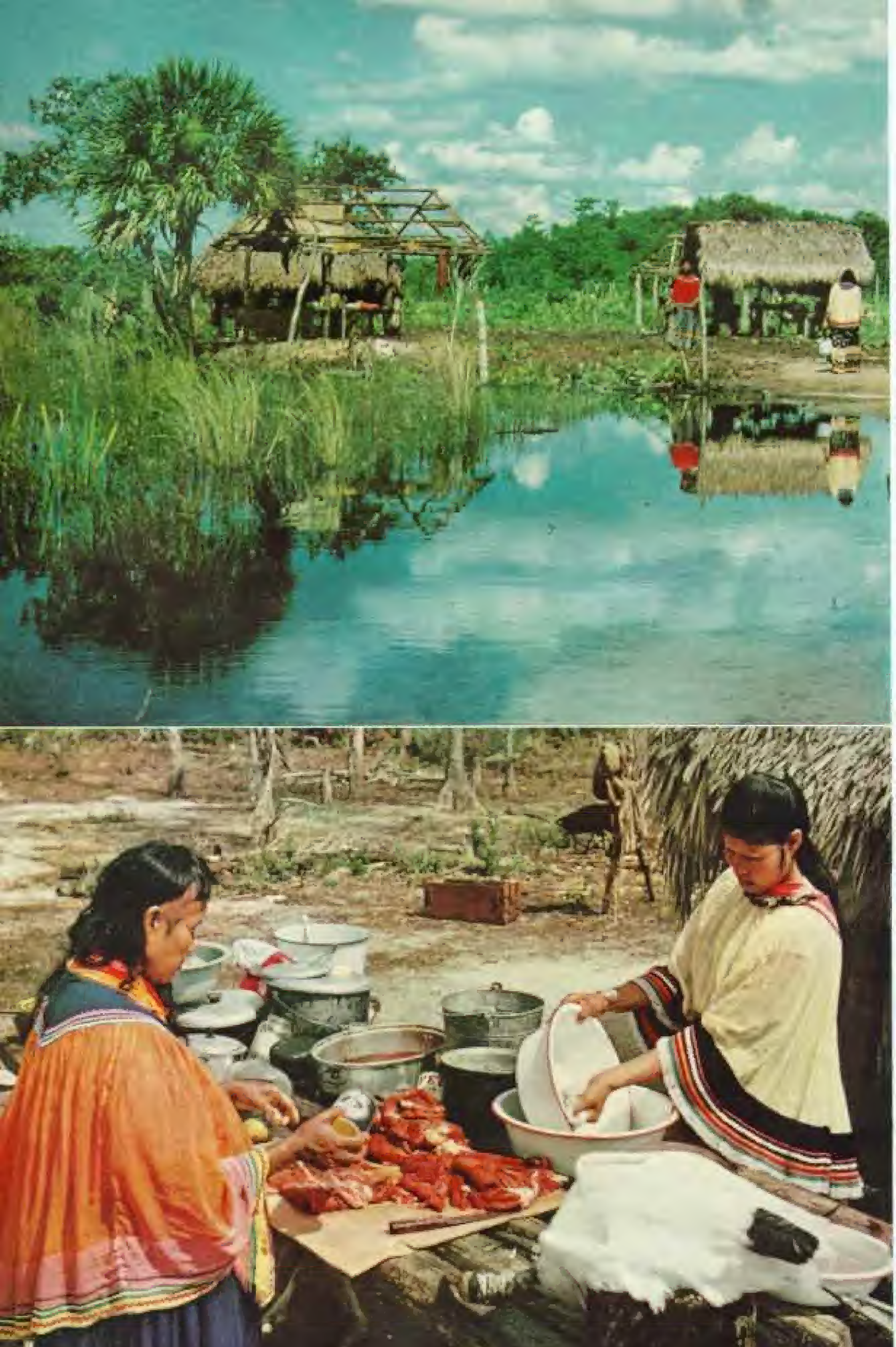
do it. But I couldn't help liking her. There was nothing personal about her attitude toward me; she just hated all whites.

As the oldest matron in the Bird clan, she had the naming of all the babies, and every name she gave was a reminder of some incident of the century-gone Seminole War, so that her people would always remember to hate the whites.

On the first night of my first Green Corn Dance, the medicine man gave me a vacant platform to sleep on. The old mother-in-law had the next chickee.

I slept fitfully, dozing until the bare boards got too hard and then standing up to ease my bones. And all night long I was conscious that the baleful old woman was watching me from under her muslin bed canopy. When daylight began to come, sure enough, I could see the edge of the canopy lift a couple of inches and feel the impact of that look of hate.

Bless her soul, a few minutes later she put on a show I shall remember to my dying day! It was full light, but long before sunrise. The edge of her canopy lifted and her face emerged. She gave me a fierce glance and



827

← Women Wash Dishes and Cure Venison in the Open Air

Page 826, lower: Indians stock their larders with fish, tortoise, wild turkey, and deer. In season they harvest wild plums, guavas, sea grapes, and the buds of cabbage palmettos. They raise pigs and chickens and cultivate corn, sweet potatoes, pumpkins, and sugar cane.

Cooked food is always available in a Seminole camp. Usually women prepare an enormous pot of meat stew and a pan of biscuits fried in grease. Fingers serve as forks, bread as gravy mops.

Sofkee, a thin gruel of corn grits, takes the place of drinking water. A pail of this liquid, with a large wooden spoon for dipping, is a permanent feature of the cookhouse.

Here Mrs. Albert Billie salts stew meat; next she will sun-dry it. Her daughter Mary washes pans just before using them, a practice she considers more sanitary than the white woman's way of washing dishes after meals and allowing them to gather dust.

→Old ways die hard. Mortar and pestle still pulverize corn for sofkee. Center of camp life is the thatched cookhouse.

← *Chickees* Rise on an Everglades Isle

When the Seminole first gathered in Florida, they built substantial houses. Repeatedly burned out by white soldiers, they adopted the practical, painless-to-abandon chickee. Fronds of cabbage palmetto thatch the roofs. Cypress rafters support possessions. Floors two feet high keep bedrolls out of the mud and shelter animals sleeping beneath.

then looked around the camp. There was not a movement. The chickees stood out stark and still—solid with bed canopies. In the cooking shelter the logs were cold and the fire was white ashes.

She dropped the canopy, and it shook and billowed as she dressed. Then an arm swung it back over her head and dropped it behind her, and she swung her feet to the ground. She reached to the right and twitched a string, then to the left, and her bed canopy dropped. She rolled it up and stuck it in the rafters above.

Camp Awakens in Five Minutes

The old lady tottered over to the next chickee and shook the canopy of the women there. Then she went to the next, and the next, and the next, shaking every woman in the camp awake. That woke the men also.

By the time she reached the last chickee every bed canopy was gone from the first and its occupants were about their morning tasks.

828

Drainage Canal in Big Cypress Serves as Laundry and Bathtub

Mother will dry her clothes on the wire fence.

↓ Alice Micco Snow, who lives on Brighton Reservation, rocks her baby in a bath-towel hammock.

Willard R. Culver (right) and David S. Boyer, National Geographic staff

A fire was going in the cooking shack. In five minutes from the time that strong-willed old woman awakened, the camp was in full operation.

Today change is apparent in every facet of Seminole life. The dugout canoe, for instance, was once almost a trademark of these Florida Indians; Now few dugouts ply the Everglades; the white man's air boat is faster (page 835), and it takes less skill to mount an old Ford engine above a shallow-draft scow than it does to hand-carve a graceful canoe from the trunk of a giant cypress. Only one Seminole retains the skill to shape a log into a smooth, evenly balanced boat. Appropriately, his name is Charlie Cypress.

As National Geographic photographer Willard R. Culver and I traveled through the 'Glades in search of illustrations for this article, the feeling grew in our minds that the art of canoe building among the Seminole should not disappear—as it must when 90-year-old Charlie dies—without a record of its passing.

Mr. Culver had learned from a former medicine man that a giant cypress log lay seasoning in the swamp water of Lard Can Strand: it was the only one he knew of that was large enough for a canoe. At the photographer's urging, Charlie agreed to put his adz to work once more.

The log was hauled out of the swamp to Charlie's camp and there, before the peering eye of Mr. Culver's camera, the old man slowly shaped one last canoe (pages 832-833).

Later, Mr. Culver arranged to have the dugout shipped to Washington, D. C. It was fitting, the National Geographic Society thought, that this particular Seminole canoe should find a permanent resting place in the collection of the Smithsonian Institution, as a reminder of the traditional skill of a changing people.

Bows and Arrows Rarely Used

Except for the boys, the Seminole Indians have seldom used bows and arrows. In the Seminole War arrows were occasionally resorted to when surprise was an element and a rifle shot would have warned the enemy. But for the most part the Indian warrior of a century ago had the long, accurate rifle of the frontiersman—a far better arm than the

A Matron Binds Her Hair into a Broad-brim, Eye-shading Hat

←Looking into the mirror at her feet, Sadie Fewell combs long hair up from her neck, smoothes it over her head, and ties it into a dangling pony-tail. In her lap lies a cardboard frame covered with black cloth.

Lower left: The frame has been tied on at the forehead, allowing the hair to drop across the face like a veil.

↓Loose ends are tucked under and secured by a black net. Sometimes beads and hatpins decorate the brim.

This style, once a trademark of the Seminole woman, is nearly obsolete. Young wives usually keep hair loose and flowing (page 821). Others wear a simple roll or bun at the forehead (page 836).

830
Glass-bead Necklace Has Many Strands

Once women wore as many as 25 pounds of beads around the neck. Today a more comfortable weight is in vogue. Widows who observe Indian tradition still put jewelry away during mourning and allow hair to stream loose.

Sadie Fewell lives on the Big Cypress Reservation.

smoothbore muskets used by many of the Army regulars.

Today the Indian still uses the white man's rifle and shotgun, as well as his pots and pans, cloth, beads, and cutlery, as he has for a century and a half. And he has adopted some of the white man's gadgets—the sewing machine, the phonograph, and the automobile.

Nearly every woman has a hand-operated Singer on which she sews the intricate piecework of the modern Seminole dress (page 836); each camp has a hand-wound portable phonograph and a love for hillbilly music; and each unit in the camp has some sort of car. The Seminole are inveterate visitors among themselves, which means that the cars have to be practically amphibious.

But to me the most significant change is in the rattles used at the Green Corn Dance. These used to be made of tortoise shells. The women, who wore 12 to 16 on each leg, jerked them with a rhythm that gave cadence to the dance.

The modern substitute gives a clearer insight into the changing Seminole character than a thousand words. Evaporated milk cans, pierced with nail holes and containing a few beads or hard seeds, have almost replaced the shells. The result, though completely devoid of glamour, is much more effective.

The Indians now rarely make flour of the coontie root or the greenbrier. They buy store bread or the white man's flour, and beef is more common than venison in the Seminole camp today. Surplus meat is cured for future use by salting and sun-drying (page 826), or by cutting off the fat, running cubes of it onto a palmetto spear, and roasting it hard and dry. When they are ready to use the meat, they cook it with rice and tomato or serve it with a dish of hot grease in which to dip it and make it a little tastier.

Sofkee Still Quenches Indians' Thirst

They usually buy their grits at the store rather than make them of corn boiled with wood ashes. But the pot of *sofkee*, a thin gruel of grits, is still always available. And when they are thirsty the Seminole still imbibe it from the common, carved-wood sofkee spoon.

The Indians live in houses without walls and with floors raised about two feet. Each member of the family has a bed canopy of unbleached muslin, about three by six feet, which is hung from the rafters at night and rolled up and tucked in the rafters during the day. The canopy, hung between saplings, makes a good shelter on a hunting trip—unless it rains—warding off dew and keeping out mosquitoes and sand flies.

In the center of camp is the cooking shack—a thatched roof over the famous star fire. That fire is a marvel of efficiency. Three to five long logs are butted together and shoved in as they burn. The cook sits on the cool part of a log and the pot rests on the burning ends.

Mother Rules in Seminole Families

Because their social system is a matriarchy, the family group of a Seminole village consists of the matriarch herself—a mature married woman—and her husband, of a different clan, of course. The unmarried daughters and sons are there, and the married daughters with their husbands and children. The married sons live with their wives' families.

The clan ranks foremost in Seminole affairs. It is a family of families, and one may not marry a member of his or her own clan. Children take the clan of their mother. The Cow Creeks have five: Bird, Tiger, Deer, Little Bird, and Snake. The Mikasuki have ten; the principal ones are Tiger, Bird, Otter, Wind, Snake, and Wolf.

Micanopy, whose name means "head chief," ruled the nation during the early part of the Second Seminole War. But a chief is only for an emergency, as in war, when authority should not be divided. Since then each group has been governed by its older men.

For dealing with the United States Government, however, a more or less arbitrary council has been set up with representatives from all four reservations. This brings in the Christian Indians who are discouraged from taking part in the ancient rites of the tribe.

But most of the staunch old-timers, who live off the reservations and still regard the Government and all its works with suspicion, refuse to have anything to do with this Government council. They insist that, never having surrendered and never having signed a treaty with the whites since their war, the Seminole are an independent nation, entitled to territory given them long ago in exchange for the lands the Government took away.

They have their own grand council, composed of the tribal group councils, and a formal constitution in which their traditional form of government has at last been put into written form.

Canoe Maker Charlie Cypress . . .

In former days the Seminole traveled on foot, on horseback, and by oxcart. As he pushed deeper into the Florida swamps, his boat became all-important.

Fashioned from native cypress, Seminole canoes proved so waterworthy that Indians took them to sea. Equipped with mast and sail, some ventured to Cuba and the Bahamas. In recent years the automobile and air boat have all but replaced the dugout (page 833).

Seminole boatwright Charlie Cypress remains active at 90 years. He agreed to make one last canoe so that the National Geographic Magazine could preserve a pictorial record of a vanishing skill.

The finished dugout may now be seen in the National Museum of the Smithsonian Institution, Washington, D. C.

. . . Shows Children a Fading Art

Upper left: Charlie fashioned the boat from a centuries-old bald cypress that fell about 15 years ago. Two men here trim the branches before dragging the log to Charlie's camp on the Big Cypress Reservation.

Lower left: Charlie, in Seminole long shirt and white man's vest, shapes the canoe's bottom with his ax.

Above: Ax in hand, the Indian roughs out the raised prow. He carved the canoe's graceful lines without the use of a level or other measuring implement.

Upper right: Charlie scoops out the center with broad, sure strokes.

➔The builder plugs holes he cut to determine thickness of the keel. He works slowly, giving the exposed wood time to season.

To these rugged old-timers, the annual Green Corn Dance and its attendant rites stand at the very heart of tribal ceremonial and authority. The dance takes place on a field of three or four acres in as inaccessible a spot as the medicine man can find. The date coincides with the new moon late in June or early in July, when the green corn ripens. No spectators are wanted, but good friends are tolerated—except on court day. The festivities last five days, and an Indian cannot remain in good standing after missing two Green Corn Dances in succession unless he goes through a special course of treatment by the medicine man.

Women Barred from Big House

In the center of a 40-foot circle smolders the dance fire. On the west side, facing east, rises the *choko thlakko*, the big house, the place where the men sit. No woman may enter it.

In the course of the first two days of the Green Corn Dance, the grounds are put in shape and there is much visiting. Each night there is a ball game around a 30-foot sapling on the dance ground. The object is to hit the sapling with a deerskin ball. When darkness comes, the fire is built up and the Indians enjoy their fun dances, like the Alligator Dance or the Catfish Dance, until about nine o'clock.

The third day is picnic day. The medicine man provides a pair of beef cattle, which he slaughters and distributes himself. All day long the women cook and bring food down to the big house. And all day long the men stuff themselves as preparation for the 30-hour fast that begins at midnight.

The next day is court day. This is the only time in the year when the medicine bundle is not hidden, the day when all visitors except Indians are excluded.

It is difficult to explain the medicine bundle. It is a collection of 600 or 700 objects—pieces of horn, stone, and the like—ordinary enough to look at, but possessing extraordinary powers in the eyes of the Indians. Each object is done up in a little buckskin packet and tied with a buckskin thong. The packets are folded in a deerskin with the hair side out, making a flat package about one by two feet and five or six inches thick.

The medicine, the Indians believe, was given them by God and includes everything necessary for their good. To them the medicine has life and particular powers, like the piece of sweat-bath stone that makes their "Turkish" baths effective as long as it stays alive.

To keep life in the medicine and to keep the Indians well is the main purpose of the Green Corn Dance.

"If no Green Corn Dance for three or four years," Sam Jones, Cow Creek medicine man, told me, "all the medicine die—and then no more Indians."

Much of the medicine is for use in war. Josie Billy, a former medicine man from Big Cypress, gave me a good example of this.

"When rain start coming," he said, "lightning hit tree—go round and round and in ground. Indians dig it out. White stone; can see through it. That's medicine. Call it 'Thunder Bullet.'"

"What does it do?" I asked.

"Use that in war," Josie said. "Have that; go in swamp; white soldiers can't come; can't see 'em; don't know they there."

Then there is what the Indians call a piece of the left-hand horn of the mythical snake king. The right-hand horn, they say, would have been more powerful, but the Indians could not get that. By holding this in their hands and singing a song, old-time hunters lured deer into shooting range. This medicine is dead now.

Medicine Bundle Brought from the East

On court day, as soon as he has bathed and sung his morning prayer, the medicine man walks straight to the east until he disappears in the distance. When he reappears some time later, he has the medicine bundle in his arms. At the dance ground he opens it and examines each piece of its contents, retying the buckskin packets and sometimes transferring the medicine to another skin. When he has checked each item, he gathers the legs of the deerskin into a basket form and hangs it on a stake driven into the ground about 50 feet to the northeast of the dance circle.

Meantime, under the direction of the medicine man's assistant, the morning "black drinks" are brewed. These powerful emetics are downed as the first step in the purification ceremonies. One is made from crushed tubers of the button snakeroot, *Eryngium synchaetum*; the other is a cold infusion of the inner bark of willow, *Salix amphibia*. Prayers are blown into the latter through a hollow reed

(Continued on page 839)

Cowboy Boots Say American Boy; Shirts Bespeak the Seminole

Brighton Reservation youngsters perch on a corral rail. Government aid started the tribe's herd in the 1950's. Now 55 Brighton families own 4,000 head.

Alligator Boards an Air Boat; Indians Will Wrestle It for Sightseers

Aquatic plants whipping against its sides, this propeller-driven craft skims through the Everglades at 30 to 40 miles an hour. Two inches of water will float it.

837

← **Seamstresses Turn Scraps into Diamonds and Rainbows**

According to one fanciful story, the Seminole War left Indian women reduced to rags, which they sewed into garments like crazy quilts. In truth, the women for several decades made plain dresses of calico bought from traders and later appliquéd them with simple designs. Today's elaborate patchwork costumes did not appear until the 1920's.

To make skirts like these, a seamstress stitches together long narrow bands of different colors or designs. Then she cuts the cloth strips either on the perpendicular or at an angle, rearranges the pieces, and renews them. She may repeat the process again and again until a complicated design emerges, full of triangles and zigzags. These strips, alternating with solid colors, make up the blouse or skirt.

In recent years Seminole costumes have attracted white buyers.

Here women sew for sale on Brighton Reservation. They get $15 to $20 for a skirt, depending on whether it is street or evening length. Palmetto-fiber dolls in Seminole dress range from 25 cents to $3.50, according to size.

Nearly every Seminole woman owns a hand-operated sewing machine.

← **Cat Scrutinizes Dog, Which Watches Boy, Who Eyes Basketmaker**

Page 836, lower: In Seminole society, the woman is head of the family. She owns most of the property and controls the purse strings. When a man marries, he goes to live with his wife's people. His children, by Seminole law, belong to the mother and her family.

In a celebrated case in 1955, a widower's mother-in-law undertook to raise five of his children. Flouting tradition, the father hired a lawyer and threatened court action. Only then did the tribal elders bow to white man's custom and give back the children to their father.

Here the wife of canoe maker Charlie Cypress weaves a sieve of cabbage palmetto fronds to sift corn.

→ Wilson Cypress held to old-time dress and distinctive traditions until his death last year, past the 90-year mark.

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Women Catch Supper from a Fishing Hole in Their Back Yard

Seminole appreciate even the mud fish so disdained by white men. Called "baby fish," the meat is boiled and mashed to a pulp for the first solid food of infants.

about three feet long, wound at intervals with three strips of red cloth.

Then the boys are scratched "to purify the blood." Every male must undergo this operation before he can eat, now or on the final morning. It is done with needles, several of which are thrust through a wooden block or a turkey quill.

A proper scratching consists of two long strokes on the outside of the upper arm and two on the inside, and the same on the forearm; two on the front and back of each thigh and the same on each lower leg, two diagonal strokes on each breast and two on each side of the back. Blood follows every stroke but generally does not run, and the wound scabs over, making a mark that stays for several weeks. Curiously, I have never known an infection to develop from this ritual.

Babies Scratched "a Little Bit"

The smaller boys and the boy babies are scratched the morning of court day, so that they can eat, the long fast being considered too much for them. With the very little ones, the scratching is merely a token.

"Scratch 'em just a little bit," Sam Jones, the Cow Creek medicine man, said to me, indicating a cross marked lightly on the back of his hand. Boys of six and older, however, endure the same scratching as the men.

At noon comes the event most publicized and most fascinating to the Indians' white neighbors—court. The senate of older men takes its place in the big house and everyone who has transgressed tribal laws in the preceding year is brought before it and tried. It is at this time also that matters of general interest are discussed and the policy of the group is determined.

Visitors from the other groups are usually present; they bring up matters their people are interested in and take part in the discussions. This makes for unity throughout the tribe.

The Seminole theory of crime, as exemplified on court day, presumes that obedience to the law is the price one pays for the privilege of belonging to a society, and a man who violates the law is acting against his own good and therefore must be out of his mind. Lest he infect others, he is outlawed and forbidden to take part in tribal ritual. He can again take his place as a member of the group only if he voluntarily puts himself into the hands of the medicine man for rehabilitation.

In 1938 John Billy, a 30-year-old Mikasuki, had been for several years an outlaw and had made no attempt to be rehabilitated. Twice he was accused by his fellow Indians of having stabbed and killed in drunken brawls. Both victims were members of the Tiger clan. Each time, at the following Green Corn Dance, he was found guilty and outlawed.

Tribal Justice Takes Charge

John Billy's time ran out when word spread that he had beaten a pregnant woman so savagely that she was sent to the hospital. The patience of the Tigers was exhausted. The older men met and decided that John Billy must die.

The duty of killing him fell to the oldest man of the Tiger clan, John Osceola, 78 years old and an almost helpless cripple.

John's son Billy drove the old man out to Big Cypress, where he told Cuffney Tiger, the medicine man, of the Tigers' decision. Approving, the medicine man gave John some spell-breaking tobacco to smoke when he had carried out the sentence. This, it was believed, would guard him from insanity, which is supposed to result from committing even justifiable homicide.

Billy Osceola drove his father to the back gate of the commercial camp where John Billy had taken refuge, went inside, and summoned the culprit. The old man climbed painfully out of the car, braced himself against it, and saw that his gun was loaded.

John Billy, knowing perfectly what was in store for him, came out of the camp, walked straight up to the crippled old man, and took the shotgun load in his chest at such close range that his clothing was burned.

The Indians left the body there—no Indian must touch it—and drove the old man back to his camp. There he sat in his chickee, smoking the sacred tobacco and receiving from his clansmen gifts that showed their approval of what he had done.

The coroner's verdict was justifiable homicide.

Old Indian Holds Back the Clouds

Late on the afternoon of one court day a few years ago, heavy rain clouds and lightning played on the horizon. Only the sky above us was relatively clear. It looked as if we were in for a drencher.

"Is it going to rain?" I asked the medicine man.

He looked the heavens over deliberately and shook his head.

"No-o-o," he said. "Old Indian sittin' up there smokin' and pushin' clouds back. Won't let it rain on Green Corn Dance."

And sure enough, it didn't—just a light drizzle you could hardly feel.

But there have been times when the old Indian must have gone to sleep, because I've seen—and felt—torrents of rain on the Green Corn Dance, since the ceremony occurs at the beginning of the rainy season.

Fun Dances Enliven Final Night

As twilight approaches, the medicine man and his assistant prepare their place on the east side of the dance circle. A fire is lighted with flint and steel from the medicine bundle.

Another black drink, the "big pot," is put on to boil. Into this go remedies for all the diseases the medicine man expects his people to be exposed to during the coming year.

The medicine bundle is taken from its stake and laid behind the medicine man, with the deerskin folded loosely. The medicine man and his assistant take their places, sitting cross-legged behind their fire facing the dance circle, and the ceremony commences.

Up to midnight the fun dances are performed. The medicine man keeps track of them by sticking little splinters of wood into the ground in platoons as each dance is performed.

Then, at midnight, the big pot is taken from the fire. The men down great draughts from it and vomit almost immediately. Like the other black drinks, it must not be retained. This is the end of the old year. For the new, the body must be cleansed inside and out, and new campfires started. At midnight, also, the Green Corn Dance begins; it is performed after that at intervals until morning.

Once, for my benefit, a special "Green Corn Dance" took place before midnight. Joe Johns was dance boss that year. He strolled around, a little switch in his hand as a mark of authority, calling the dances, naming the leaders, and urging everyone to greater effort. Early in the evening he called a dance, and the men began to line up. He strolled over to where I was sitting.

"You better join in this time," Joe said. "Going to start Green Corn Dance now."

I thought there was a rule against beginning the Green Corn Dance before midnight, but I obediently joined the men.

We hopped around the ring on one foot and then around on the other. Being office-soft, I was soon winded. I dropped out of the line and stood panting by the big house. No one paid any attention to me, and the dance ended shortly after that.

A year later Charlie Micco's wife told me what had happened. It wasn't really the Green Corn Dance, she explained, the Indians were simply having a joke at my expense. They wanted to see how long I would last. That particular dance has probably taken its place now, along with the Chicken Dance and the Catfish Dance, as the Louis Capron Dance. I would give a lot to know the words of the song that went with it.

Health Insured for Coming Year

At the climax of the Green Corn Dance, all the ritual has been fulfilled and the faith of the Indians has been demonstrated. They have drawn about them the forces that will revivify the medicine and bring them health during the coming year. *Este Fasta*, the "Give Person," the emissary of *Hesaeheeta Meaee*, who is God, is close; ready to reach down and put new medicine with the old if a new situation demands it.

As soon as the sky begins to gray in the east, the medicine man goes over the medicine. He opens each packet and examines it to discover if Este Fasta has given him anything new. When he finishes, he folds the deerskin again. Then he takes it in his arms and walks toward the east until he is out of sight.

Soon, from the clan camps, single file down the paths through the palmettos, come the women in their bright costumes, carrying food—including, for the first time this season, green corn. They leave the food at the foot of the paths, and the men bring it into the big house and then sit on both sides facing it.

The sun is just rising when the medicine man reappears, empty-handed, in the distance. Then the feast starts. Another Green Corn Dance is over, and a new year begins.

Robert C. Hermes, National Audubon Society

Raccoon: Amiable Rogue in a Black Mask

Tough, Curious, and Unawed by Man or Dog, This Bear-faced Rascal Shows a Sense of Humor and Takes Civilization in Stride

By Melvin R. Ellis

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EXCEPT for Br'er Fox, no scalawag with taking ways has aroused as much favorable comment as the ring-tailed raccoon, which looks like a little brother to the bear. In folklore, in hunting stories, and in news columns this black-masked mammal, native only to the Americas, gets away with just about everything, and the public loves him for it.

The coon's behavior isn't due to bad temper. What drives him chiefly, I think, is curiosity, a strong appetite, and a determination not to give ground. Not much, anyway.

If men cut a coon's wood lots to build a summer cottage, they can expect the animal to come and live in the fireplace chimney. Fill in the creek where raccoons catch shiners and chubs, and you will hear your garbage cans go rattling over at midnight. Pour concrete, and coons will make themselves at home in the culverts under the road.

Coons take civilization in stride and grow fat where lampposts have replaced trees. About a thousand raccoons, for example, settled in the fine homes on Wisconsin's Lake Geneva in 1950, when the summer residents dispersed for the winter. Subsequent hunts forced the gray army to retreat, but survivors filtered back into vacant attics and garages, and some coon families took over entire mansions. Newspapers headlined the story: "Coons Strike It Rich!"

Then the proprietor of a fishing lodge in Ontario's Algonquin Provincial Park threatened to sue a railroad because a train had cut off his pet's tail. The reporters practically tried the case in the newspapers—and found for the raccoon. And no wonder. Reporters, it seems, can't help but be impressed by these friendly rogues that prey so cavalierly on that most talented of mammals—man.

Even in fable the mischievous coon usually comes out on top. Thus Br'er Coon advised the opossum to put its tail in the fire so it might be decorated with rings. The possum did as the coon said, and poof!—now it goes through life with a naked tail.

There are many more reports of odd raccoon behavior: one made its home under an automobile hood; another wandered down a main street with a half-gallon oyster can over its head; still another rode a monkey, slept with a dog, and nursed a cat's kittens. But none of these portray the masked one in its natural environment.

To find out how the coon sleeps, eats, mates, and dies, go where the fields come down to the forest, where the moon silvers the leaves of the high trees, where the creek is a white ribbon in the brown marsh. This is a good place to learn the true story of *Procyon lotor*—the plantigrade, or sole walker, almost flat-footed, he shuffles like a bear but is more closely related to the pandas of Asia and the ring-tailed cats of the western United States.

Not that the forest is the only place to find raccoons. They roam the beaches of both oceans, looking for the sea's lesser creatures left stranded by the tide. They hide

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"Anybody Home?"

A closed door proves no obstacle for the adroit raccoon. Standing on hind legs, he turns the knob with nimble front fingers. Then, like a thief in the night, he stealthily enters.

Life Nos. Text Lines

from the glare of the desert sun in crevices of rock. When water covers their little islands in the southern bayous, they scamper up the mangrove roots. Perfectly camouflaged, they are curled where Spanish moss drapes the cypress trees standing knee-deep in Florida's Everglades. From Canada to Mexico they crack shells of clams or eat lizards, catch frogs or gorge on grasshoppers, dine on green corn or steal the marmalade from the sandwiches in someone's lunch box.

Heron's Nest Serves as Winter Home

Even in the forest coons do not always move into the hollows of trees. Horicon marsh in southeastern Wisconsin has a lot of coons but only three den trees. There they prefer muskrat houses and woodchuck burrows, or they may put a roof on a blue heron's high platform nest of sticks and stay for the winter.

Along the limestone thumb that juts off Wisconsin into Lake Michigan coons live in ledge crevices; hunters' hounds sometimes hurtle into space as a trail ends abruptly at the edge of a cliff.

Practically every State has raccoons. Depending on the supply of food, they range in size from the little five-pound subspecies of Vaca Key, Florida, to animals weighing twenty-five to thirty pounds.

The common coon's average weight is about seven or eight pounds for the female, fifteen pounds for the male. An occasional specimen will attain forty pounds, and some coon hunters have reported animals weighing more. Texans claim their breed is the largest.

Thirty-one subspecies are generally considered to show important enough differences to warrant listing—mainly matters of size, color, and length and texture of fur. But, basically, what is true of a coon in Canada is true of one in Florida's remote Ten Thousand Islands. A desert raccoon may eat a snake instead of a frog, but will still amble along like a contented dowager born and reared in Maine.

The biggest raccoon I ever saw was caught in one of my traps on the edge of semidesert country in California. I never set traps for raccoons, but they blunder into predator sets.

This one was in a coyote set. It looked as large as a field-type springer spaniel and must have weighed about thirty-five pounds. It was caught lightly by a hind paw, so I decided to let it go. But each time I put a hand near the spring release, the coon twisted about and struck swiftly as a snake.

I tore off my jacket and threw it over the animal. It recoiled as if its legs were of spring

"Looks Good, Smells Good, Tastes Good, Too"

In the wilds or as a house pet, *Procyon lotor* spends most of its waking hours eating or searching for food. Average male coon weighs 15 pounds, the female half as much. An occasional specimen attains 40 pounds.

Life Illus. Photo Libr.

steel, and we went around and around with the sand flying. The coon squawked with fear, and I was afraid to let go lest it turn the tables and fasten onto me.

Suffice it to say I outlasted the raccoon. I managed to drag its imprisoned paw out from beneath the jacket, and sprang it from the trap. Then I jumped back—and my jacket went hopping down the dry wash a hundred feet before the coon got free of it.

Males Philander in February

Northern State raccoons probably are the best subjects for study. Go to see them when the wind is cold and the branches are bare, when February snow is on the ground. Then the female coons should be napping but they aren't. They are waiting for the male coons to come calling.

Raccoons do not hibernate. In cold country, during severe cold snaps, they take long naps, their tails curled over their sharp muzzles and black-button noses. But comes a warm day and a warm night and their paw marks show up where the sun has softened the mud, looking like the hand marks of a human baby (page 847).

Most raccoons leave tracks at night. But some roam in daylight, especially during the mating season. The male, done with his courting, shows no further interest in the female or the kits that are born about nine weeks later.

These number three to six and arrive in the snug hollow of the den fully clothed in fur coats. They stay blind for three weeks, and will suckle as long as the mother has milk and lets them.

When the youngsters are about a month old, mother starts teaching them to look for food. They keep falling over their own feet, but soon they are introduced to frogs and crayfish, or crickets and grass snakes, a nest full of young birds, a dead mouse, or a wrinkled apple left over from last fall. They'll try practically anything edible.

In autumn, when the hunters come, the mother coon has fed her youngsters so well that they weigh about half as much as she does. But they are relatively unschooled in the ways of throwing dogs off their trail.

So the mother stays with them and continues the lessons until the mating season approaches. Then she usually drives out any young that haven't left of their own accord

Like a Back-pedaling Boxer, a Cautious Coon Retreats from Its Rival's Secret Weapon

to stake out den areas and rear families. Most of them will mate before they are a year old.

Some young coons have a rugged time of it. Mother boxes them about. They are difficult to convince, at least in the beginning, and may take her attempts to instill discipline as invitations to play.

The kits face attack from flesh eaters—coyotes, bobcats, pumas, and horned owls—and mother is often hard put to keep her youngsters out of harm's way. Like human children, they seem to resent interference and she must prod them hard before they will head back to safety.

When danger is near, the female literally boosts the young up the tree ahead of her. Occasionally she will pick up a youngster in domestic cat fashion by the nape of the neck (page 850). Then, if cornered, she will attack with startling ferocity.

I once made the mistake of meeting a female with a family face to face in a summer cottage attic. I had waited until I thought lotor's family would be off on a night's sojourn before climbing a ladder and entering the attic's tiny, single window. I patched a hole near the eaves through which the coons had entered, and was about to crawl back to the window. Then my flashlight beam

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"Come On, Let's Play"

Pet coons never tire of romping. This one had hoped to steal a nap on the forbidden sofa, but reckoned without its energetic playmate

Title from Guillermo

Cornfield Raider Scurries to a Stream and Dunks Its Loot

If water is available, the coon often wets its food. Scientists are not sure why.

struck two balls of white fire: the coon's eyes! They blocked my only avenue of escape.

I never force an issue when the odds are against me, so I waited for the raccoon to make the first move. She did. Warily at first, and then with seeming unconcern, she walked around me to the far end of the attic.

Relieved, I headed for the ladder. But the moment I blocked the starlight from the window and cut off the coon's escape route, she squalled and we hit the hole the same instant.

Coons Return to Attic Hideaway

Perhaps she only meant to escape. I'll never know. We crashed down the ladder together, hitting about every sixth rung. Then she fled for the woods, taking along some scalp and skin from my right ear lobe.

I nailed that window shut right away. But before morning the coons had the boards off the hole at the eaves again. They took the boards from the window, too. I gave up.

Raccoons usually avoid a fight, but woe to the dog that meets a big mule in the water. The coon will clamber on the dog's head, digging the five strong claws of each foot into the skin. He'll stick like a burr until the dog drowns.

It is difficult to believe the raccoon capable of such ferocity, especially after watching a mother and her half-grown youngsters cavorting at the edge of a field in the moonlight. The mother coon seems to encourage the kits to play. Then, while they tumble about, she sits back as if enjoying their antics. Raccoons give the impression of having a sense of humor. Young coons in captivity clown all the time. If raised with another animal —a dog, or cat, or squirrel—they learn to tolerate it (page 845).

If caught young and handled often enough, coons make reasonably affectionate pets. It is a rare spring when metropolitan papers do not report a litter of young coons "rescued" from the den tree near someone's front door and being bottle-fed to maturity (page 852).

Young animals can also be bought from raccoon farmers, but some States require permits for keeping them.

Pet raccoons may be brought up indoors, and some have even been housebroken. But they will thrive better outside in a hay-lined nest box with a covered wire runway such as is used to pen dogs. You can't trust them completely; they may bite. But what animal is entirely predictable?

Raccoon Population Sets Record

Right now the wild raccoon population of the United States is probably at a record high for this century. One reason is that when the college boys of the roaring twenties were graduated, their successors showed little taste for coonskin coats.

Raw coonskins dropped from an average of $8 in the predepression days to $3 in 1932; trappers became fewer and concentrated on more profitable fur. During World War II the

847.

Paw Marks Resemble Baby's Handprints →

Early morning sun reveals evidence of a coon's nocturnal prowling.

♦ The coon is a good swimmer, and often foils pursuing hounds by plunging into the water to break the scent line.

Charles Philip Fox (below) Jack Dermid

848

Jim Hargan

Spread-eagled on a Wire Cage, Acrobatic Coons Compete for the Keeper's Handout

With prices of coonskins down, the Nation's raccoon population is up. To decrease their number, several States have set bounties. These animals were captured for display at the Iowa State Fair, Des Moines.

average pelt brought $5.50, but by 1954 it was down to $2. Even the great Davy Crockett craze of 1955 didn't reduce the coons much. Coonskin caps blossomed on practically every kid in the Nation, and the price went up about a dollar and a half; but cheaper furs served just as well and were used more often.

As raccoon hunting with long-eared, mellow-mouthed dogs became more and more popular, State conservation departments obtained regulations to protect the coons. Hunters began to think it more sporting to catch them alive. Captured coons now are used as breeding stock, or released at the end of the hunting and trapping seasons to raise families in comparative peace.

So the raccoons continue to increase, and several States have put bounties on their hides. But some leading game biologists say the day of reckoning is at hand.

They claim that raccoons, like most animals, must be harvested by man. Otherwise they will crowd themselves into precarious population peaks and hunger and disease will decimate them. Labor is susceptible to many diseases

849 Alan B. Goddard, Black Star

♠ **"But Officer, I'm Innocent"**

Naturalists have called the coon "the charmer of the American woods." In recent years it has become increasingly popular as a pet.

♦ Warmly clad in thick coats of grayish-brown hair, this group calls to mind the college boys of the 1920's who considered a raccoon coat the touchstone of campus success. Bushy tail, ringed in black, capped many a young head during the Davy Crockett craze of 1955. These animals disport in a San Francisco zoo enclosure.

Frank T. Dattan

Like the Domestic Cat, Mother Coon Carries Her Baby by the Nape of the Neck

and parasites of domestic animals, including distemper, rabies, and worms. Some autumn night soon, they say, the hounds will come out beneath the hunter's moon and there will be few coon trails to follow.

If that should happen, I think the coon will come back as it always has. And when the corn comes into milk, the females will still be bending green stalks so the youngsters can gorge themselves.

Animals Fish with Sensitive Fingers

But the raccoons will not be running to some creek or lake with each cob to wash it, as has been reported. This is a fable. They often dabble their food in water, but make no distinction between a mud puddle and a clear spring side by side (page 846).

Lotor literally means "a washer." The Algonquin Indians of Virginia called the coon "arakun," from their word *arakunem*, meaning "he who scratches with his hands." Better yet, they might have called him "the feeler." He is nearly as talented with his hands as the monkey.

The raccoon's sense of touch is as superbly developed as his sense of smell. Fishing in a backwater, he moves along braced on his hind paws, looking at the night sky in a detached way while the fingers of his front paws sort the stones from the clams, the sticks from the crayfish, the empty snail shells from the occupied ones.

Perhaps the water makes the raccoon's hands more sensitive. Perhaps he gets pleasure from feeling for his food, somewhat as humans do from letting a tasty morsel linger on their tongues. But these are only guesses.

Though raccoons are sensitive to sound and vibrations, they are not alarmed by noises having no direct bearing on their welfare. Where suburban traffic makes a race track out of West Bluemound Road in Milwaukee, raccoons wait for night in the trees by the side of the road. The sound of sirens, whistles, and horns doesn't seem to bother them.

But let another coon start up their tree and the slightest scratching will signal that here is something to be investigated.

Like crows, raccoons are attracted by flashy objects. But I have found that they do not collect things as crows do. A raccoon will scrutinize, smell, and perhaps taste the shiny object, and then throw it away. I think the coon's habit of casting up silvery minnows and other aquatic morsels by the light of the moon explains this interest in anything else that shines.

That's also why trappers put bits of shiny metal on trap plates. Sometimes tinfoil suspended above a trap will lure the coon. I once watched a pet raccoon trying to capture the gleam on an automobile bumper. This animal kept at it for ten minutes.

Raccoons are relatively easy to trap. But the old ones seem to have gathered wisdom with the years; they outsmart the hounds by scrambling along the crests of windfalls, and swimming creeks to break the scent line. As they flee, they "tap" trees with their forepaws, making the dogs think they climbed up. When forced aloft, they move through the treetops.

No story about the raccoon would be complete without details of the hunt. Usually the encounters with the coons are rather brief, and there is always time to delight in the sights and sounds of the night. These are as much a part of the raccoon hunt as capturing the animal.

I remember one October night on the Door Peninsula in Wisconsin when we went high up a winding road, across a fresh frost sparkling under a white moon. The hounds bayed far ahead and the hunters—without guns, but carrying flashlights, fish-landing nets, and gunny sacks—were strung along a dim trail up to a plateau on a cliff. On top was an enchanted place where tall, leafless hardwoods let the moonbeams through.

The lights of Menominee and Marinette twinkled 16 miles across the water. A navigation light flashed red every few seconds, and beyond where white waves crested over black rocks, moved a lighted ferry. Clouds formed a pearly strand along the horizon.

As I looked at all this, the dogs howled "treed." Flashlights found the coon in a crotch 30 feet up in a big maple, its ringed tail curled closely at its side. Like all well-fed coons in fall, it looked enormous.

"Who is the toughest guy here?" asked Herman Ohnesorge, owner of the hounds. A cornered coon can prove exceedingly troublesome, especially if you want it alive.

A boy who said he was 16 went up that tree almost as expertly as a coon. But just as he put a hand out to shake the limb, the

"Won't Someone Take Pity on a Homeless Waif?"

A Missouri farmer did. He found this kit curled beside its dead mother in a forest and raised it in his home as a pet.

W. C. Darrah, National Geographic Staff

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Jack Donald

First Come, First Served. Orphans of the Wild Line Up for the Breakfast Bottle

If captured young, the coon makes an affectionate, mischievous pet. Like the monkey, he demands an active life or becomes morose and unmanageable. A pet may be kept indoors but thrives better in an outside pen.

animal leaped to the ground. A dog broke its tether, rushed the raccoon, and got it by the tail. The coon dug in and started hauling the hound through the leaves.

Seeking a better grip, the hound opened its jaws. That was a mistake. The coon slipped over the side of the cliff and was gone.

The dogs, turned loose once more, raced across the white-frosted carpet of last summer's leaves. Soon they bayed again. Down the cliff the hunters slipped and bounced to where the masked one was silhouetted in a small apple tree at the edge of an orchard.

Cornered Coon Mauls Hunters

The hounds were tethered again. Ohnesorge reached for the coon and pulled it from the tree. But he missed the yawning gunny sack and the animal bit him in the leg and the arm. He dropped the coon and someone popped a net over it. Someone else reached in for a tail hold, and again the coon's teeth sank into human flesh. The man howled and spun away like a ballet dancer.

Ohnesorge managed to get the coon into the bag at last. The hounds quieted down, and the hunters sifted through the orchard toward the road. Then again there was a high, clear, excited note—a hound had struck another trail.

That is raccoon hunting in Wisconsin, and it is pretty much the same in almost every State—in the swamps of the South, the bluff country of Kansas, the wood lots of New England.

Recently, however, lotor has increased notably in the far-northern forests of the United States and Canada, where there is little coon hunting. There aren't enough roads to intercept the dogs and pick them up. A pack is likely to be gone all night or for several days, particularly if the dogs aren't trained to avoid coyote or deer trails.

The hounds may put two raccoon families

Eyes Pleading for Rescue, Poodle and Coon Endure a Saturday Night Tub

Elwin Wee Towle

up one tree. Once, while hunting along the banks of Florida's Withlacoochee River with a melodious hound named Music, we put nine coons up one tree. They had been feeding on Sam Jordan's peanuts, and Sam allowed that if we didn't thin out the raccoons and possums some, the pork would be going to market lean.

Coon Treed on Milwaukee Stage

Entire communities may get a chance to see a coon chase. The biggest hunt was held at an outdoor show in Milwaukee, where a raccoon was led down the middle of the most traveled downtown boulevard. Unerringly, a hundred hounds raced pell-mell through the city and treed their quarry on the stage of a crowded auditorium!

One of the largest raccoon hunting groups in the Midwest, the Coon and Fox Hunters' Association in Evansville, Wisconsin, feeds approximately 1,000 guests at its annual coon banquet.

Some people don't like the taste of raccoon flesh. But I've been told that naturalist John Burroughs considered it a delicacy and often served it to his friends Henry Ford, Harvey Firestone, and Thomas Edison.

Friends of mine put their coon carcasses into the deep freeze and the weekly card party fare is roast coon with red-beet wine for the gentlemen and rhubarb wine for the ladies.

Whether one likes or dislikes raccoon coats, raccoon flesh, or the idea of hunting coons, he should know that the animal is a part of our heritage—more truly American, perhaps, than the bison or the eagle.

Nobody can say how long Ioter had been here when the white man arrived. But the coon played an important role in the Indian's economy and enlivened his campfire stories.

Woodland Calls Convey Many Emotions

Even today, the best part of a coon hunt is the stories. Each hound-dog man can tell of at least one coon that outsmarted all the hounds to die of old age. I have stood near an old coon while he looked down from his tree on a pack of dogs that couldn't harm him, and I swear he grinned and grinned and grinned.

As winter closes in on the northern States, the raccoons restrict their activity, but in summer and early fall the coon's salute to approaching evening sounds almost as thrilling as the wail of the wolf.

Few who hear it quavering through the woods recognize the source. The nearest sound is the horned owl's hooting. But the raccoon does not build to a crescendo with short, experimental hoots as the owl does. He lets go with a full-born waho-o-o-o-o. I've never heard a captive coon use this call.

The evening cry fits the mask. It adds to the mystery. I'll grant that the four to six black-brown tail rings, the mask, and the grizzly coat are all part of the raccoon's camouflage. But it is romantic to believe that nature, in a flippant mood, decided the forests needed at least one highwayman—a furred Robin Hood.

Besides his evening challenge, the coon has a squall of rage which is almost a snarl, a series of birdlike twitters, and a startling cry he gives when hopelessly trapped. This is a bleating sound, shorter and more piercing than the bleat of hoofed animals. It carries far and apparently warns other raccoons. It is heart-rending. I've heard it half a dozen times and I don't care to hear it again.

Scientists Disagree on Restocking

Much effort currently goes into restocking wood lots with raccoons. Results have been fair, and the men who hunt the coons deserve some credit for this, since their hunting and trapping license money contributes to it.

There is a question, however, about the effectiveness of artificially stocking raccoons. Dr. Eugene H. Dustman of Ohio calls it ineffective and unsound. It may improve hunting temporarily, he says, but there is little chance that it will have lasting effect.

All the same, Br'er Coon will take care of himself. Cut his den tree and he'll live in your drain pipe. Guard the corn and he'll visit the house while you are away and pick cherries from your pie.

Let me warn you against the mistake a Milwaukee man made when he found Br'er Coon in his hen house. Triumphantly the man locked the hen house door and ran to get the conservation warden so he could legally take his revenge. While he was gone, the coon killed eight chickens.

The man could hardly afford the loss, but he got little sympathy in the press. Ioter just doesn't fit any role except that of the hero; even when the dogs have him he goes down fighting!

No wonder today's kids, like the pioneers of yesterday, are proud to wear his tail.

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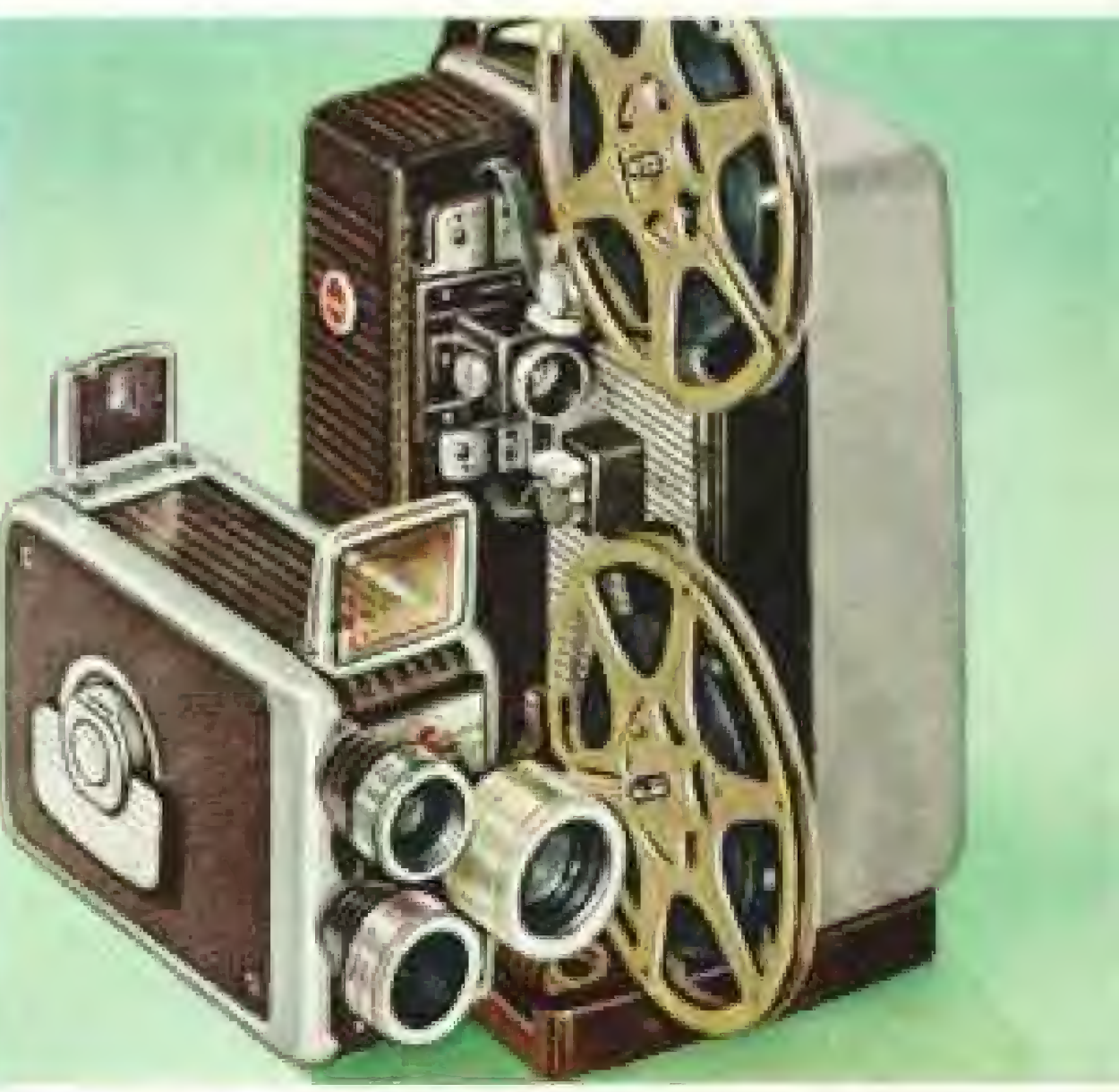

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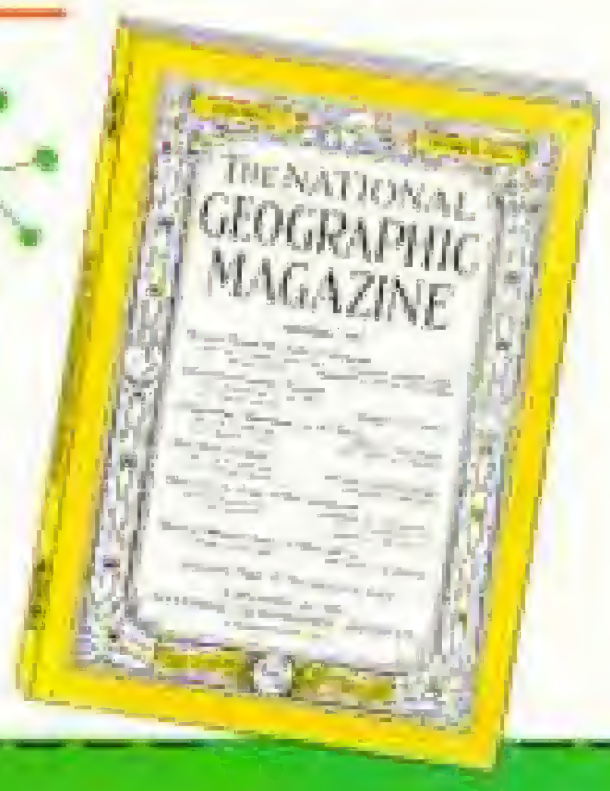

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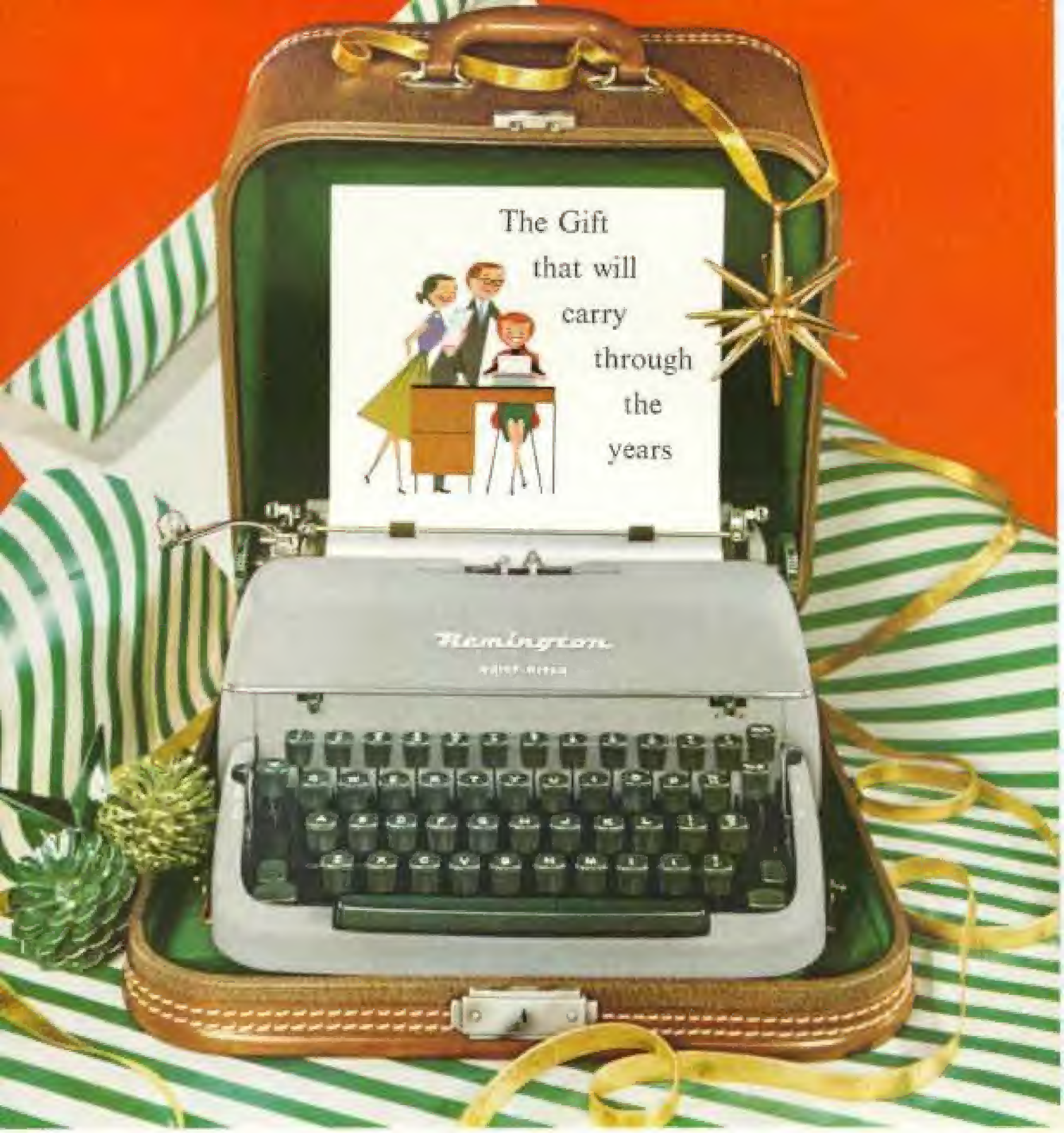

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