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JANUARY-FEBRUARY 1970

ISTANBUL: QUEEN OF CITIES

also: Birth of a Bureaucracy by Vincent Sheean

American biographer Vincent Sheean has met a number of times with Saudi Arabia's King Faisal in recent years. Some of his personal observations—on the man and on his works—appear beginning on page 2.

ARAMCO WORLD magazine

BIRTH OF A BUREAUCRACY

BY VINCENT SHEEAN

To manage the complex of schools, roads, dams and hospitals now going up in Saudi Arabia, King Faisal—says author Vincent Sheean—is creating a civil service already better than some of the systems on which it was modeled. 2

ISTANBUL: QUEEN OF CITIES

BY ANNE TURNER BRUNO

In her rich history she has had many names—"Mother of the World," "Door to the Ultimate Happiness" and "City Guarded by God." But none is more fitting than the one she bears now: Istanbul, meaning simply "The City". 6

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Cover: Two among Istanbul's visual treasures, both exemplifield in this striking photograph by Tor Eigeland, are the sparkling inlet known as the Golden Horn, which serves as natural harbor, and the exotic skyline of domes and minarets crowning the city's hills. Story and color section beginning on page 6.

BIRTH OF A BUREAUCRACY

BY VINCENT SHEEAN

*Vincent Sheean is probably one of the world's foremost reporters and is certainly one of its more prolific writers. Between 1926 and 1963 he turned out 26 books, ranging in nature from his brilliant—and recently reissued—*Personal History, *one of the most famous and important books of the 1930's, to* Dorothy and Red, *a touching and penetrating look at two other greats of that period, Sinclair Lewis and Dorothy Thompson.*

Vincent "Jimmy" Sheean was born in 1900, became a reporter at 18 and an author, of An American Among the Riffs, *at 26. In between he molded and developed the style that would mark his work thereafter—sensitive, subjective observation combined with hard work and objective research. In those years he also began to cover and record such turbulent events of the 1920's and '30's as the rise of Stalin, Chiang Kai-shek and Hitler, the collapse of the League of Nations, the Riffs' uprising in Morocco, the early battle for Palestine between Zionist and Arab and the Spanish Civil War.*

In those years Sheean, like his friend, competitor and contemporary, Ernest Hemingway, developed an extraordinary range of friends among the great men who were shaping, or would shape, history, many of them rulers in the East. One was Gandhi, whom he met during a tour of duty as an intelligence officer in World War II and later enshrined in Mahatma Gandhi, *written several years after an assassin killed Gandhi before Sheean's eyes. Another was Nehru, also the subject of a book* (Nehru: Ten Years of Power). *A third was King Faisal of Saudi Arabia, a man he first met 10 years ago, and the subject of a book scheduled for publication this February.*

—THE EDITORS

Visitors to Saudi Arabia, who grow more numerous all the time, are faced with the name of the present sovereign of the country wherever they turn. King Faisal, son of 'Abd al-'Aziz Al Sa'ud, is the third of his family to have the title and power over the greater part of the Arabian Peninsula, uniting it—substantially—for the first time since the days of the Prophet Muhammad and his immediate successors.

The visitors are still not as numerous as they are likely to become in a subsequent and easier age. It is neither cheap nor easy to visit Arabia. But those who come cannot avoid noticing what is being done to improve the lot of the people—schools, roads, ports, airlines, buses, consumer goods and public health. Wherever they look they see the name of King Faisal, and if they shouldn't notice, someone is sure to tell them that the work they are witnessing is done at his order and in fulfilment of his desire.

His actual name is given, whether he likes it or not, to a great number of schools and other public institutions to which it is difficult to refuse that sanction. This goes from military academies to hospitals, from a school for girls in a village to a hostel for Muslim pilgrims. The work now being done for blind orphans, boys and girls alike, and for the deaf-and-dumb children, which fascinated me last winter when I visited the institutions, is done by order of the King and on money he insisted on appropriating for the purpose. So is the multi-million-dollar desalination project at Jiddah; so is the imposing dam which is now arising on the Wadi Jizan near the borders of Yemen, also on the Red Sea; so is the continuation of work on sand stabilization—arresting the ceaseless shift of the centuries—in the Eastern Province and elsewhere. Faisal's name and activity, his will to raise the whole level of life for his people, are evident in dozens of enterprises now going on in every part of the vast, almost empty peninsula.

After repeated visits to the kingdom during the 1960's I was finally moved, this past winter, to ask His Majesty something over which I had long wondered.

"You have started more works of public improvement than almost anybody of whom I have knowledge," I told him, "and almost all of them in this decade. It is a staggering work even to think about. What I have wondered is whether you can keep up, steadily sustain, an interest in each of these works. When you have seen its beginning do you follow the progress of the development? There are so many things that seem to be a kind of world in themselves. Can Your Majesty find time to watch over all this, that is each work and all the work, along with all your other duties?"

Faisal lifted his head and gave me a good healthy stare, accompanied by a broadening grin. His smile is rare and perhaps for that reason it seems to illumine his whole rather austere face.

"You seem to think I'm the only man in this kingdom who does any work," he said. "That isn't true. We have many devoted public servants here and their number is increasing. And, of course, I'm human, completely human. I can't do more than one man is allowed to do in a day. It is written in the Koran, 'God does not place on any person a burden greater than he can bear.' There are others who can be trusted to carry out work once it has been well begun."

In this principle—the delegation of authority—Faisal has gone far beyond his brother and father who preceded him. The regular ministries which line the airport avenue in Riyadh, the royal capital, bear witness to the birth of a bureaucracy which, however recent, is already well established and functioning better than some of the older systems on which it has been modeled. The young men of Arabia are ready and anxious to serve their government, in which civil service jobs have opened up lavishly during the past decade. Much or most of the development in this respect is new and has reached its full strength only in the five years since Faisal became King (1964). During the reign of his father, the great 'Abd al-'Aziz, who was known to the West as "Ibn Sa'ud," there was no such thing as a cabinet of ministers or a set of ministries with civil service regulations, promotions and pensions, a regular, institutionalized government in the western sense. Most of that has grown and flourished under the aegis of Faisal, first as Prime Minister and later as sovereign. He has had much advice from experts, of course, including bankers, businessmen and professors from all over the world. There are a certain number of these who can be summoned to Riyadh, even today, on very brief notice (and for adequate fees), to give their views on plans or projects. For, as fate would have it, the birth of the modern Arabian government was accompanied by a very considerable increase in cash revenues. Unlike almost every other "developing" country in Asia and Africa, the Saudi government pays its own way and is seldom under obligation to any external institution or nation, however benevolent.

The part King Faisal has played in all this would be difficult to exaggerate. There are dozens of ways—aside from the physical evidence in roads, schools and hospitals—whereby the King's private voice and private ear have made decisive alterations of destiny. I know of one man, one of the most talented executives today in that part of the world, who staked his whole future on an interview with the King and won. He had come through his school in Egypt with flying colors and felt entitled to a scholarship in the United States but was crossed off the list, he thought, because of favoritism; he came of modest parentage, his rivals from an important tribe. The King heard him, was convinced and sent him to America. He is now the head of the newest invention of state capitalism, the great consortium called Petromin, which engages in many activities concerning petroleum and minerals throughout the country.

Petromin itself is an extraordinary innovation. In a country which never had a stock market or a nationwide industrial-financial enterprise before, a Petromin-sponsored business recently put its shares on the non-existent market, that is, through banks in the cities, and the citizens of Arabia greatly over-subscribed and had to be content with taking their turns at the shares. It is true that the investment of savings has not hitherto flourished much in Arabia—men tended either to hoard, to invest in small enterprises or real estate, and sometimes to invest in holdings abroad; and, along with that, a lack of the machinery for buying and selling. This, too, is changing now, and the remarkable success of Petromin will have helped to bring about new methods.

The problems of the country, so long neglected or forgotten, cannot yield to easy, quick solutions, but there are almost countless ways in which the effort at solution goes forward. In practically every one of these cases Faisal seems to be at least the inspiration of the work and often its direct patron. Take any one of the great difficulties of the land and people—water, health, education, communications—and there is the King busy through others, those carefully chosen others to whom he delegates his immense authority in each case. He picks and chooses his instruments with an uncanny skill because he has known these men all his life, as well as their social and economic environment (tribal alliances and the like) and their points of view both inherited and individual. For example, the Ministry of Education has had to introduce a good deal of what conservative Muslims —not always approvingly—call "innovation" during the past seven or eight years. The aim has been universal literacy, which, in view of the small population of the kingdom (something between three and six million) ought to be perfectly attainable. "A hundred new schools a year" was the King's order, and the Ministry of Education was entrusted with the task. Universal primary education, even for boys, was suspect; for girls it seemed sheer revolution when it was introduced, only seven years ago. But now, after some slight disorder and a good deal of complaint, the idea has caught on and even the most out-of-the-way villages now clamor for more schools.

Some of the credit for the many achievements in education must go to the astute and devoted Minister, the Shaikh Hasan Al ash-Shaikh, a direct descendant of the 18th-century Islamic reformer Muhammad ibn 'Abd al-Wahhab, on whose teachings the Saudi kingdom was founded. The Wahhabite or Wahhabi movement coincided with the rise of the Sa'ud family to nationwide power and was to a great extent responsible for it. Wahhabism, if we may so call it, that is the doctrine of Muhammad ibn 'Abd al-Wahhab, is a sort of Islamic puritanism, and it is associated in almost equal proportions with the House of Sa'ud and the House of 'Abd al-Wahhab (ash-Shaikh), the descendants of the great religious reformer.

As it happens, King Faisal is descended from both of these lines; his father was the great king who founded the Saudi nation in 1932 and his mother was directly descended from 'Abd al-Wahhab. The reformer was always known as "the Shaikh," and his male descendants all bear that title. It is, of course, common in the tribal system (meaning simply "elder") but when used as a special honorific, almost as a family name, it is rare in Arabia. Thus the Shaikh Hasan Al ash-Shaikh, Minister of Education, bears one of the most respected names in the whole peninsula, revered by the traditionally devout and historically esteemed by all, whether Wahhabi or not.

Naturally, for the purposes Faisal had in mind, this was a God-given instrument. Few in Arabia would dream of attacking a direct descendant of "the Shaikh" (that is, Muhammad ibn 'Abd al-Wahhab) for unorthodoxy or for any deviation from the pure faith. If this Minister of Education opens a school he does so not only with the authority

"It is written in the Koran, 'God does not place on any person a burden greater than he can bear.'"

of the King, but also with the authority inherent in the honored name of the religious reformer who did so much to create the nation. If you were going to choose the ideal instrument for the introduction of general education in a society which had for years discouraged such a concept, or to insist on public health measures that were unfamiliar, it would be hard to find a better man. Fortunately for Saudi Arabia such a man was at hand.

Education and health—the "new ministries," as they are called—demand an increasing share of the budget every year. They increase their authority as they increase their personnel, and the recruitment of workers for their service grows with the return of students sent abroad, as well as with the advent of trained workers from other Arab countries. Indeed the influx from Damascus, Cairo and Baghdad has grown less in these past two or three years—partly, it's true, because of political conflicts, but also because the supply of teachers, doctors and workers from Saudi Arabia itself is increasing noticeably. The time may be coming when the neighboring Arab countries will no longer be called upon to provide such heavy quotas of specialists for the schools and hospitals, the universities and public institutions.

There are other ministries that don't seem to be either old or new which have also received support and encouragement from Faisal. One is the Ministry of Agriculture and Water whose energetic minister, Hassan Mishari, did his advanced studies in the United States (if you closed your eyes while he talks, you would think him an American), and has drawn heavily upon American experts for various projects now in progress, many of which have as a prime aim the rectification of past errors.

As in many other developing countries, some of the first foreign engineers who were brought in to supervise sewage, drainage, road construction and water supply projects, sometimes tended to oversimplify their planning or neglect local conditions. Combined with the difficulties of dealing with inexperienced authorities, this tendency had serious effects. Some built paved roads, for example, without adequate drainage and last winter, when it rained as it had not rained for more than 20 years, the Ka'bah at Mecca, the greatest shrine of Islam, was flooded to a depth of 10 feet. Since this was January, just before the pilgrimage, the season when devout Muslims come from all over the earth to venerate the place of their religious origin, King Faisal's sovereign anger was aroused as it seldom is. He ordered the appropriate authorities to deal with the crisis at whatever cost to the government. (Showing that there are indeed advantages to absolute authority.)

There were other errors too. The earliest desalination plant in Jiddah failed. Also, water from artesian wells was used so extravagantly that the entire water level of the capital city was drastically lowered.

To avoid repetition of such errors, new projects today have to be coordinated with all the others in their own field, so that no one scheme can obviate or negate another. The Central Planning Organization now has an overriding authority in such matters, with easy access to technicians in each field, from—literally—anywhere in the world on very short notice.

Of all the plans to develop Saudi Arabia, however, none is more fascinating, or potentially more fruitful for the future of the country, than those to encourage the settlement of nomads on the land.

The nomads—or Bedouins, as they are loosely called—constitute a large part of Arab life. But their number is really almost anybody's guess. From the Central Statistical Service of the Ministry of Finance, which has been compiling reports on them in the past three years, and the Ministry of Interior, which deals with the wandering tribes, it would seem that at least 20 per cent of the whole population is nomadic—yet even they are beginning to settle down.

Mishari, whose ministry deals with this question most intimately, is convinced that time will bring nearly all of them into the fold of the orderly village, doing agricultural work, aware of the advantages of roads, schools and hospitals. After all, the life of the desert, however romantic it may seem, is really very hard. People live longer—and better—in villages.

Like his father before him, King Faisal is very interested in the settlement of nomads. But (also like his father before him!) he cannot resist the appeal which the life of the desert seems to make to all Arabs with a trace of poetry in their being. Some years ago, in one of my earliest interviews with Faisal as King, he quoted some Bedouin poetry to me about the joys of youth in the desert. I could see in his eyes and his smile as he recited the words how the pictures of the past rose in mirage before him—how this apostle of the future is, in so many deep respects, aware of the merit of everything that has gone before.

Spanning two continents, two religions, and three of the world's great empires...

The Persian name was *Dersaadet*—Door to the Ultimate Happiness. The Greeks called it *Teofilaktos*—City Guarded by God; the Romans, *Nuova Roma*—New Rome; the Arabs, *Farrouk*—City Separating Two Continents; and the Ottoman Turks, *Ümmüdünya*—Mother of the World. Now, and since 1923 when the Turkish Republic formally renamed it, it is called Istanbul, meaning just *The City*—as though there were none other to compare.

This may not be as presumptious as it sounds. As ancient Byzantium and resplendent Constantinople, Istanbul was for centuries the world's leading metropolis. In its leap across centuries and civilizations it was the center of three of the world's greatest empires—Eastern Roman, Byzantine and Ottoman—and two of man's most important religions: Eastern Orthodox Christianity and Islam. And in one way it *is* incomparable. It is the only city in the world to span two continents. Straddling across the narrow Bosporus Strait, Istanbul links the great land masses of Europe and Asia.

Knowledgeable travelers today acclaim Istanbul as one of the three most beautiful cities on earth, ranking it with Hong Kong and Rio de Janeiro, whose hilly silhouettes are also reflected in surrounding waters. Neither, however, is as exotic or romantic as Istanbul with its singular skyline of almost 500 domed mosques flanked by tapering minarets, and its sun-drenched shores embanked with white marble palaces, medieval fortresses, fine mansions, weathered wooden houses, colorful cafes and tea gardens built among or on the old sea walls.

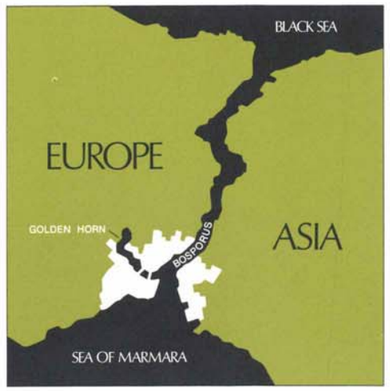
Istanbul is really three cities in terrain—as it has been in time—and each has its specific character. Most of its two-and-a-quarter million residents live on the European side

ISTANBUL:
Queen of Cities

BY ANNE TURNER BRUNO

A chimney sweep heads toward work in Stamboul, oldest section of the city.

PHOTOGRAPHY BY TOR EIGELAND



of the Bosporus, where its waters join the Sea of Marmara. There the Bosporus' deep inlet—which forms the curved natural port known as the Golden Horn—divides the high promontory of the Old City of Stamboul on the south from the New City of Galata and Pera. The third section is a mile and a half across the Bosporus and is made up of the Üsküdar and Kadiköy settlements of Turkey's Anatolian mainland, formerly Asia Minor.

Protruding into the water, the three sections form a common harbor where dozens of doughty ferryboats bustle back and forth from Europe to Asia, dodging passenger and merchant steamships of all flags, carefully skirting the bellowing ocean-going tankers and freighters. North from the harbor of Greater Istanbul, a ribbon of picturesque suburbs and fishing towns on the parallel shorelines, extends the city 17 miles up the Bosporus to the Black Sea.

This sparkling channel called the Bosporus is the city's lifeline: as a year-round highway carrying people and commerce on its surface and an amazing variety of fish —some 400 types—in its depths. It is also its May to November swimming pool by day, waterfront dining room and dance hall by moonlight.

Although born of the Bosporus, Istanbul is mothered by a total of four seas. The strong, cold currents of the stormy Black Sea flow down the Bosporus into the smoother Sea of Marmara. The Marmara leads directly into the twin strait of the Dardanelles (history's Hellespont) which empties right below Troy into the Aegean Sea and finally into the Mediterranean.

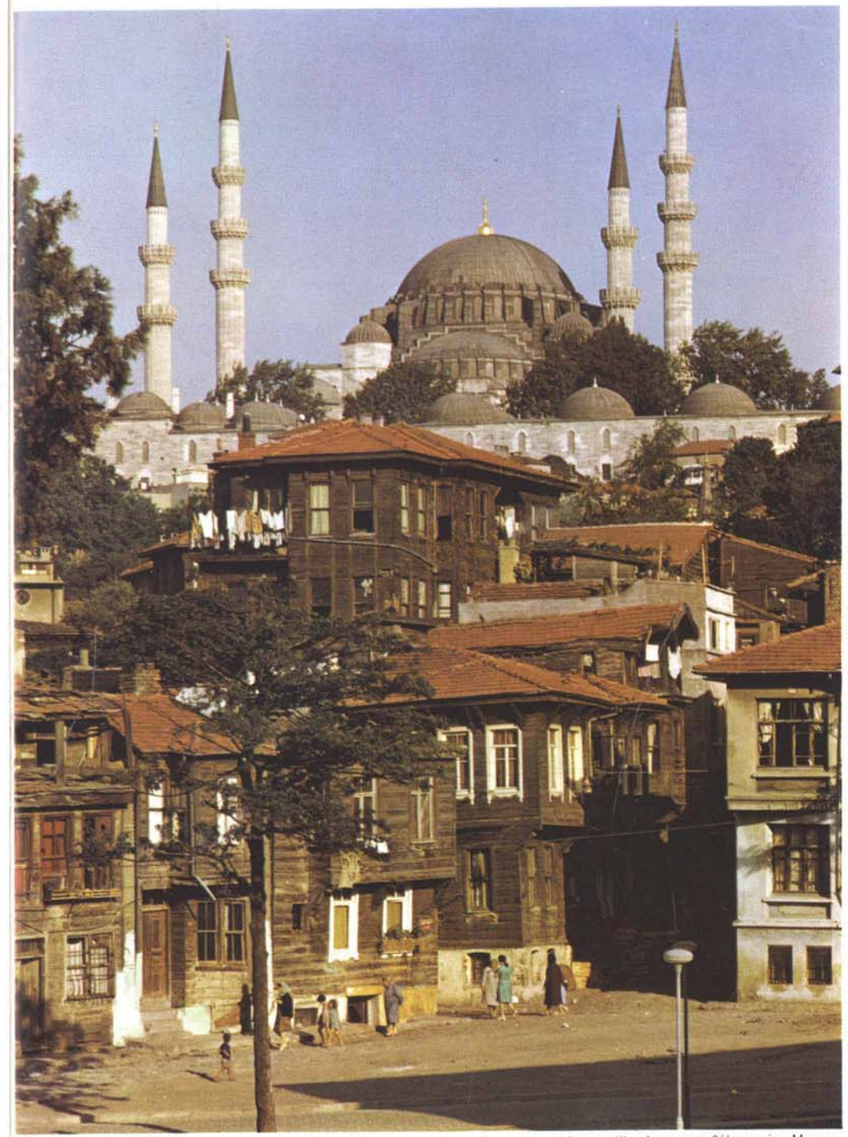
Because of this incomparable position —double-locked by the easily defensible gates of the Bosporus and Dardanelles—The City has always been coveted for its natural safety, as well as its wealth and beauty. Demosthenes, in the fourth century before Christ, correctly predicted that the point of the Old City would determine the destinies of the adjacent Thracian bread basket and the opposite fertile coastal plain of Anatolia —and history has borne him out. More than a dozen diverse peoples—Greeks and Goths, Romans and Crusaders from the West, Persians and Central Asian Turks from the East, Slavs from the North and Saracens from the South—have fought 1,000 wars over the vital landbridge and water lane. Turkey alone has had 40 major verbal and armed contests the last 200 years as her northern neighbor Russia reached for the straits, the only maritime outlet to the Mediterranean and other warm waters for her huge tankers and warships.

Like any city astride an international crossroads, Istanbul has become a city of the most striking contrasts. It is a mélange of oriental mentality and gracious hospitality, occidental appetites and ambitions, northern pace and energy, southern lassitude and contentment. It is a veritable Tower of Babel where some 30 languages are spoken daily and in architecture, transport, dress and customs it shows its origins, its history and its brilliantly cosmopolitan character. Here, a Roman aqueduct loops across a boulevard in front of a modern city hall; there, a sagging house propped up on Greek columns leans into a stark, rectangular office building. Here, a towering new hotel overlooks the Bosporus; there a vacated villa, plastered with Nile mud to comfort a homesick Egyptian princess, shares the view. On the avenues, outsized Cadillac and Mercedes cars edge past peasants' horse carts. Before posh apartments on the steep cobbled "Street of the Chicken Which Cannot Fly" or "Come On In, Don't Wait Street," the dancing bears of the gypsies perform. In the bazaars women from country villages cocooned in black robes from hair to hemline pull aside their veils to eye their mini-skirted, mink-coated sisters from other climes and times. Turbaned watersellers offer *su* to ragged laborers at a penny a glass in front of chrome-plated snack bars aswarm with hairy young Edwardians and itchy hippies. Nightclub clients drink "coexistent" *Votka* and *Coke* as hostesses alternate the Jerk and the Shake with languid belly dances.

The range of the unexpected enchants the western mind with a "subconscious charm of strange remoteness," a feeling that perhaps springs from the city's ancient roots. The first city was founded in 657 B.C. by the Megarian Greek chief and trader Byzas who built his Byzantium on the harp-shaped peninsula and prospered from the traffic in, and tolls on, Black Sea gold and grain, Mediterranean olive oil and fruits.

The City always attracted commerce. But its lasting fame was earned by the governments and religions which are epitomized in the trio of pinnacled buildings dominating the horizon of the Old City today: St. Sophia, the Blue Mosque, and Topkapı Palace.

Called the world's greatest religious temple, the massive basilica of St. Sophia, with its 150-foot high dome topped by four missile-shaped minarets, was *the* first Christian cathedral and then an imperial mosque, before it was made into the present



The Bosporus is lined both by palaces (such as Dolmabahçe, top) and warmly weathered houses like those near Süleymaniye Mosque.

museum in 1936. Constantine the Great built St. Sophia (meaning "Holy Wisdom," not a lady saint) after he chose the city to be capital of his Eastern Roman Empire in A.D. 330. It was a suitable adornment for a city that by A.D. 476, the time of the fall of Rome, was the unchallenged heart of the growing Greco-Roman-Slavic-Asiatic civilization that would be called the Byzantine Empire, and that would lead the world in wealth, learning, art, politics and power for the next thousand years.

Later, in the mid 500's, the Emperor Justinian rebuilt St. Sophia, looting the known world of gold, silver, marble, statuary and art works to do so, then exclaimed of the architectural wonder, "I have surpassed thee, Oh, Solomon!"—as indeed he had.

St. Sophia, with its main dome and four half domes and its exquisite mosaic murals, created the Christian art style called Byzantine and set the style for an admiring Europe. It also excited Europe's greed. When the Fourth Crusaders, en route to the Holy Land, restored the Roman Empire in 1204 for a brief 50 years, they not only took back to Europe many of the Byzantine scholars, manuscripts and ideas that eventually helped to inspire the Renaissance, but stripped the city of its fantastic treasures. A notable example is the statue of four golden horses and chariot now on top of St. Mark's Cathedral in Venice. The Crusaders tore it from the top of Constantinople's hippodrome, a Roman-built, oval, horse race and chariot course over 1,300 feet long, the largest in history.

The magnificence of St. Sophia, however, may also have been its salvation. When Constantinople fell, in 1453, the conqueror,

Fifth-century walls were built of brick and stone. The land walls, protecting the city on the west, stretched nearly five miles across the high promontory between the Sea of Marmara and the Golden Horn.

23-year old Sultan Mehmet, a brilliant linguist, poet, scholar and soldier, so marveled at it that he preserved it from destruction. Later, after converting it into a mosque (by covering the mosaics and adding a minaret) he even prayed in it. He and his men also marveled at the magnificence of marble halls and palaces, stately homes, spacious avenues and quays, and reputedly adopted for their Istanbul the crescent found atop the old buildings. It was the lasting tribute to the thin slice of moon that had saved the city almost 1,800 years earlier by revealing the assault preparations of Philip of Macedonia, Greek king and father of Alexander the Great.

St. Sophia was also the archetype for the second great structure of the Old City, the famous Blue Mosque. Soaking up Byzantine life like a sponge, the Ottomans, when they began to build their own houses of worship, began to copy the great Byzantine dome. Thus, in 1616, just a few hundred yards away, the Sultan Ahmet Mosque ballooned up majestically against the sky, a fitting companion—and rival—to St. Sophia. Known as the Blue Mosque, for the delicate blue and green faience of the interior walls, it is considered the most beautiful mosque in a city that claims the largest number of mosques anywhere in the world. Certainly, it is the only one in the world with six minarets.

The third structure is Topkapı, a sprawling labrythine palace once described as "more splendid than Versailles, more bloody than the Kremlin and more mysterious ... than the Imperial Palace of Peking."

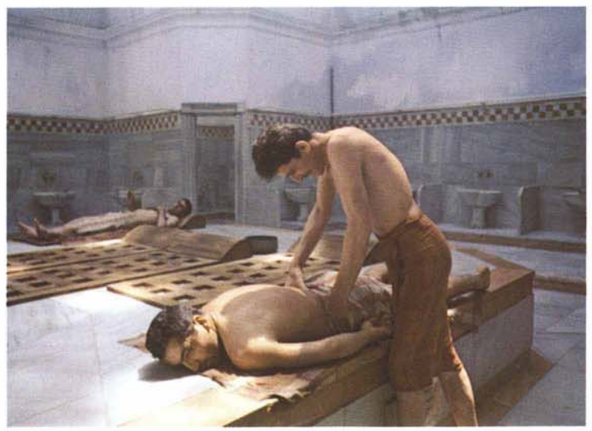
Now a museum rich in collections of jewels, weapons, silken gowns and Ming porcelain, Topkapı was once the world's symbol of oriental power, extravagance, and decadence. Within its great complex of halls and courtyards the powerful sultans, who ruled one of history's greatest empires for nearly 400 years, not only adopted Byzantine architecture but also the Byzantine passion for intrigue and its taste for luxury. They also adopted such institutions as the harem in which at one time some 1,500 choice beauties of the empire lived and died at the whim of their imperial ruler and under the watchful eye of their eunuch guards.

Much has been written about the Ottoman sultans, most of it concentrated on their swift extension of power to Morocco and Vienna, their battles with the powerful Janissaries, their cruelty, their intrigues, their ruthless competition for power and their fantastic opulence. But the "Sublime Beings" and their bizarre entourages—numbering at times 10,000 individuals—had their better side too. Some tried to reform the empire. Others cultivated the arts. Of the 35 sultans, 32 were poets and five of them were outstanding poets. One, for inspiration, used to throw handfuls of rubies and emeralds into the palace wading pool so he could watch the flash of women's bodies as they dived into the water after them. Another used to hang mirrors between his famous tulips and set gilded turtles, each with a candle on its back, wandering through the garden at night while he tried to draw and paint the colorful images in the mirrors.

In the centuries when Topkapı was not only the focal point of the empire but the center of a burgeoning city, there grew up on the hills that sloped down to the Bosporus the neighborhoods and institutions which today retain so much of the special flavor of the past. One was the covered bazaar. Another was the university. In a later era there also grew up Istanbul's Fleet Street.

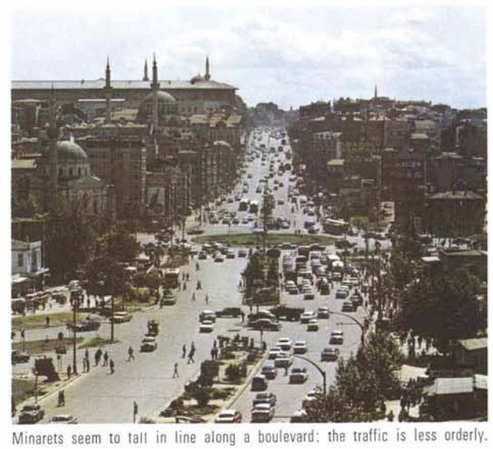
The bazaar, which lies inland behind the palace and was built by the sultans themselves, is thought to be the largest in the world. Every day some 10,000 shouting, cajoling merchants and salesmen in 4,000

In suburban resorts north of Istanbul, sun-drenched villas crowd the banks of the Bosporus, lifeline—and playground—of the city.



A massage at the Turkish baths is one way to relax from the daily tensions of a bustling city.

... or dozing by a window garden of red geraniums.



Minarets seem to fall in line along a boulevard: the traffic is less orderly.

Drummer of traditional janissary band strikes a happy note.

shops offer a tantalizing variety of goods —from Greek coins, both genuine and false, and Crusader swords to the latest fashions in leather and suede—to an estimated 250,000 customers.

Just behind the bazaar is the monumental Arabesque doorway to the University of Istanbul where some 40,000 students attend the country's largest and oldest—it was established by Mehmet in 1453—educational institution and where the 350-year-old Tower of Beyazit winks its Cyclopian eye at Yeşilköy Airport 15 miles away and gives its weather forecast: blue for fair, green for rain, red for snow.

Between the university, and the railroad station (where the famous if now shabby Orient Express ends its run), is Bab-i Ali, the Fleet Street of Istanbul where 16 newspapers are printed daily in Turkish. Past the station, the "Street of Letter Writers" leads to Galata Bridge, the older and more important of the two crossings over the Golden Horn to the New City.

It has been said that 100,000 persons and 100 nationalities cross Galata Bridge each day, but not one idea in 10 years. By count, some 62,000 automobiles and trucks surge over it daily in a wild chaotic hubbub of vehicular and human traffic that seems to threaten violent death to all. The bridge was once called "the most wonderful pathway in Europe," but that was 100 years ago when the banks of the Golden Horn glittered with the merchants' shipping and manses. The five-mile-long estuary today is a gigantic sewer spilling out the refuse of shoreline factories and slums. Unhappily, only the sunset's glow enriches its crescent now.

On the southern bank of the estuary stands the Cathedral of St. George, where His Holiness Athenagoras I continues as Greek Orthodox Archbishop of Constantinople, Ecumenical Patriarch and spiritual leader of the world's 160 million Eastern Orthodox Christians—the same six-foot six-inch, dynamic, bearded octogenarian who gave Christian ecumenicism renewed impetus six years ago by offering a kiss of peace to Pope Paul VI in Jerusalem.

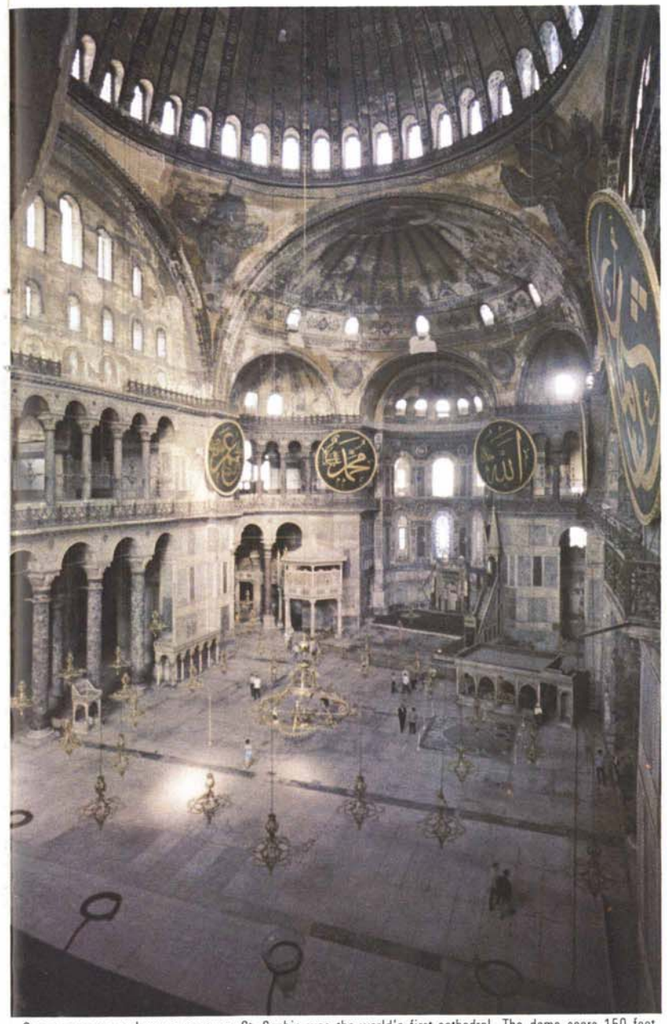
At the far end of the Golden Horn is the Grand Mosque and Tomb of Ayyub (meaning Job), scene of the sultans' coronations, and a sacred spot to Muslims. One of the Prophet Muhammad's companions, Ayyub died at Constantinople in A.D. 669 as a standard bearer of the Saracens' first attack on the Byzantine capital. Their annual attempts were always defeated by the miraculous Greek fire, which burned everything it touched in air and water, and they finally departed in 717.

The bridge—the bridge to the New City—is anchored in the coastal arc known for almost 1,000 years as Galata, possibly for early Gallic settlers. Galata and the "Infidel Hill of Pera" (Pera meaning "beyond" in Greek), as the devout Muslims called it, were the homes of the Frankish, Genoese, Venetian, Armenian, Jewish and Greek merchants and financiers whom the soldier-farmer Turks wooed to serve their imperial city.

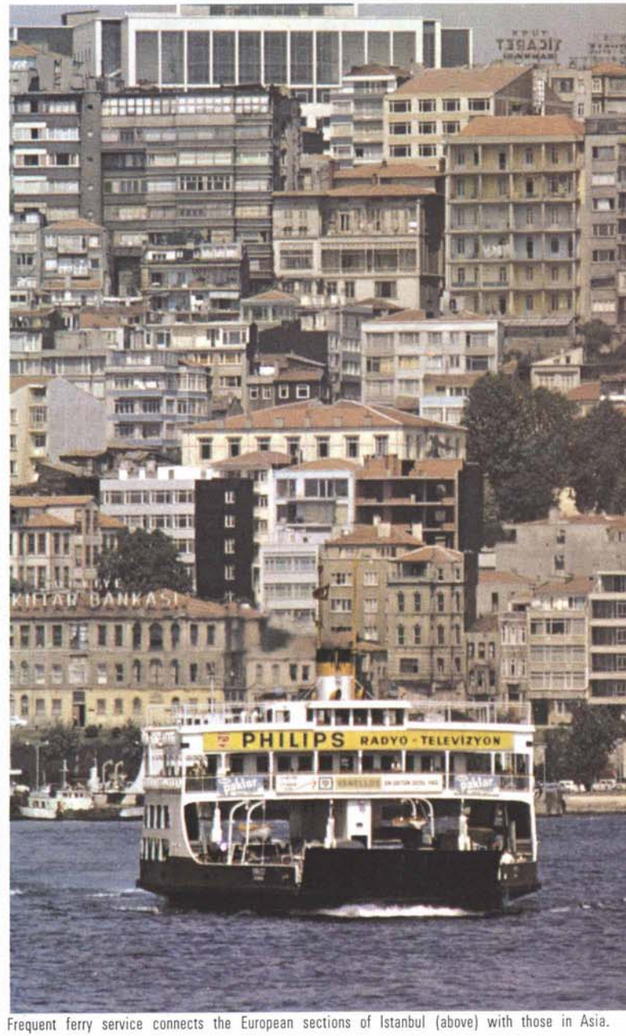
When Ataturk, the founder of the Republic moved the capital to Ankara, Istanbul adjusted easily to its present role as Turkey's largest port, industrial and economic center. The New City—now expanded to include a score of communities and *quartiers*—became a booming commercial, entertainment and residential area offering profit and pleasure to its burgeoning masses. Twentieth-century trade and tourism gravitates to Taksim Square atop the New City's plateau for fine hotels, restaurants, modern *kokteyl* lounges and such quaint alleys as "Drunk Man's Passage."

Interestingly enough, the city, once known for the world's largest hippodrome offering public entertainment, boasts almost 30 legitimate theatres. About 23 of them are in the New City and offer, in Turkish, only weeks after world premieres, the works of such leading playwrights as Edward Albee, Samuel Beckett and Harold Pinter. In addition, the stunning scenery, varied settings and the surprising Turkish flair for acting, make Istanbul a Hollywood on the Bosporus. About 200 feature-length films are made each year, primarily for domestic consumption.

One of the most dramatic and eye-catching buildings in Istanbul is the Dolmabahçe Palace which fronts a half-mile of the Bosporus at the northern end of the New City. The white baroque wedding cake with its ornate grill fence and gateways was the last home of the sultans from 1853 to 1923 and of President Ataturk, who died there in 1938. Dolmabahçe has been



Once a mosque and now a museum, St. Sophia was the world's first cathedral. The dome soars 150 feet.



Frequent ferry service connects the European sections of Istanbul (above) with those in Asia.

A sidewalk table is one spot to have tea, while a samovar keeps the pot warm.

Parts of the city retain a village charm.

Performers enjoy the spirited folk dancing as much as tourists do.

Galata has look of old Genoa.

A ferry steams beneath Topkapı Palace, out of the Golden Horn toward the Sea of Marmara.

maintained as a museum in tribute to the man who rallied the Turkish people after the Ottoman Empire's defeat in World War I and led them in an unusual experiment in democracy which, in its struggle to develop the nation's natural resources and human talents, has shown exciting potential.

A mile south from Dolmabahçe are the principal car ferries that bridge the Bosporus to Üsküdar, The City's largest Asiatic suburb. The once-busy Byzantine Scutari, which hosted silk and spice caravans from the Far East, is now a sleepy town featuring grand somnolent mosques, a few dope dens, the largest Muslim cemeteries in the East, and the towering Selimiye Barracks where Britisher Florence Nightingale began modern nursing in the 1854-56 Crimean War.

Just beyond the barracks is the town of Kadiköy, the main terminal for intercontinental commuters who pour off the express ferryboats every 20 minutes and then up the 15 miles of coastal suburbs lining the Sea of Marmara. A dozen miles offshore are the nine Princes' Islands, one-time playgrounds—and sometimes prisons—for Byzantine royalty. The isles' silken swimming waters, fine sandy beaches fringed by pines and palms, relaxing horse-drawn carriages serving villas and hotels make them a popular vacationland.

The Princes' Islands, along with the the other resorts on the Marmara and Bosporus, represent the city's waterfront boundaries. But as peasants forsake the mainland for The City's presumed opportunities in a tidal wave that has inundated all of The City's three sections and doubled the census in a little more than a decade, all boundaries are beginning to give. It is estimated that today's populations will double again to four and a half million persons by 1985.

In its concern, The City is drawing up a renewal plan that sees Greater Istanbul a 70-mile-long megalopolis stretching 40 miles westward on the European banks of the Marmara and 30 miles eastward on the Marmara's Asiatic shores.

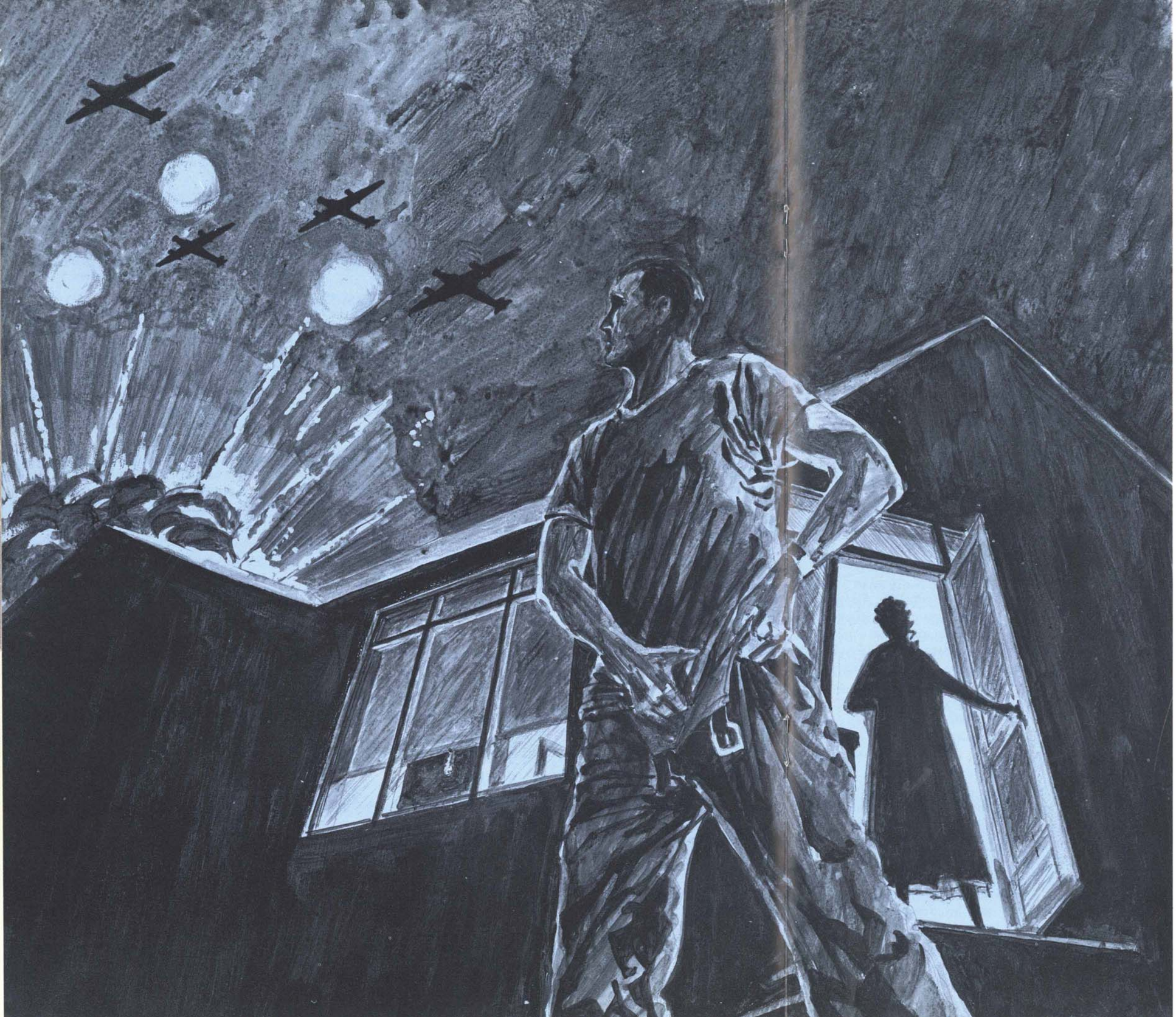
As a part of the $150,000,000 renovation, a Bosporus bridge—the first permanent span in history to connect Europe and Asia—will be built about four miles north of the Old City promontory out of sight of the famous skyline, thanks to rare planning foresight. Scheduled to be finished in 1972, the bridge is expected to transport some 20,000 vehicles daily between the two continents, twice the number carried on the existing ferries.

A peripheral road leading to the bridge is designed to remove two-thirds of the overwhelming traffic jammed into the main arteries between Old and New cities. The vehicular flow should also be reduced by transplanting industry from the center city Golden Horn to the Asian section, where new communities are planned for at least a million persons.

No matter what positive changes are made in Istanbul's traffic and housing however, residents and visitors expect it to remain the queen of cities, the place where the sun bursts out of Asia to lighten Europe's morning windows and exits dramatically behind the haze of the Golden Horn; where great ships steam across the waters in between, writing their smoky calligraphy upon the skies; and where the heavens, punctuated by a parade of minarets, echo to the muezzins' five-times-a-day call to prayer in the poignant wail that captures the magic of the East.

Anne Turner Bruno is a free-lance writer who has lived in Istanbul for five years. She has written for McCall's, The Reader's Digest, Business Week *and* Sports Illustrated.

Evening rush hour traffic jams Galata Bridge across the Golden Horn. The bridge joins the Old City of Stamboul (foreground) with the New City of Galata and Pera, all in Europe. Ferry boats sail from the busy bridge area and ply the Bosporus Strait to Usküdar.



DISCOVERY!

the story of ARAMCO then

CHAPTER 12: AIR RAID!

BY WALLACE STEGNER
ILLUSTRATED BY DON THOMPSON

SYNOPSIS: By 1940 the search for Arabian oil was clearly a success. Casoc, the American company that had followed the 1920 financiers and adventurers into King Ibn Sa'ud's Arabia, had explored the vast concession area awarded it by the King, found oil in quantities that promised an exciting future for Arabia, built a modest refinery, loaded its first tanker and built, on a slight rise near the Gulf coast, the rude camp that would become the community called Dhahran.

For the men of Casoc the search had never been easy, and sometimes, as they ranged into the unmapped Empty Quarter, crossed the peninsula to the Red Sea, spent 10 days fighting one of the world's great oil well fires or sailed anxiously out into the Gulf in search of the bodies of poor Charlie Herring and his wife, they wondered if it were worth it.

Nor were the physical challenges and hazards always the worst problems. There were also the misunderstandings that were probably inevitable in the first confrontation of aggressive technological society with the pastoral passivity of the desert but which, nonetheless, could put a colorful driller named John Ames in jail for accidentally hitting a boy who darted into the path of his car.

Still the search went on, aided now by the second wave of such young but able professionals as Tom Barger, later to become president and chairman of the board of the company, but at that stage merely an apprentice geologist with an appetite for work and a feeling for the language and people of the country in which he found himself.

In Europe, meanwhile, war had broken out as Hitler sent his angry legions storming into Belgium, Holland, Denmark, Poland and France. No one in Casoc was very surprised, but in view of recent efforts by German and Japanese spokesmen to win oil concessions in Arabia, some did feel that they should take basic precautions. They recalled all field parties, sent Tom Barger out to scout the concession area for evidence of German infiltration, and began to stockpile supplies.

After a while, though, everybody relaxed. There were shortages, of course, as the war gradually pinched off supplies, and there was a slight concern at the vulnerability of both Bahrain, which, as a British treaty-state was *at war, and Dhahran, which was, some thought, uncomfortably close. But no one really worried. Not at least, until the night of October 19, 1940.*

The night of October 19, 1940. The sky is full of light from a late three-quarter moon, the purity of its cup is broken only by one trailing film of cloud, the stars are pale but very many. Over the Gulf, where sometimes a heavy fish splashes in water still as oil, the lower air is faintly pearly. Bahrain lies afloat, its houses dark, the crocked alleys of Manama blackly rutted among the moon-white walls. Only the refinery blazes with light, a hub at the center of lighted spokes of roads, throwing its harder, brighter, five-and-dime glitter back at the softer glitter of the stars and the cooling metal of the moon. Five hundred yards to one side, the gas flares gush flame.

A little after 3 A.M. the Bapco guard in the field gave a warning that there were planes going over. Somewhat later, he warned again, worried about who they might be. At the Sitra terminal a worker outside having his past-midnight lunch saw them and called William Gentry, who in turn called Ward Anderson. Anderson got up and put on his pants and went out on the porch. That was just about the moment when a jolting roll of explosions shocked the Phil McConnells out of bed. Gertrude McConnell, shocked awake before she had had time to stop sleeping, groped around on the floor under the impression that there was an earthquake and that she should be down where falling objects wouldn't hit her. Phil McConnell cursed the elusiveness of a man's pants whenever an emergency arose, found a pair neatly laid out and started to drag them on, threw them aside because he realized they were good ones that might get dirty, rushed to the closet for another pair, and finally made it outside.

Directly over the Bapco refinery's bright stare of light, between that and the moon, hung two tremendous stars, too big and bright to be real. Phil could have read a magazine in his yard. Next door, Ward Anderson's door slammed, then his car door, then his car shot gravel as it zoomed out into the road. McConnell yelled to him vainly to turn off his lights, and Gertrude McConnell yelled vainly at Phil not to go out, and Phil yelled again at Mrs. Anderson to ask if Gertie could come over, and in a minute or two he was headed down the road after Anderson, but with his lights turned off.

It was perfectly clear that Bahrain had been, or was being, bombed. By the time they had gathered to check the damage—Fred Davies, Lloyd Hamilton, McConnell, Milton Lipp, Don Hanna, a collection of bosses both resident and visiting—the intense magnesium flares had winked out and rumors had begun to come in. One of them said that some men interrupted at a late poker party had been hurrying home just now when they thought they saw flares in the sky over Arabia, and thought they heard muffled explosions.

In Dhahran many people had heard those same explosions. "Spike" Spurlock, the lawyer who had drawn up the papers for the incorporation of Casoc in 1933 and who had until recently been in the London office, lay there awhile listening for something more, and then rolled over and went back to sleep. But Spurlock was a philosopher by nature, so unexcitable that his friends swore a self-winding wrist watch would invariably go dead on his wrist. Others, not so calm, ran out in shirttails, pajamas, or less, to discover what went on. Bill Eltiste dashed out of his quarters, and his neighbor, Mrs. Dreyfus, out of hers, and together they talked for a while, before Bill realized he had neglected to dress. He denies indignantly, however, that he was naked. "I had my shoes on," he says, and besides, as if in mitigation of the informality of his attire, "it was dark."

By then the Italian planes which had dropped two or three dozen small 50-pound fragmentation bombs on Arabia and more than 80 on Bahrain were a long way off to the west in the shining metallic sky, headed for Eritrea. They had come, it appeared later, from the Dodecanese Islands. Since no wreckage was ever found, it was presumed that they made their African sanctuary on the fuel they had. Why they had bombed the refinery on Bahrain was obvious enough, but why they had dropped bombs on Saudi Arabia, a neutral country whose government they were trying to woo, was a harder one. And when people got out in the morning and began to inspect the damage they had done, everything disintegrated into guess and speculation and incredulity mixed with ribald rumor. If the bombers had been manned by Mark Twain's version of James Fenimore Cooper's Indians they could not have performed more ineptly.

On a night shining with moonlight, the planes had come over Dhahran, flying at 6,000 feet and in no hurry. Below them the blaze of lights from the wells and the gas-separator plant glittered up at the sky's illuminated dome. They flew with stern directness over the gas-oil separator plant. They may be presumed to have squinted through their bombsights. Presumably young men aboard the aircraft grew tense. There came an order. Deadly missiles tumbled out of the planes' bellies and lit with devastating effect at the edge of the *jabals*, several hundred yards from anything, puncturing an oil flow line and cutting a water main.

Then the bombers, having done their deadly work, circled once to observe it, and bored on through the night to Bahrain. Below them here the refinery was jeweled with lights like a Texas oil town. They circled at least once, looking it over. No one bothered them, no alarms went out, no planes rose, no ack-ack came up at them. Bahrain, as a matter of fact, was thought to be so far away from enemy bases that it needed no defenses at all. There it lay, lighted up like a California supermarket opening.

Carefully the raiders dropped flares—more or less the equivalent of lighting a match to look into a movie projector's beam. Again came the order. Again deadly missiles tumbled out of the planes' bellies. This time they played havoc with a coke pile. Then the bombers turned westward again and droned away toward Africa.

It was simply inconceivable that they should have missed, not once but twice, from that height and under those conditions. Some thought they must have missed on purpose—that the raid was made as a stunt, to scare the British into diverting part of their already inadequate guns and planes from the Mediterranean or elsewhere to defend Bahrain. Some thought it had been done for propaganda reasons, and therefore wasn't concerned with doing damage. Yet if you had your enemy right in your sights why would you deliberately miss him? Some believed that the Bahrain refinery was missed because it was an American neutral installation, though effectively part of the British war effort. These same people thought the bombs dropped on Dhahran were a mistake, the result of some pilot's confusion about exactly where he was.

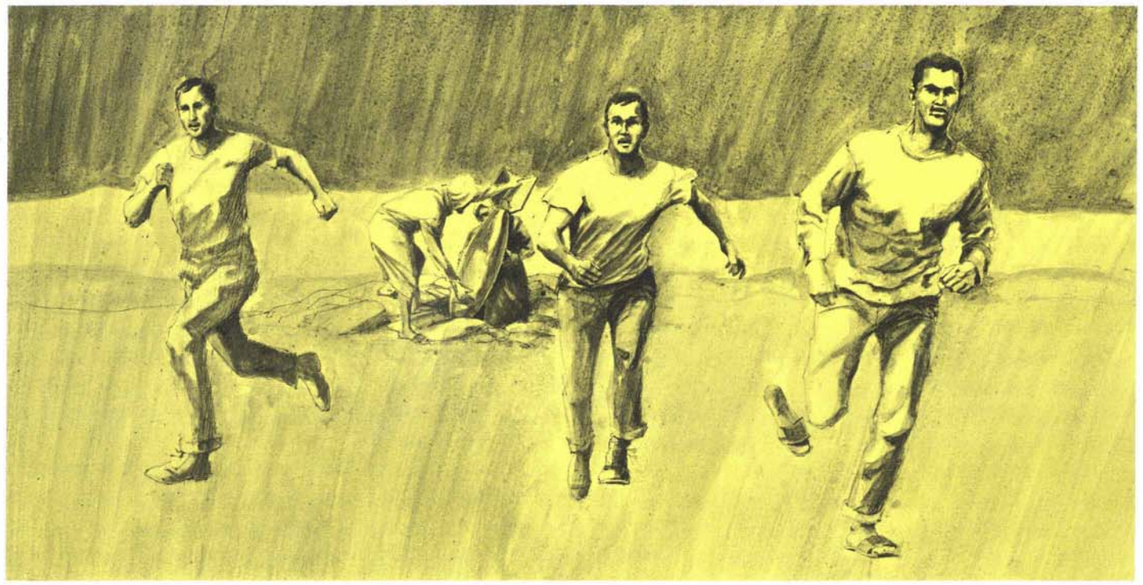
The explanation that satisfied more people than any other was that the raid suffered from too much care, not too little. In both Dhahran and Bahrain the bombs fell well-clustered, and in each case near the flares. But the flares at Dhahran had been moved farther away from the installations within the past week. A man carefully briefed to sight on the flares might possibly have stayed with his instructions even though the brightly-lighted GOSP and wells suggested that other targets might be simpler and more effective. Over on Bahrain, also, the flares had been moved farther from the refinery shortly before the bombing. Having arrived at the Arabian flares thinking he was over Bahrain, a well-briefed but unimaginative squadron leader might have realized his geographical error and flown on to Bahrain to repeat his tactical blunder. And if that explanation didn't satisfy you, what had you to offer?

When the flow line was punctured at Dhahran, a stream of oil flowed down among the houses where many of the Saudi workmen lived; Dick Kerr and Charlie Davis had the job of routing everybody out before somebody's *barasti* fire or a carelessly tossed match should touch off a blaze. Everybody stayed up all night; and about 6 A.M., Cal Ross heard the official Italian announcement over his radio: "Bahrain has been destroyed. Fires were left burning that the pilots could see for a hundred miles as they left the scene."

The next morning at Dhahran there were about 50 or 60 Americans, along with a number of Saudis, scratching around in the line of small bomb craters that ran along a level stretch of ground, then up and over a rise and down the other side. They were searching for bomb fragments to keep as souvenirs. All at once Oliver ("Danny") Boone burst from one of the craters, running as if for his life. The others, following his panic-stricken, backward-straining gaze, saw two Saudis who had just come over the rim, each carrying a dud bomb. Within seconds there wasn't an American in sight—only a pair of Hofuf sandals that Joe Carroll had run out of in his dash for cover.

From behind a rock, Boone screamed at the Saudis to put the bombs down. He did not have to resort to Slim Williams' form of Arabic; he knew the right word for down, which was *taht!* But he nearly swallowed his tongue when the innocent Saudis took him at his word and tossed the bombs wonderingly aside. Before the Americans went back to their scavenging they assigned Cal Ross and Bill Eltiste the job of disposing of the duds. Nobody was curious enough to disassemble them and see how they worked, or why they hadn't gone off. Eltiste and Ross laid a stick of dynamite beside each one and detonated them from a good safe distance.

Whatever the explanation of this most futile of all air raids—and no one knows the real answer yet—there was one instant effect. If the motive was to scare the British, the raid was a success. It also scared the Americans, who as neutrals had less cause to stay there and be shot at. Before another night of moonlight rolled around, the Bahrain refinery was blacked out



and shut down while the crews worked on air raid shelters.

In Dhahran, a few people took to the dunes and slept out, but most of them, including the wives, refused to budge. The contemporary members of the Tinkerers and Gadgeteers' Society of Saudi Arabia began what would turn out to be a four-year series of experiments in meeting the threats of war. They sprayed the whole town with oil to keep streets and sidewalks from shining, and made it a housekeeper's nightmare; they began rigging air injection systems —venturis—on the flares, and turned them into giant Bunsen burners that threw a blue and much less visible flame into the sides of the *jabals*. And a lot of them, including some who had stayed after the Italian declaration of war in June only because they hoped Arabia would be outside the war zone, began to get out.

The women of Bahrain started moving with the first British India boat. Gertrude McConnell went on that, not so much because she wanted to go for herself as because her friend Gretchen Foley, pregnant and frightened, didn't want to leave without her. Some women from Casoc were aboard, and a few men whose contracts were up anyway, or who for one reason or other were about to leave. In a day or so planes took out some more.

Then Floyd Ohliger got approval to use a tanker. He put an emergency launch aboard it to augment the lifeboats, the shop built life rafts to be slung on the deck, and a whole crowd of evacuees started the five-day trip down the Gulf to Bombay. On November 12, a couple of weeks after the Bahrain refinery had cautiously opened up again, 99 Casoc and Bapco evacuees sailed for home from Bombay on the *President Garfield*, leaving Bahrain practically bare of American women and Dhahran with only a watchful handful, waiting to see if anything more would happen.

In February, 1940, Dhahran had been a community of 371 American employes, 38 American wives and 16 American children, plus a force of 3,300 Saudi Arab, Bahraini, Indian and other employes. In fact, the whole Casoc operation was getting so large that in September, 1940, it was separated from Socal's foreign producing department and was made an independent entity, with its own board of directors and with Fred Davies as president. But within a few weeks after the *opera bouffe* bombing, the American group in Dhahran was down to 226 employes, 19 wives and 5 children. By May of the next year the camp was totally womanless and childless, and many men with families and obligations in the States were leaving. The Company, on the principle that staying in Dhahran was a kind of war service that no one should be required to do against his will, did not try to hold them.

Operations shrank as the labor force dwindled and as the flow of supplies was pinched off. Everything they obtained—and for two or three years they had trouble getting anything—had to come to them around the Cape of Good Hope. Industrial parts, cars, trucks, tires, food, equipment of all kinds, grew harder and harder to obtain, and at length impossible, and though they tried to stockpile everything they could, they were crippled by shortages that threatened, but were never quite able, to shut them down altogether.

When the war interfered, they were on the verge of being one of the major oil producers in the world, with the most extravagant prospects for expansion. Although the Ma'aqala wildcat had been closed down in March, 1940, as a dry hole, Abu Hadriya No. 1 had struck oil that same month at a depth of 10,115 feet, and a second well had been started there to test the extent of the field. Just after the bombing, in November, 1940, the drillers dirtied up the rig with a big new producer at Abqaiq No. 1, about 35 miles southwest of Dhahran.

The second Abu Hadriya well was suspended and the first shut in immediately after the bombing; Abqaiq No. 1 was shut in the following February. But even by that time they knew enough of the potentialities of the Abqaiq field to know that it was incomparably larger and more important than that at Dammam. Perhaps Max Steineke's greatest single achievement had been the series of intuitions that led to this suspicion of closure at Abqaiq, later demonstrated to be one of the world's great oil reservoirs. He had weighed and collated such random and uncertain clues as the occurrence of salt flats, the occasional patches of Tertiary outcrops, even the alignment of the sand hills. He had suggested the use of structure drilling and by that means had corroborated his guess that there was around Abqiaq a well-defined domal feature whose surface features had been all but obliterated. The test well was spudded in on August 4, 1940. In November San Francisco cabled its congratulations. According to a memorandum by Terry Duce, one of the directors, just before the well was shut in February, 1941, "the drill-stem test ... indicates that the well was flowing at the rate of 405 barrels an hour or 9,720 barrels per day ... These are of course only drill-stem tests and merely indicative that we have a big well ... with the possibility of a big new field."

Considering that in the United States, where competitive leasing and drilling put a maximum of holes down into a field, a well that produced 100 barrels a day was a good one, and that some wells, with constant pumping, produced 12 barrels or less, Mr. Duce's restraint seems almost chilly. Abqaiq No. 1 was a better well than any at Dammam, and if Steineke's guess about the structure was correct (as it proved to be) the field itself was many times greater.

Instead of developing it, they closed it down; they had to. Without adequate manpower or adequate supplies, they were able, by great effort and ingenuity, to keep the Dammam field producing, though the 12,000 to 15,000 barrels a day that they got through the stabilization plant, down to al-Khobar by the six-inch pipeline, and by barge across the channel to the Bahrain refinery never satisfied the home office, and would not have satisfied themselves if they had not known their daily production was more than they were entitled to in the circumstances. At Ras Tanura the crude oil tank farm stood idle, the pumps were still, the port facilities went unused. The 3,000-barrel-a-day "tea kettle" refinery, which had been completed on the Ras Tanura sandspit in the autumn of 1940, was shut down the following June. The 20 miles of channel beacons leading in to the port no longer flashed their lights down the shallow Gulf. No crude coursed through the pipeline from Dammam, no tanker followed the course of the *D. G. Scofield* to the moorings, the *El Segundo* was off on more pressing business. Any tankers plying the Gulf, and any naval vessels in need of refueling, were headed for Bahrain or Abadan, where they could obtain refined products.

But what isolated them from the world and from the clamor of great events made their own problems more absorbing, their little society more cohesive. One effect of isolation and shortages was to return them to the frontier makeshift and ingenuity that had obtained before the big growth year of 1936. Another was to return them to the bunkhouse way of life by withdrawing all their wives and children and suspending everything that had made Dhahran a sort of home. Still another was to put the Saudi Arab Government in a bad hole financially since both oil royalties and the hajj fell off sharply. By now, when the Saudi Arab Government got in a hole, it automatically consulted the Company. Fortunately its need coincided with the enforced release of many Company geologists, engineers, and relations men from business duties. Instead of expanding its oil operations, Casoc found itself expanding its goodwill activities. The revolutionary, disturbing but increasingly fruitful, meeting of cultures that had begun in 1933 was accelerated, not halted, by the war. Al-Hasa was still a frontier, with everything that implied.

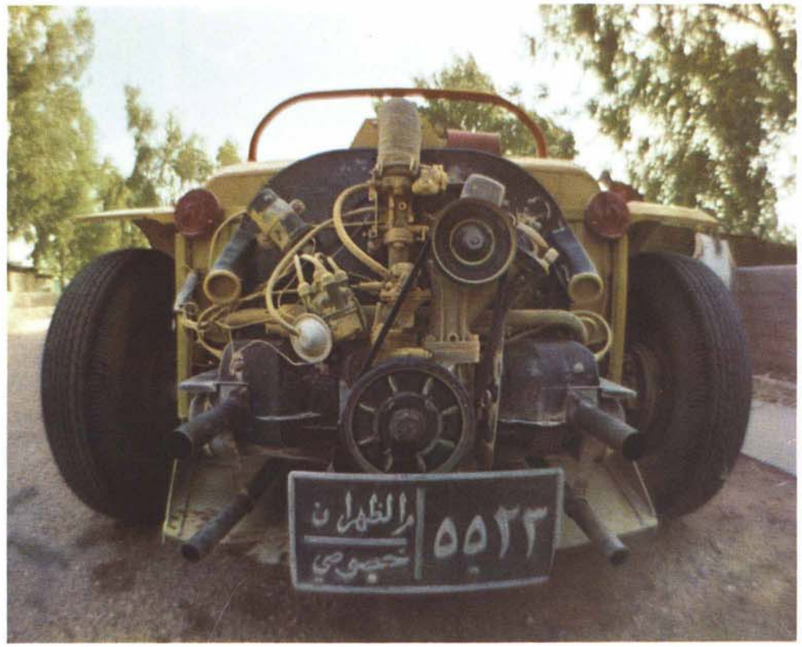
TO BE CONTINUED

MONGREL

PHOTOGRAPHY BY KHALIL ABOU EL-NASR

Driver Ray Putnam belts himself in, then...

Takeoff! Car is also built to take the jolt of desert touch down.



It took years before Aramco's desert transportation specialists were fully satisfied they had found the heavy-duty vehicles they needed to support the company's exploration and production teams: some of the biggest, toughest trucks and tractors in use anywhere (**Aramco World**, May-June, 1969). But when a group of Trans-Arabian Pipe Line employes at Turaif, Saudi Arabia decided to build a fly-weight model for weekend explorations outside their remote pump station, the "Desert Fun Car" was just a hop, bump and spin of the tires away.

The specs: one 1963 VW 1200; body, doors and rear bumper removed; fenders, windshield, front bumper trimmed; roll bar, protruding head lights and safety belts added; wheels turned inside-out for six inches extra width; larger and wider tires for increased flotation and three inches extra ground clearance.

The Danish Archeological Expedition had been in the Arabian Gulf for 15 years. It had explored and dug in almost all the tiny independent shaikhdoms that line the southern shore of the Gulf, the eastern coast of the Arabian Peninsula.

Our results had been—very satisfactory. In Bahrain we had discovered the capital city of the ancient realm of Dilmun, which had risen to power about 2800 B.C. and for 2,000 years dominated the trade and sea routes between Mesopotamia and the cities of the Indus Valley. During this period, until Dilmun was incorporated in the Assyrian Empire about 600 B.C., four successive cities were built, each on the ruins of its predecessor. And above them all lay the ruins of no less a city, built in the third century B.C., when Bahrain had regained and kept its independence during the reigns of Alexander the Great and his successors.

In Kuwait we had found and dug the northernmost outpost of the Dilmun Kingdom, and, a stone's throw away, the southernmost outpost toward Arabia of Alexander's empire, a fortified Greek town, with Greek temples, Greek inscriptions, Greek wine jars and works of art.

In Qatar we had evidence of a rich Stone Age, taking the story of man in Arabia perhaps a hundred thousand years into the past.

And in Abu Dhabi we had found another civilization, contemporary with the founding of Dilmun, which might well be the lost land of Makan, which in the third and second millennia B.C. supplied Bronze Age Mesopotamia with the copper on which its civilization was based.

They were results rich enough in all conscience. Yet, looking at the map, we knew that we were only nibbling on the fringes of things. Behind and between our diggings on the coast and the islands lay the colossal bulk of Great Arabia, virtually unexplored.

"Our bluff was called. Now we had to decide, and decide fast, whether we dared tackle an area ... 20 times the total area we had worked ..."

We had visited Saudi Arabia three times, hardly more than weekend visits, as the guests of the Arabian American Oil Company. And we had been shown something of what the archeological enthusiasts of the oil company had gathered up from the surface during their explorations. We had twice applied for permission to explore and dig. But at that time there was no one to whom one could properly apply. We had lectured on our findings from the Gulf states to the staff and students of Riyadh University, and—perhaps as a result of our applications and lectures—a Directorate of Antiquities was constituted under the Saudi Arabian Ministry of Education.

Then in the beginning of 1967 a letter reached us from the Directorate of Antiquities. They noted that we had previously applied for permission to explore in the Eastern Province, and they would be pleased if we would renew our application,

Up and down the Gulf they had searched; now it was time for Arabia.

LOOKING FOR DILMUN

BY GEOFFREY BIBBY

as there was now a strong possibility that it could be granted. Our bluff was called. Now we had to decide, and decide fast, whether we dared tackle an area of a hundred thousand square miles, 20 times the total area we had worked over during the last 13 years, and how, if we dared, we should set about it.

The problem was essentially one of what Sir Mortimer Wheeler has called "strategic archeology." It would be no use dissipating our strength trying to cover the whole area. But at the other extreme there was the danger of getting bogged down on a single site, however important. What we needed, it seemed to me, was a mobile force of specialists, capable of making swift probes at selected points, and extracting the maximum of information in the minimum of time. There would have to be a ruthless timetable, moving the party from site to site whatever the temptation to remain. And yet, in such a reconnaissance in unknown territory, there would have to be sufficient flexibility to allow unexpected discoveries to be exploited. It would not be easy.

We started with one inestimable advantage. The "pot-pickers" of Dhahran had already been over the whole area with a fine-tooth comb. The preliminary reconnaissance of surface indications had been done for us. No useful purpose would be served by our trying to duplicate their work. What we could do, and must do, was dig, and dig at points where the surface indications suggested that digging would supply new information. I picked out four areas where digging might be expected to give specific answers to specific questions.

There was Thaj, a hundred miles north of Dhahran and 60 miles inland, where we had twice collected shards of Greek pottery from a tell covering the ruins of a huge walled city. There was the island of Tarut, in Qatif Bay north of Dhahran, where we had found Dilmun shards on a tell in the center of the island, a tell which was difficult of access because a ladies' washing place occupied the only accessible site; and since we were last in Tarut some interesting objects of Classical date, mixed with earlier objects, had been found by sand-quarriers. And then there was 'Uqair, traditionally the site of the lost Classical emporium of Gerrha (but we had our doubts), and an area north of 'Uqair where the sand dunes did not quite cover a huge extent of abandoned irrigation. And, finally, I picked Yabrin, over three hundred miles away in the deep south, as a "wildcat" project. It tied up with nothing we had previously tackled, but we knew that there were thousands of burial mounds at Yabrin, which had never been investigated...

While the government of Saudi Arabia was considering our application to dig, our application for assistance, financial and logistical, was sent to the oil company at Dhahran. And at the same time as the government approved our plans, Aramco replied that their Exploration Department had been authorized to organize the practical side of our expedition.

When it comes to making a ground survey of the moon, or of Mars, the Space Administration might do worse than to put the matter in the hands of the Exploration Department of Aramco. It is accustomed to making everyday routine out of desert journeys which 30 years ago would have earned their performers an F.R.G.S., a knighthood and undying fame. It establishes, and keeps supplied with all comforts, camps in the middle of that most inaccessible of all deserts, the Rub' al-Khali, the Empty Quarter of Arabia.

Our intrepid venture deep into archeologically unknown territory was to them, we found, a jaunt within the normal picnicking area around Dhahran, for the most part well within commuting range. It could be organized in odd moments of relaxation from arranging really serious expeditions.

Yet our preparations were put afoot with the same light-hearted attention to detail as the bigger projects received. For Exploration works on a very simple principle. The man in the field is always right. He knows what he wants; the man in the depot only has to see that he gets it. Order 10,000 gallons of diesel oil, or ask them to change a library book or send a birthday telegram. It will be done. Radio in a requisition for six cans of asparagus tips by special truck; and a truck will arrive with six cans of asparagus tips. If you ask for special delivery you have a reason, and that is enough for Exploration.

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So when in January of 1968 we set off for Thaj, we were equipped to a standard to which archeologists are not accustomed. Ahead went what Exploration called a "bobtail," an immense ten-tired, six-wheel-drive, stake-bodied truck, with a cab like the bridge of a steamboat (including a lanyard above the driver's head to sound the siren) and with a smokestack puffing out a white plume of exhaust. It towed a 2,000-gallon tank of water and carried a dozen or so drums of gasoline, oil and kerosene, as well as our six tents and the greater part of our camp equipment. Bobtails are the new ships of the desert, and their drivers are a special breed of men, akin to—probably the sons of—the great Bedouin guides of 30 years ago. They travel immense distances across Arabia, often alone and guided only by God, the stars, and their instinct for direction and distance. They are the sinews of Exploration's communication system.

Behind followed our two Land-Rovers, each with its radio-transmission aerial nodding to the movement, and our two-ton truck. We had never had a truck at our disposal anywhere before, but the Fargo was scarcely large enough to hold our stock of provisions, beds, mattresses, chairs, and cook-stoves. Our personnel rode the Land-Rovers. Our party was 13 strong, a mechanic and two drivers, three cooks, and seven "scientists." Christian Fischer and I were the only "dirt archeologists."

I had, for better or worse, my party of specialists. Holger Kapel, who had tramped the length and breadth of Qatar and had just published, on his 71st birthday, the first of our definitive reports, on the Stone Age cultures of Qatar, was to range the desert within a day's drive of our camp, and work out the Stone Age cultures of Arabia. Erling Bondensen, our geologist, was to answer, we hoped, a lot of our questions about climate: why was Thaj built on the shore of a salt flat, a *sabkha*? Where had the coastline been at the time of Gerrha—

and of Early Dilmun? What had happened to the irrigated area north of 'Uqair? Where had the sand come from, and when? Ole Brande, our surveyor, who had mapped our city tell on Bahrain as a student and was now a professor, was cradling his theodolite on his knees. His biggest job would be to make the town plan of Thaj, his most difficult job making sense of the wide scattering of irrigation channels north of 'Uqair. Bente Hojholt was our draftswoman, who up to now had been drawing pottery in the museum in Denmark. This time everything we found must be drawn on the spot, for nothing would come back to the museum in Denmark. The infant department of antiquities in Riyadh was playing it safe. They did not wish to jeopardize a hard-won position by risking charges that they were giving national treasures to foreign museums. Everything we found was to be handed over to them. In this we were in full agreement. We had been too long the Cinderella of our own museum not to appreciate the difficulties faced by a department trying to do what had not previously been done; and we felt rather like godfathers to the antiquities department. We had watched its advent and teething troubles with solicitude, and we were prepared to go to a lot of trouble to strengthen its position.

"'What, think you,' I asked, 'is under the lid here, a djinni?' One of them grinned. 'If God wills,' he said, 'there will be gold.'"

Abdul-Rahman al-Ibrahim was the representative of the department on our party, a specialist in Islamic architecture and archeology, but as anxious as we to get his teeth into the pre-Islamic past of his country. Christian and I would have to do any digging that was to be done.

The immediate archeological problem with Thaj was straightforward, and could be answered by a single carefully-placed sondage. Did the city of the time of Alexander, which surface indications showed to exist, overlie a city or several cities of earlier date? The longer-term historical problem was immensely more complex. What was this city? What part did it play in the history of Arabia, or the history of the world? Who had lived in it? Why was it where it was? These questions we could not hope to answer in a single season. But because they were important questions, we would look at Thaj, and survey Thaj, with a view to full-scale excavation. For that was what would be needed if the historical questions were to be answered. And in our preoccupation with our realm of Dilmun we should not lose sight of the fact that in Thaj we had a site of historical importance, architectural promise, and even potential tourist attraction which many an archeologist would regard as the crown of a lifetime's work.

The weather was wet and bitterly cold. The tents were snug, but the beds were difficult to leave on a chill blustering morning. I reminded myself that by April in Yabrin we should look back in sheer disbelief to a time when we wished that the weather were warmer. But that did not help. What did help was to go and shovel soil and sand up the three-meter high wall of our sondage. Sited just inside the south wall of the city, it measured only two by two meters, and was already deeper than it was wide. I had promised the department to dig no holes larger than two meters square, and to fill them in when we left. For the department was afraid that superstitious local inhabitants might object to any excavation which could disturb djinns and malignant spirits. I had told them that I did not believe their people to be more prejudiced than those we knew so well in the Gulf states. And when, digging down along the inner side of the squared-stone city wall, we had found the first bowl, lidded by another bowl, just like the "snake-offering" bowls we had found in the "Assyrian palace" in Bahrain, I lifted it up and showed it to the group of young Bedouins squatting on the edge of the excavation. "What, think you," I asked, "is under the lid here, a djinni?" One of them grinned. "If God wills," he said, "there will be gold." "There will be nothing," said another. "If God wills," said I, "there will be a snake." They laughed. Foreigners are so full of superstition. And they were right. There was nothing but sand. We found four more pairs of bowls like the first, but none of them contained anything but sand. There may be a connection of some sort between the snake bowls of Bahrain and the empty bowls of Thaj—though the Thaj bowls are three or four hundred years later in date—but the snake, at least, had by then ceased to figure in the offerings.

There was no earlier city at Thaj. Three meters down, we were below the foundations of the city wall, in a pit that had been dug before the wall was built into the sterile sand which at that time covered the site. Five meters down we came to the bottom of the pit. And the pottery was identical from first to last. Thaj had had but one period of occupation, and that had not lasted more than perhaps 400 years. We have carbon samples from the lowest and the uppermost levels which may give us the life-span of the city. The ash layers in the upper levels are indeed so thick that it is likely that Thaj died by fire and the sword.

The city proved even more imposing on examination than at first acquaintance. The city wall is 15 feet thick, faced with stone both out and in, and with towers at regular intervals jutting out from the line of the wall. On excavation the walls would still stand seven feet high, and would be an imposing ancient monument. It must have been even more imposing to the caravans from the Hadhramaut 2,000 years ago which, after 40 days in the desert, saw the crenellated walls rising to their full height above the palms and gardens south of the city, with the blue waters of the lake beyond.

We were sorely tempted to clear a section of the outer wall, to show what could be done. But we radioed for the bobtail instead, and moved down to the coast.

We encamped on the fringe of the Qatif oasis, opposite the island of Tarut, which was our real aim. The tell in the center of the town at Tarut was still the only settlement of Dilmun date, and of the Dilmun cultures, in Saudi Arabia, still Saudi Arabia's oldest town. And we had hopes that—now that we were "official" and accompanied by a government representative—we could somehow circumvent the tabu on approaching the harem side of the tell.

We had an interview with the Amir, where Abdul-Rahman pleaded our case; and the retired mayor of Qatif, a local antiquary of unimpeachable respectability, was summoned to accompany us to Tarut. After protracted negotiations with the elders there it was agreed that our examination of the tell in the presence of the ex-mayor could be permitted, and, after suitable warnings had been issued, we were permitted to wander at will over the tell—for the space of two hours.

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Rarely have we worked so fast. Ole set up his theodolite, and in the two hours produced an accurate sketch-map of the tell. Bente was instructed to take photographs—on the assumption that the ladies of the town, who showed no inclination to flee our presence, would be reassured by a lady photographer. And Christian and Erling and I worked on the exposed southern face of the tell. The sun-baked soil was iron-hard, and only Erling's geological pick-hammer was capable of making much impression on it. But we could work out at least four levels of occupation, each with exposed stumps of squared-stone walling, and we started digging into the lowest exposed layer.

In the middle of our work we were called by the ex-mayor to see the innermost holy of holies, the women's bathing-pool. Leaving Erling to dig, we passed through a maze of walls to find, hard up against the steepest side of the tell, a large natural rock basin full of clear bubbling water. It was one of the natural springs such as we knew from Bahrain. The water was over 12 feet deep, and eight feet below the surface could be seen the footings of a mighty wall of immense squared stones. This pool was clearly the reason for the existence of the settlement on this spot, and must have supplied the town with water for over 4,000 years.

When we returned to our digging, Erling could prove to us that the occupation of the town stretched even further into the past. From the bottom stratum on which he was working he had recovered a nondescript shard of yellowish pottery and three pieces of worked flint, including an undoubted flint knife-blade. We were back to the Neolithic.

It was slender evidence on which to push the history of Dilmun this further step backward in time. But it was ineluctable. On all our previous "Dilmun" sites, at Barbar, on Failaka, at Qala'at al-Bahrain, we had found no worked flint. A large number of flint nodules, yes, and a few flakes of flint, and even one flint core from which blades had been struck, but not a single piece of flint with the secondary chipping, the *rétouche*, which shows that it was formed for use. That three retouched fragments had appeared in a hurried, almost casual, burrowing into an exposed stratum could only mean that worked flint was in very common use at the time of that stratum.

We had no date for the level. The Neolithic is a long period, and off the main stream of progress tends to persist. We knew too little about Tarut to say whether it had been a backwater, but it was unlikely. In fact one of our main tenets of faith was that Early Dilmun had *not* been a backwater, that on the contrary it had ridden the main stream of progress precisely during the time when Mesopotamia was equipping itself with bronze. If any country might have been expected to have left the Stone Age for the Copper Age *earlier* than Mesopotamia it would be the country which supplied Mesopotamia with copper.

During the following weeks, while we looked at Seleucid-period cemeteries on Tarut and on the coast, and later when we moved camp to the puzzling area of abandoned irrigation channels north of 'Uqair, I speculated vainly on the problem of digging the Tarut tell. At a stroke it had become not merely the oldest town in Saudi Arabia, but the oldest town-site in the Gulf. And it could not be dug.

It was brought home to me how lucky we had hitherto been. Elsewhere in the Middle East the important ancient site which is still inhabited is a common problem. Sondages dictated by property rights, trenches governed by chance-free areas, compensation to land owners and the actual purchase of excavation areas belong to the ordinary headaches of the expedition leader. In all our work in the Gulf we had never before met these problems. We had met them now, and in an extreme form. We had never commanded the sort of money which would be needed to buy up the center of Tarut town. In any case, the women's bathing pool, the communal washing-place and the main water supply of Tarut was not for sale.

I thought of putting in an all-woman team. We had women archeologists enough. In a week or so I was going east to visit Karen, who this year was running our dig in Buraimi. She could well dig Tarut. But it would not work. We could not use a feminine labor force. Only government decree could open Tarut to us, and a government decree would be highly unpopular locally; not among the women, who had watched out reconnaissance with interest and with no trace of shyness, but among the men.

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The problem was incapable of solution. And it was to become of even greater importance in a few week's time.

In the meantime we were now encamped in a hollow among white sand dunes and flowering desert bushes, 20 miles north of 'Uqair. Our third problem was to determine whether the area of abandoned irrigation channels could have any connection with the lost city of Gerrha—or whether alternatively Gerrha lay beneath the ruined Islamic city at 'Uqair.

We did not find Gerrha (unless indeed, as Professor Peter Glob and Christian think, the walled city at Thaj may be Gerrha). At 'Uqair three sondages showed the Islamic occupation extending down to the footings of the ruined city wall,

which must therefore itself be Islamic. And there was nothing below. Further north, we quartered the area for five miles around our camp, mainly on foot. All this area had been harshly eroded by the sand and the wind (which blew down our tents one savage night). We found village sites where the walls and even the floors of the houses had been scoured completely away. Nothing would have remained to show that houses had once stood there had it not been that, where the hearths had stood, the clay floors had been baked to a hardness which had resisted the sandstorms of two millennia. Among the hearths, now standing a good two feet above the general ground level, were the beads and coins and half-eroded potsherds of the settlements. The pattern of the fields, too, could be worked out, even the palm gardens where rings of darker earth marked the irrigation pools around each vanished tree. We found and dug two small forts. And everywhere the date was right, the potsherds were of the Classical period, but nowhere was there a city.

As we worked it became obvious that we were exploring a coastland. We were almost 10 miles from the sea here, with the wide and treacherous *sabkha*—salt flat—stretching to the east, as far as the narrow strip of sand hills that divided the *sabkha* from the sea. But the characteristics of a coastland were unmistakable. Our village sites lay at the head of arms of *sabkha* running into rocky coves. The forts stood on low headlands. The largest stretch of irrigation channels could even be identified as reclaimed land, and Erling could show from his section trenches how the dikes had finally broken, and the sea taken back the polder.

Erling's researches were beginning to pay off, and to tie up with earlier geological investigations of the coastal *sabkhas* of Qatar and the Trucial Coast, which had shown that the *sabkhas* there were only about 2,000 years old. It began to look as though the coastal area of east Arabia had been slowly rising throughout the last many thousands of years. It was not unlikely. Some millions of years ago, in the late Miocene, during the last great mountain-building period of the world, the Persian massif had lunged southward, tipping the whole slab of Arabia. In the east, Arabia had been pressed down below sea level, forming the Arabian Gulf. And in the west the slab had been cracked off from Africa, forming the deep chasm of the Red Sea, the Rift Valley of East Africa, and the crack which is now the Gulf of Aqaba and the Jordan Valley. It was not unlikely that a recovery had been going on ever since, that Arabia was gradually returning to the horizontal.

It would explain many things in the historical record. Such a rise of east Arabia would reduce the flow of underground water from the high land to the west, would in extreme cases, as perhaps here north of 'Uqair, cut off the flow altogether. The exposed sea bottom would dry out and blow away as sand and dust, which would choke the vegetation on the land, already threatened by the diminishing water supply. Dust-bowl conditions would result, adding more sand to the dunes. The supply of pasture for grazing animals would diminish, and what there was would be overgrazed, giving more denuded areas, and more sand. Perhaps the whole of the sand of Arabia could not be accounted for by this one single cause, but everything would contribute to the same end. And the process had been culminating during the time when man was trying to establish his civilizations along the coast. Dilmun and Gerrha had been fighting a losing battle.

Now the fight is being taken up again, with oil to hold the dunes in check, with deep borings to tap new water supplies, with organized establishment of vegetation coverage to hold down the surface and retain the air humidity for which the Gulf is notorious. It is a slow process to reverse the judgments of nature, but it had only been a very slight change in environment which had originally tipped the balance fractionally against man; if the efforts of man could reverse the tip, then all the processes would build up the other way. Archeological research began to have an unsuspected relevance ...

By chance we did a lot of traveling from that camp. Holger and Abdul-Rahman and I drove the long desert road to Qatar, a trip we had dreamed for years of making the other way, and presented Holger's Stone Age book to the Ruler. And Holger and Ole joined a Dhahran party making a five-day trip to Qaryat al-Fau, a region of rock-inscriptions 600 miles to the southwest and less than a hundred miles from the borders of Yemen. It was twice as far as our investigations had been planned to range, but then we were only archeologists—the Dhahran party were members of Exploration Department on holiday.

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And I was in Buraimi for a week.

I got back to Dhahran to find the party returned from 'Uqair, and prepared to move out next day to the south, to Yabrin. And it was then, 12 hours before we were to move off, that the completely unexpected discovery broke, the discovery which—without knowing what it was to be—we nevertheless had to be flexible enough to meet. A note was awaiting me from one of the most enthusiastic of the pot-pickers. Was I interested in a site with flint arrowheads and painted pottery?

The finds were spread out on the table when I arrived 10 minutes later. A score of barbed and tanged arrowheads and as many other flint implements, knives and scrapers and awls. Half a dozen obsidian blades. And about 200 potsherds, of a thin, greenish-yellow ware decorated with geometric patterns in dark-brown paint. I was speechless, for this was beyond our dreams, and I suddenly knew what the lowest level at Tarut was, with its nondescript yellowish shard and its three pieces of worked flint. The discoverer was looking anxiously at me, afraid that I would shrug my shoulders and say "Islamic." I stammered out, "But ... but this is Ubaid."

Somewhere round about 5000 B.C. the first agricultural settlers moved into the waste of swamps along the lower valley of the Tigris and the Euphrates, the region which was to be Sumer, and later still Babylonia. And these first Stone Age settlers made pottery of a greenish-yellow clay decorated with geometric designs in dark-brown paint. Where they came from no one knows, perhaps from the south, perhaps from the east. During a thousand years or so they gradually tamed lower Mesopotamia and their pottery spread to the already settled regions of north Mesopotamia and even into Syria. Their culture is called Al-Ubaid, and the nearest settlement of the Ubaid culture to Dhahran, and the earliest of them all at that, was at Eridu, 400 miles away to the north. And now it lay here, in Arabia.

I sat down to think it all out, and to hear about the site. It was a surface site, I learned, a low hill among the sand dunes a quarter of a mile from the coast, about 60 miles north of Dhahran. I knew that stretch of coast. Here, as to the south, whence we had just come, there was a large area of *sabkha* between the land and the sea, and a strip of low sandy hills fencing the *sabkha* off from the sea. It must have been a string of islands, I thought, six and seven thousand years ago, when the *sabkha* was sea. There were no traces of buildings, my informant went on, but there were pieces of plaster showing a smooth face on one side and the impress of bound bundles of reeds on the other. I was shown half a dozen pieces, clear proof of the type of houses of these Stone Age Arabians, and akin to the clay plastering with impress of reeds which had been found on other Ubaid sites. But the largest piece had more to tell. Its smooth side was encrusted with barnacles. "Yes," said the finder, "I found that on the lowest edge of the site."

A fortnight later, when we visited the site, Ole surveyed the height of the spot where the plaster was found. It lay four meters above high-water mark. It was positive proof that the land had risen in relation to the sea.

All this was of paramount importance. It was the biggest new thing that had come out of Arabia since we had found the Copper Age culture of Abu Dhabi. It cried aloud for immediate investigation. But we were after all not flexible enough. We could not break our schedule. We were packed and provisioned for Yabrin. The bobtails, two of them this time, had set off the day before, and they had no radios. They could not be recalled.

We set off the following morning—a hundred miles by road to the oasis of Hofuf, and then 250 miles on a compass course through the dunes and across the endless gravel plains; a night rolled in blankets beside the trucks, and then on for another 50 miles through steep, eroded hills. This was a journey which even Exploration took somewhat seriously, though Yabrin was to them but a way-halt on the route to the Rub' al-Khali.

Yabrin was our shot-in-the-dark. It is a large oasis, uninhabited except for occasional summer visits by the Murrah tribe, and air photographs showed a large number of tumuli on the hills around. This far inland—for Yabrin is over 300 miles from the coast—the tumuli could hardly be of our Early Dilmun culture, unless Dilmun was something very different from the coastal civilization which we believed it to be. So they might be anything.

We had planned to spend a fortnight at Yabrin, but we cut it down to 10 days, days of fierce heat, with a dust-storm which blew up regularly at noon each day, scourging our faces, clogging our nostrils, and threatening to tear the tents out of the ground. We learned to start work at six, as soon as it was light, and to begin the long drive back to camp as soon as the yellow clouds appeared on the southern horizon soon after 11.

The tumuli were there all right, in their thousands on every hilltop. And down in the scrub of the oasis we found a string of larger mounds, with long chambers of immense stones, the largest chamber 46 feet in length. These mounds were too large for our little party to tackle, with the nearest available workmen 200 miles away. But we opened a half-dozen of the smaller hilltop cairns. They were elaborately built of unshaped stones, conical with a rectangular slab-lined chamber in the center.

"Whatever the answer, one thing was clear. Civilization was over a thousand years older in the Gulf lands than we had believed, and somehow that thousand years of history had to be filled."

And they had been thoroughly plundered. Five were completely empty, and the sixth contained only a scatter of bones and one overlooked bronze spearhead. There was not a single potsherd, a circumstance so odd that one is tempted to believe that the moundbuilders, like indeed the Bedouins of today, used little or no pottery. The spearhead was our only indication of date, and its form, with socket and square shoulders, suggested the middle of the Second Millennium B.C.

In the mornings, then, we dug our mounds, or collected flint arrowheads on the rich Late Palaeolithic site a stone's throw from the large mounds in the valley. In the afternoons, as the canvas of our tents buffeted in the sand-driving wind, our thoughts were, as often as not, 6,000 years in the past. The Fifth Millennium B.C. must, with due reservation, be the date of the Ubaid site on the coast. And it changed all our conceptions of the history of the Gulf. Had civilization reached the Gulf from the north after all, and not from the east? Or had the Ubaid culture originated in east Arabia and spread from there to Mesopotamia? Was there some basis for the old Sumerian legend of the fish-man who had brought agriculture to Mesopotamia from the Arabian Gulf? Whatever the answer, one thing was clear. Civilization was over a thousand years older in the Gulf lands than we had believed, and somehow that thousand years of history had to be filled.

It was tantalizing to know that there was one place, and one place only, where the missing centuries could be investigated. The tell of Tarut had Ubaid ware in its lowest, and Dilmun ware in its uppermost strata. In between would lie the tale of how the one developed into the other. And Tarut was still as impossible to dig as ever.

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Evolutionary adaptations of both form and habit help make Arabia's desert mammals...

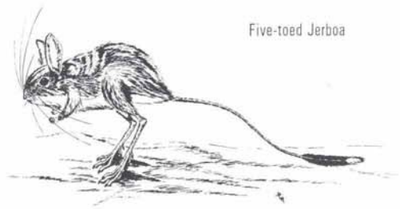
FIT TO SURVIVE

ARTICLE AND DRAWINGS BY DAVID L. HARRISON

Photographs of the bleak surface of the moon and Mars, so commonplace last year, emphasize an important fact that is often forgotten: how fertile is our planet Earth. Even in its most inhospitable reaches —the poles, the mountain peaks, the depths of the ocean, and the deserts—life, in some form, has somehow established itself and survived. In parts of the Arabian deserts, for instance, conditions for survival are as demanding as any on—or maybe even off—Earth: intense heat, nearly unrelieved aridity, sudden cold; yet the mammalian fauna there is surprisingly varied. Despite the great and very special problems of survival, many wild mammals manage to survive, and some even to flourish.

The Arabian Peninsula has a total area of about a million square miles, the greater part of which is arid steppe and desert terrain, part of the great Palaeartic Desert tract stretching from the Sahara to Sind, in West Pakistan. About one fifth is the sandy desert of film and fiction: like the Rub' al-Khali and the Nafud, in which the wind has built up great ridges and dunes

Five-toed Jerboa



of sand. Other vast tracts are composed of undulating, featureless wastes with stony or dusty surfaces, occasional water holes and permanent coarse vegetation in hollows. Most of the peninsula is incomparatively dry; most parts receive less than 10 inches annual rainfall, some as little as one inch. In the hearts of the deserts rain may not occur at all in a whole year. In summer the heat is scorching, July average temperatures—the figure midway between the highest and lowest readings each day—in places exceed 95° F. Shade temperatures exceeding 120° F. are by no means unusual—and in winter bitterly cold days are not rare.

For mammals those conditions mean

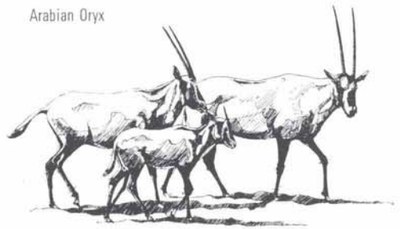
Ethiopian Desert Hedgehog

trouble. Because of them vegetation is extremely sparse, which creates a food problem, and makes concealment from predators difficult. (Conversely, of course, predatory animals have greater difficulty in approaching and capturing their prey undetected.) This lack of cover is one reason why nearly all desert mammals are nocturnal, only leaving the security of their burrows or lairs under cover of darkness. Almost all desert mammals are pallid. It has long been debated whether or not these pale hues—"desert coloration"—provide a camouflage, but recent discoveries among Arabian rodents tend to confirm that they do.

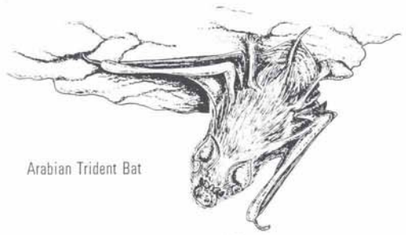
Two species of Spiny Mouse are found in Arabia, living in arid rocky terrain. One exception to the nocturnal rule is the Golden Spiny Mouse *(Acomys russatus)*. The Golden Spiny is often seen darting about among the rocks in the intense heat of midday. Its normal coloration is a light reddish brown, but recently a new form was discovered, living on fields of black lava in eastern Jordan, which has evolved an entirely blackish pelage. The related but nocturnal species, *Acomys dimidiatus*, is also affected by soil color and on darker soils and rocks a darker, greyish race is found. Such instances are widespread among the desert mammals, and exceptions such as the strikingly obvious black and white pattern of the ratel, or Honey Badger, are generally easy to explain. The ratel, for example, with its vicious bite, tough, leathery hide and skunk-like ability to eject an evil-smelling secretion from the anal glands, is clearly a case of *warning* coloration. It advertises to all the fact that its possessor is best left in peace. Protective coloration is effective only when animals are motionless; it is highly developed among the desert hares, which often blend invisibly with the predominant soil color.

The problem of escape from predators in such bare terrain is an important factor in the lives of small desert mammals. Many small rodents seldom wander far from the

Arabian Oryx



security of their burrows, but the jerboas, a form of rodent, have evolved a special solution to this problem. By progressive elongation of the hind foot and elevation of the stance onto the tips of the three longest toes, followed by total loss of the outer toes, a method of moving by rapid and irregular jumps has been evolved. This makes the jerboa extremely difficult to capture and allows it to wander far afield. Two species are found in the Arabian deserts: the more primitive Five-toed Jerboa *(Allactaga euphratica)*, which lives on the stony steppe-deserts of the north (with its two outer toes still present on its foot, but functionless) and the Three-toed Jerboa



Arabian Trident Bat

(Jaculus jaculus), a ubiquitous creature that is, without doubt, one of the most highly adapted desert mammals. This engaging little rodent is able to live in true sand desert, thanks in part to its ability to obtain a sure foothold when moving on soft sand by using tufts of long, rather rigid hair on the three remaining toes. A similar adaptation is found on the feet of that unique desert predator, the Sand Cat *(Felis margarita)*. The pads which are normally visible on the soles of cats' feet are wholly concealed in this species by long tufts of wavy hair. The desert hare shows a similar tendency.

The sparsity of vegetation in the desert, which means that food supply is scarce for herbivores, leads in turn to a low population density and wide dispersal of individuals. Predators, in these conditions, tend to be even more widely dispersed than usual. Thus, for all desert mammals the problem of locating other individuals of their own species becomes important and almost all have exceptionally large ears. There is scarcely an exception to this rule; from the little Fennec Fox to the Sand Cat to the tiny Arabian Hare with its almost ludicrously large ears. Even the handsome black- and white-faced Ethiopian Desert Hedgehog *(Paraechinus aethiopicus)*, which wanders in the most arid desert, has very large ears indeed. One reason for this is probably physiological (facilitating greater heat loss from the body) but there is no doubt that a greater acuity of sound localization also results because of an enlarged bony chamber surrounding the middle ear. This chamber, the tympanic bulla, is often greatly enlarged in desert mammals, attaining extreme degrees in rodents such as the Sand Rats *(Meriones)*, where it may form almost the whole back of the skull. Recent research has shown that such enlarged bullae form a resonating chamber that sharpens the hearing for a sound frequency range corresponding to the rodent's own cry.

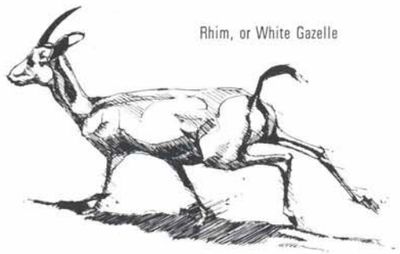
Libyan Jird

Another striking feature of the jerboas is the prominent black and white tuft on the tail tip, which is very obvious, bobbing up and down as the animal hops about in the moonlight or in the fast-gathering gloom of the desert dusk. It is believed that this also functions as a danger signal. The Sand Rats, too, have prominent black tail tips and one of the Arabian species which is active by day, *Meriones lybicus*, holds its tail erect as it flees to the burrow, apparently to warn other members of the colony of danger.

Other important problems which desert mammals must solve are the physiological restrictions imposed upon them by the climate. The problem of temperature regulation is probably the least difficult of these, however, because fortunately the intense heat of the desert sun does not penetrate far beneath the surface of the earth. Many desert rodents customarily close up the burrow entrance with a plug of soil during the daytime, thus preserving an equable microclimate in their home. Other mammals, like the unique little hyrax, seek shelter during the heat of the day in caves or rock crevices or, like the jackal, in dense thickets. For surface mammals, however, such as the Arabian Oryx, the gazelles and the hares, thermal insulation is a severe problem. Such species as these can rarely find more shade than that in shallow cavities scratched out in the sand or beneath some bush or overhanging rock.

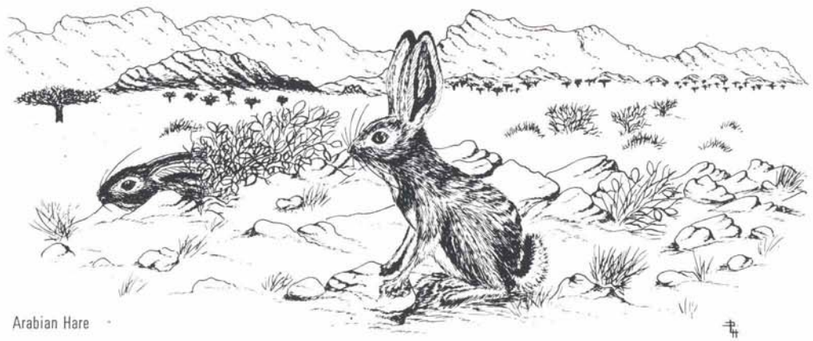
By far the most exacting of all the

physiological problems which must be solved by the desert's mammals, however, is that of water balance. Various methods have been evolved to overcome the virtual absence of available drinking water over long periods. Some desert rodents obtain necessary moisture by feeding on certain



Rhim, or White Gazelle

succulent plants which store water in their foliage. The Fat Jird *(Psammomys obesus)* feeds largely on the foliage of certain *Salsolaceae*, such as *Traganum*, the leaves of which contain almost 83 per cent water. The dwarf shrub *Rhanterium eppaposum* is an important food plant for the handsome Rhim, or White Gazelle *(Gazella subgutturosa marica)*, of the Arabian sands, because its buds hold moisture in times of drought. Depending on plants for moisture, however, carries with it a great degree of ecological dependence and restricts the distribution of the animal species. A far greater degree of water independence has been achieved by those rodents that are able to exist for long periods on a diet of



Arabian Hare

dry seeds. Excavation of the tunnel systems of some species of gerbil reveals numerous blind side-tunnels packed with dried seeds; these storage chambers provide food during the long, hot summer months. The Greater Egyptian Jerboa *(Jaculus orientalis)*, which occurs in Sinai, is able to survive for three years on a diet of dry barley and wheat containing only 10 per cent water. An ordinary rat on this diet dies after three days, so that the jerboa has three hundred times the survival power of the rat.

Other desert animals can store water in special depots of fat, maintaining their hydration by obtaining metabolic water from the breakdown of the fat. The Arabian Camel is, of course, the classical example. The fat in a camel's hump weighs perhaps 20 to 30 pounds, and the breakdown of each pound provides 1.1 pounds of water (by combining released hydrogen with oxygen derived from respiration). This remarkable beast is able to tolerate a 25 per cent loss of body weight under conditions of prolonged water deprivation; it can endure a rise of body temperature of 9° above normal and when opportunity presents it will drink as much as 25 gallons at a time to restore its condition. Some animals, such as the beautiful Arabian Gazelle *(Gazella gazella arabica)*, have been observed to drink sea water in situations when they are almost completely without fresh water and I have myself observed a marked partiality for salt in a captive gazelle. It habitually licked the sweat running from my arms and legs during the fiery heat of summer in Oman.

It is interesting that desert bats such as the curious Trident Bat, with its three-pronged noseleaf, are obliged to visit water holes, and often at dusk enormous numbers may be seen diving down to take sips of water from the surface. The reason for this water dependence is found in the nature of their diet. Most Arabian bats live on insects, which have a high protein content. And that means a considerable excretion of urea as waste product which in turn means a significant loss of water in urine.

Herbivorous mammals have another difficulty: the scarcity of pasture in periods of prolonged drought. Some of the larger species, such as the handsome Arabian Oryx *(Oryx leucoryx)*, can cover great distances in search of those favored areas where recent showers have produced fresh pasture. The oryx has been known to cover almost 60 miles, nearly all at a walk, in less than 18 hours. In fact they don't have to have free water for months at a time, living on moisture from succulent plants and even, occasionally, from dew. The oryx, incidentally, is one of the mammals which can consume the bitter and cathartic gourd of the Desert Colocynth *(Citrullus colocynthis)*.

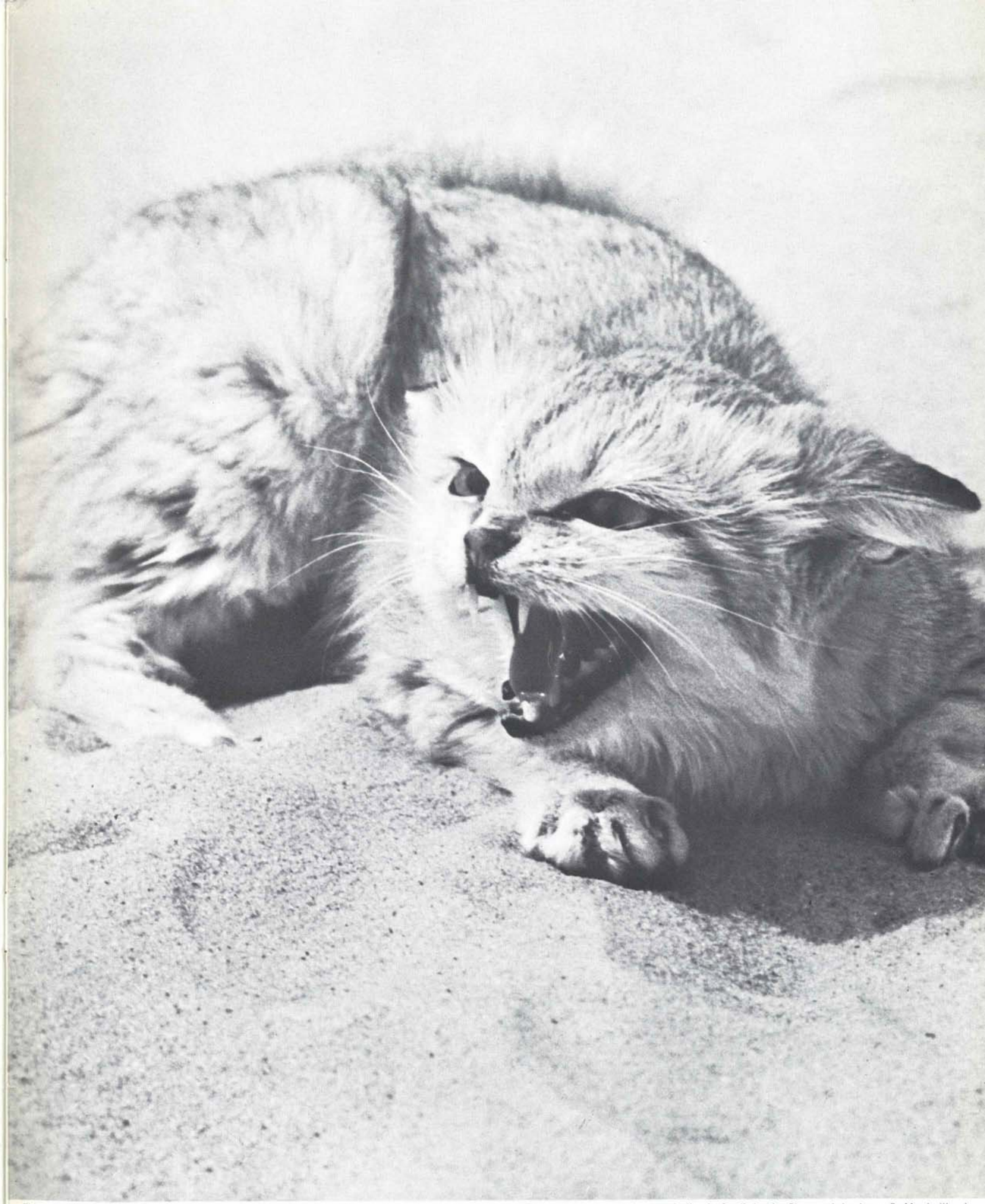
The smaller mammals are less fortunate in times of prolonged drought, however; rodents must retire deep into their burrows and live on stored food until better times return. Some species are probably capable of aestivation; that is to say they pass into a torpid condition similar to hibernation,

Golden Spiny Mouse

thus greatly reducing their metabolic requirements. This has been observed in some of the gerbils and I suspect that the Three-toed Jerboa may also employ aestivation, since it seems to disappear during the hot summer months in Arabia.

Among the rodents that resort to food storage, surely the strange-looking Mole Rat *(Spalax leucodon)*, which occurs in the fringes of the north-western deserts, must be the most prodigious worker. As much as 40 pounds of potatoes and sugar beets have been found stored in this rodent's burrows, which are marked by a series of mounds resembling molehills. This strange creature has become so totally modified for subterranean life that it has lost all external trace of eyes, ears and tail, using its enormous incisor teeth for digging and the flattened head for shoveling soil like a bulldozer, useful evolutionary adaptations for a moon-like desert environment where truly, only the fittest survive.

David L. Harrison, author of Footsteps in the Sand *and the two-volume, standard reference work* Mammals of Arabia *(Ernest Benn Limited, London), would be pleased to receive information or specimens to further his research.*



This specimen of the rare desert predator, the Sand Cat (Felix margarita), a creature well adapted to life in its harsh environment, was captured alive in Saudi Arabia. Photograph by James P. Mandaville, Jr.