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JANUARY-FEBRUARY 1969

THE RIYAL: A MIRACLE IN MONEY

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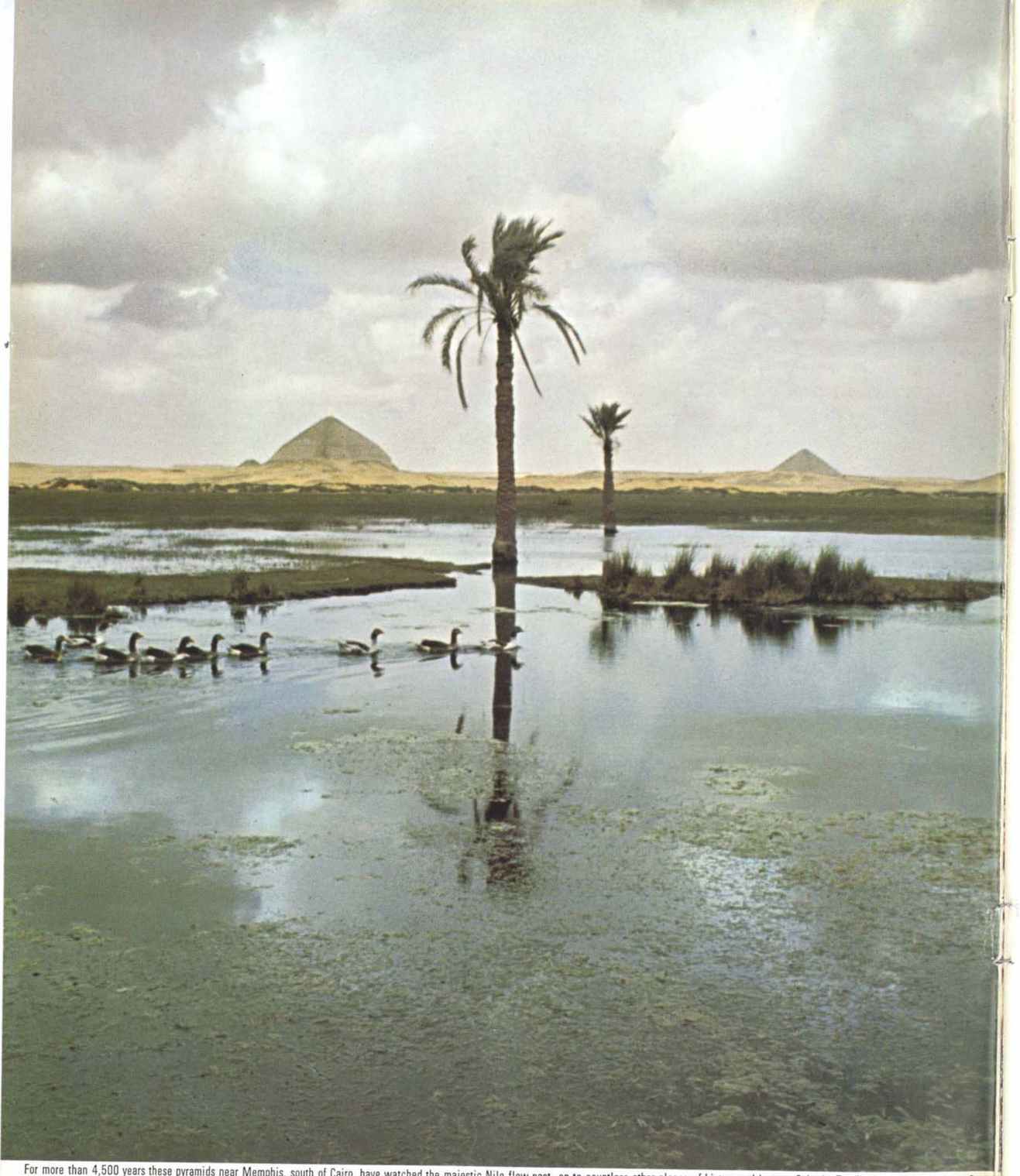

For more than 4,500 years these pyramids near Memphis, south of Cairo, have watched the majestic Nile flow past, on to countless other places of history and beauty. Color by Tor Eigeland begins on page 8.

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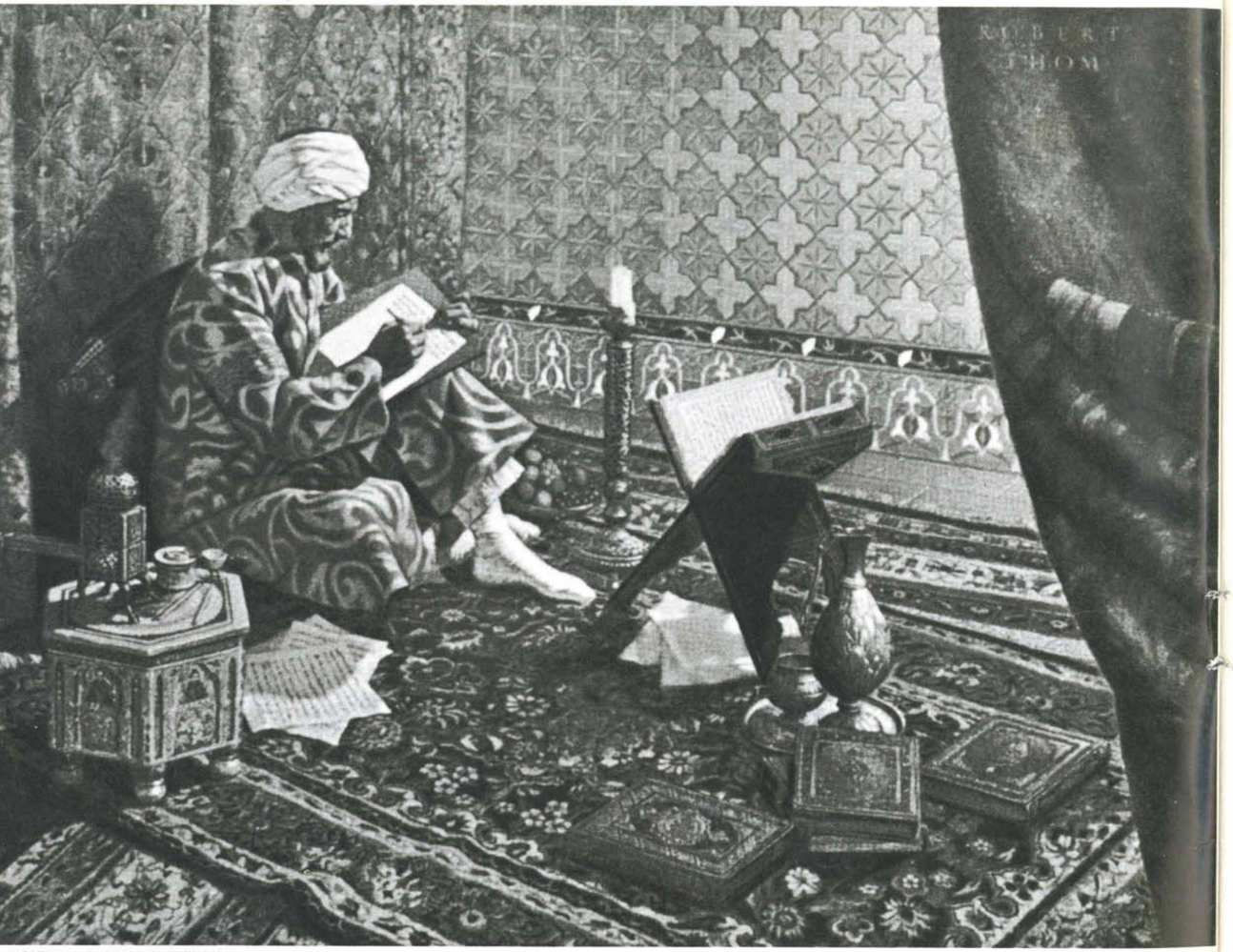
Cover: Saudi Arabian banknotes, fanned out in denominations of colorful one-, five-, ten-, fifty- and one hundred-riyals, provide quiet testimony to the almost miraculous recovery of the kingdom's monetary system. Rear Cover: A gold 'slug' minted years ago in Philadelphia for the kingdom; a specimen of the silver riyal whose silver content sometimes exceeded its face value; and one of the famous Maria Theresa thalers, once the most common coin on the Arabian Peninsula.

DE BAKEY

From Avicenna to DeBakey... Vision and Enterprise in the Arts of Healing.



AVICENNA – THE "PERSIAN GALEN"

MEDICINE FROM THE MIDDLE EAST

BY LESLIE FARMER

Two hundred years after the Arabians swept out of the peninsula on an irresistible Islamic tide, the medicine they practiced was the most advanced in the world. With the breakup of the Islamic world after the devastating invasions of the Mongols, Arab medicine sank into a deathlike sleep, to be awakened, after 600 years, by an emperor's sword.

The first trained Arab physician was Al-Harith ibn Kaladah, who shortly before the advent of Islam had traveled to the school of Jundi Shapur in Persia to study medicine, then returned to the peninsula to practice. The Persian wars had brought Greek physicians captive to Persia; Alexander's conquest had made Greek its official language, so educated Persians were brought in contact with Greek scientific literature. The school was already flourishing when Nestorian Christians from Edessa, near modern Aleppo, sought refuge in Persia after the East Roman emperor Zeno in Constantinople ordered Edessa's university closed for supporting the Nestorian heresy. The university had taught a pure Hippocratic medicine; the native Christians, learning Greek so as to be able to read the Scriptures, had also come in contact with Greek medical writings. The coming of the Nestorians to Jundi Shapur strengthened the Greek element there—the scientific method of close observation and carefully preserved notes on symptoms, treatment and results that made the medicine of Greece the first essentially modern medicine.

In A.D. 630 Jundi Shapur surrendered peacefully to the armies of Islam. It was to remain the greatest center of medicine in Islam until Baghdad, under the Abbasids, drained it first of its best teachers then, inevitably, of students.

The record of medicine among the Arabs between Ibn Kaladah and the Abbasids is patchy. With the Abbasids, the scientific approach of Greek medicine, as taught by the physicians of Jundi Shapur who were attracted to the great capital, was elaborated and extended by Arab intellect to bring forth the golden age of Arab medicine.

It was the time of the Arab world's greatest physicians, Rhazes and Avicenna, whose portraits hang in the great hall of the School of Medicine at the University of Paris. Rhazes' 141 works established his reputation as one of the keenest thinkers and greatest clinicians of the Middle Ages, during which his *Kitab al-Asrar* (Book of Secrets) was a chief source of clinical knowledge in Europe. Second only to Rhazes was Avicenna; his *Al-Qanun fil-Tibb* (The Canon) was the textbook in medical schools of Europe for 500 years. Brilliant though lesser physicians of the Abbasid period described some 130 eye diseases and also contributed a clear conception of the pulmonary circulation of the blood (some 500 years before the Portuguese Servetus, who was credited with the discovery). Some were so confident in their surgical skill that they did not hesitate to operate for cataract on a one-eyed man. The Abbasid caliphs, in the impetus of the day's almost Renaissance-like thirst for knowledge, dispensed money lavishly on translations from Greek, Syriac and Indian scientific writings, a practice reaching its peak when Al-Ma'mun, the son of Harun al-Rashid, founded a state college of translators.

The period saw some remarkable advances: the world's first apothecary shops and pharmacopoeia; as early as 931 some examination required for all practicing physicians to test their qualifications; a staff of doctors that made visits to outlying towns and to prisons. Harun al-Rashid built the first hospital of Islam in Baghdad; before the end of the Abbasid empire there were hospitals—some with special libraries and courses for medical students—in every major city of the realm. They were divided into separate sections for men and women, each with a complex of wards—for internal medicine, surgery, orthopedics, diseases of the eye and convalescent rooms—and a hierarchy of chief physicians, heads of the various departments, orderlies and nurses.

But before the disintegration of the

PAINTINGS COURTESY PARKE DAVIS AND CO./PHOTOGRAPHY BY KHALIL ABOU EL-NASR

RHAZES AND ARABIC MEDICINE

Abbasid empire Arab science had made its last significant advances. The indiscriminate reverence for past authorities, in science as well as in philosophy, that was to be the curse of medieval Europe, was stifling Arab intellect, and the brilliant light of scientific medicine among the Arabs was going out.

Europe, meanwhile, had long since entered her dark ages. The monasteries, the few centers of learning, preserved some of the classical writings and dispensed a strange mixture of alchemy, remedies embalmed in the classical texts and, in cases of dire need, fervent prayers. In addition, in scattered spots in Europe a spark of science, lit from the sinking light of the East, smoldered on.

One was Salerno, near Naples, whose embryo medical school, influenced at first by a few classical texts, was revolutionized by the coming of Constantine the African. An Arab physician born in Carthage, he eventually came to Salerno under the patronage of the Norman conquerer Robert Guiscard, and settled down to translate his Greek and Arabic medical manuscripts. Later writings from Salerno clearly show Constantine's influence in their attempts to learn from nature rather than from past authorities and in their stress on careful and collected notes.

Another was Montpellier in southern France, a cosmopolitan and tolerant university town on the road between Spain and Italy, a natural refuge for the Spanish Arabs and Arabized Spaniards driven out by the growing intolerance of Spain's Christian rulers. Some were physicians, many bilingual in Arabic and Spanish and some also knowing Latin; in short, they had access to, and could pass on, both the Arab medical writings and Arabic translations from Greek. By the 14th century there was a medical school at Montpellier whose curriculum included Hippocrates and Avicenna, and which was turning out translators, teachers, medical writers and practitioners of the first order.

With the Renaissance came the great revival of interest in classical learning. The Greek writings revived interest in science; an efficient thermometer, the microscope, taking the pulse, clinical teaching of medicine, even reasonably sophisticated facial plastic surgery were some of the contributions of the age.

The era of the Industrial Revolution saw improvements in public health such as the licensing of midwives, increased interest in the health of mothers and children, the compulsory registration of births, deaths and cases of contagious disease. By the 19th century the existence of bacteria had finally found credence, laying the foundation for the knowledge of the nature of infection, and other revolutionary developments in medicine took place. One was the use of anesthesia, which reduced the necessity for speed in operations and permitted more careful work. Another was the discovery of the nature of sepsis—then the rule, not the exception, in hospitals—and of effective antiseptics. Before, surgeons had hesitated to operate even with anesthesia, for fear of a fatal infection. The last of the 19th and the beginning of the 20th century brought in immunizations against disease, surgery of the brain and heart, improved plastic surgery, the use of X rays, the "miracle drugs," more specialization and great government interest in public health. Scientists now talk of an artificial liver, stomach, pancreas and intestines of new plastics and metals, even an artificial brain of miniature computers, and researchers already are working on an artificial skin to cover extensive burns.

After the Abbasids—first under the Mamelukes, then under the Ottoman Turks, who defeated the Mamelukes—Arab science had suffered a quick decline and a long stagnation. On July 1, 1798, Napoleon landed at Alexandria in a bid to cut the British lifeline to India. He failed, but in the attempt he brought the East and the West face to face. Among the troops that the Ottoman Turks sent to repel him was the illiterate son of an Albanian tobacco merchant, Muhammad Ali, risen to officer on the staff of the Turkish governor of Egypt. When the governor left, Muhammad Ali stayed—with a picked regiment of Albanian guards under him. In two years, he was master of Egypt.

He built canals, schools and factories; he founded a ministry of education, a civil service and a navy; he introduced cotton from the Sudan, imported an army of foreign advisers, military and professional and educational, and sent Egyptians out to England, Italy, Austria and France to be educated. And last but not least, with the help of Dr. Antoine Clot—better known as "Clot Bey"—he founded the Arab world's first modern school of medicine in Cairo, Abu Za'bal, later known as Qasr al-Ayni, in 1827.

Lebanon, meanwhile, was ruled by a man friendly to Muhammad Ali, the Emir Bashir al-Shihabi. Tolerant and open to new ideas, in 1806, he had himself and his family vaccinated against smallpox and encouraged others to do likewise. In 1813-1816 the plague raged through Lebanon. Bashir ordered a special fund set aside for isolation of the sick in special quarters set up outside the towns, set up roadblocks and prohibited the holding of markets and fairs.

Once when Bashir became seriously ill, Muhammad Ali sent Clot to care for him. On his return, Clot took with him five promising Lebanese youths to study at Qasr al-Ayni; they returned to be Lebanon's first modern doctors. It was also the repercussions of Muhammad Ali's modernization in Egypt that introduced modern medicine into Syria; while campaigning there his son, Ibrahim Pasha, sent back some bright Syrian boys to study at the medical school and they also returned to practice in their country.

Lebanon began her first school of medicine in 1867 under the auspices of the Syrian Protestant College, later the American University of Beirut; a second one opened in 1883 at the French University of St. Joseph. The Sudan's school of medicine opened in 1924, and Iraq's Royal Medical School in 1927, both under British auspices. Tunisia, Morocco and Algeria have opened medical schools in the last decade, and in Saudi Arabia contractors are working on the country's first medical school now.

Egypt now has five more medical schools, Syria and Iraq each another. Hospitals, dispensaries, mobile medical units for the more remote areas, mother and child health centers, school health centers, nursing schools, special hospitals for the particular medical needs of the area are, it seems, springing up in the Arab world as fast as the money is available for them. In the peninsula, with the gush of oil wealth, developments have been particularly spectacular. Saudi Arabia now has some 73 hospitals, 167 dispensaries and 250 health centers; Kuwait's medical services, that started in 1949 with one 50-bed hospital, now include 10 hospitals and sanatoriums.

Bahrain spent 55% of her 1967 budget on health and education. Qatar, which in 1945 had one hospital with one resident doctor, now has five hospitals, one with 600 beds and 15 specialists. The Trucial States have their de facto medical centers in Abu Dhabi and Dubai, the richest two; the Sultanate of Muscat and Oman, that shipped out its first shipload of oil in 1966, has begun to construct health facilities. The two Yemens are building respectively on the health facilities left by the British and on aid from Kuwait.

And other statistics tell their story. In the mid-19th century there was one medical journal in the Arab world; now there are over 50. The doctor-patient ratio of Kuwait, highest in the area at 1:780, compares favorably with Sweden's 1:960, Switzerland's 1:680, Great Britain's 1:830 and the United States' 1:700. Infant mortality is down all over the area. And in the wake of the heart-transplantation operations came rumors that such an operation would be performed at the hospital of the American University of Beirut, by the same Lebanese surgeon who performed the Middle East's first open heart operation. The press descended on the university, the doctor refused to talk, the director of the hospital denied that such an operation was contemplated—for the present. But even the necessity of such a denial underscores the level of competence available to the area.

It is difficult to evaluate completely the quality and the quantity of Arab work in medicine. Many doctors can be cited who have brilliant promise but

who are still comparatively young, in their late 30's or early 40's. Many are siphoned off by the brain drain, lured not only by higher salaries but by more prestige or greater facilities for research—notably post-graduate students abroad who simply don't return. In 1966, statistics show, the Middle Eastern graduates licensed to practice in the United States alone came to 10 per cent of the area's yearly crop. Once established abroad they melt into the landscape; Arab names crop up, unnoticeable unless one knows how to look, metamorphosed into unrecognizability: a Khoury into a Corey, a Dabaghi into a DeBakey, an al-Hawa into a Howard.

And medical skill is difficult for a layman to measure in medical values—both from secular ignorance and, not less confusing, the differences of doctors themselves in evaluating colleagues. But two names are inevitably mentioned first, those of two men both of Lebanese origin.

Michael Ellis DeBakey was born in Lake Charles, Louisiana, in 1908, of Lebanese-American parents. He graduated from Tulane University, New Orleans, and studied also in Europe, eventually becoming professor and chairman of the department of surgery at Baylor University's college of medicine in Houston, Texas. He is editor, co-editor or member of the editorial board of some 16 medical and scientific journals and has served on several advisory committees to the United States government. He made many contributions to thoracic, cardiac and vascular surgery before, with the help of engineers, he designed the "auxiliary heart", an air-driven pump of plastic and synthetic fabric, to take over part of the work of the heart's main "pump", the left ventricle. In 1966 the "heart" took over most of the work for a victim of rheumatic heart disease after a corrective operation, allowing her damaged heart slowly to recover. Newspapers carried articles for several weeks running, and DeBakey's photograph was plastered over the front pages of the world press. Last autumn, Dr. DeBakey and his Methodist Hospital colleagues again made history when five surgical teams (about 70 persons) headed by DeBakey transplanted for the first time four organs—the heart, one lung and two kidneys—from a single donor into four recipients during simultaneous operations.

Sir Peter Medawer was born in 1915 in Rio de Janeiro, son of a British subject of Lebanese origin. Educated at Marlborough and Magdalen colleges in England, he took a bachelor's degree in zoology and then became interested in research on those fields of biology related to medicine. A series of prizes, professorates and fellowships, including the Royal Medal, have culminated in his appointment to the position of Director of the National Institute for Medical Research in 1962.

During the Second World War the Medical Research Council asked Medawer and another researcher, Burnet, to investigate why skin grafts from one person to another will not take, as the British government was much interested in developing improved methods of grafting—an operation used in the treatment of extensive burns suffered by troops and civilian bomb victims. This was the work which enabled Medawer to formulate the theories of transplantation immunity which would form the basis for his later work—in brief, that there must exist a mechanism enabling the organism to distinguish "self" from "nonself." Medawer was able to show that a homograft, a skin graft from another person, is at first rejected rather slowly. But the second time it is tried, the patient's body has acquired an immunity to it, and the graft is rejected quickly.

In the 1940's in Birmingham, in collaboration with R. Billingham, Medawer studied the problem of skin grafts in cattle. Together they concluded that the phenomenon they called "actively acquired tolerance of homograft" could be artificially produced. Medawer continued to work with Billingham and L. Brent in London, and their work began to cause great excitement in the transplant field. In 1953 they published a paper on their experiments.

They had proved that the full capacity to produce immunity is only reached several weeks after birth. Burnet had early theorized that the capacity to recognize self-substance is not inherited, but acquired in fetal life. During the constant contact with self-substance, the developing immunity-producing tissue must learn to recognize and "remember" its pattern. If this assumption were correct, a foreign pattern could also impress itself on the immunological memory if it were introduced into the fetus at the right time. Burnet predicted the possibility of experimental preparation of an individual so as to make him later able to accept a foreign substance as his own.

Medawer, Billingham and Brent, working on this hypothesis, inoculated unborn mice with tissue from another variety of mice. Then after the mice had been born and reached immunological maturity, grafts of the same immunological pattern were performed. They were not rejected. Further, it was discovered, the injection of white blood cells from the lymphatic system could confer tolerance for grafts of skin, tissue, ovaries, kidneys, thyroid or adrenal glands.

In March, 1960, Medawer delivered the Dunham Lectures at Harvard. The large amphitheater of the medical school was packed and loudspeakers in other auditoriums broadcast to the overflow audience. In December, 1960, Medawer and Burnet were jointly awarded the Nobel Prize in medicine.

Their observations now have been further expanded. The recent heart transplant operations have raised a host of questions as to how long the recipient's immunity can be suppressed. Experiments now being carried on, based on the work of Burnet and Medawer, may provide the answers.

There are many others not so famous, well known, nationally or internationally, in their fields. One is Dr. Victor Najjar, Professor of Microbiology at Vanderbilt University in Nashville, Tennessee. His name appears in a variety of common medical terms, such as the Najjar Solution and the Crigler-Najjar Syndrome.

The Najjar Solution is the solution now widely used by UNRWA to rehydrate badly dehydrated babies, victims of a combination of intestinal disorders, intense heat and improper care. The Crigler-Najjar Syndrome, the description and analysis of which made Najjar world-famous in his specialty, the metabolic diseases of children, is a condition that causes newly born babies to look extremely jaundiced, and which eventually fatally affects the brain. Najjar discovered that the condition was due to a congenital absence of the enzyme that clears the body of bilirubin.

A graduate who left and came back was Dr. Khalil Wakim, who emigrated from Lebanon to the United States with a Mayo Foundation fellowship to become Professor of Physiology and consultant at the University of Minnesota. He returned in 1950 at the request of the Syrian government to help reorganize the medical college and modernize the hospitals of Damascus. For this he was awarded the Gold Medal of the Highest Order of Merit by both Syria and Lebanon.

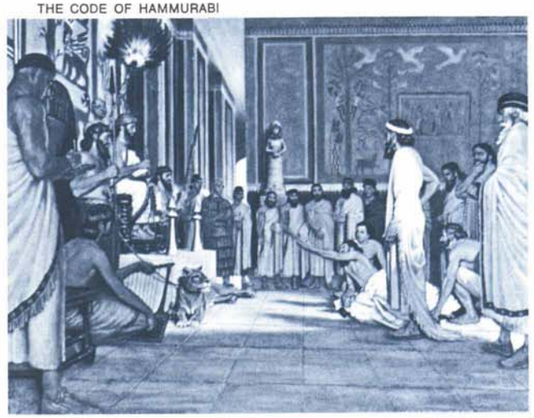
One of the most notable representatives of women in medicine is Dr. Rosalie Nemir Audi, past president of the American Medical Women's Association—the highest position a woman can hold in United States medical organizations. Born in Waco, Texas, in 1905—the same year that Anastase Barakat, the first Lebanese woman doctor, graduated from Harvard's medical school—she graduated from Johns Hopkins Medical School and now is Professor of Pediatrics at New York University and director of the Children's Chest Clinic at Bellevue. She is well known for her many articles on pneumonia and tuberculosis. Married, with two sons and a daughter, she has a strong interest in all aspects of Lebanese culture which makes her Brooklyn home a magnet for Lebanese in the United States. Last autumn Dr. Audi was awarded the Order of the Cedars by the Lebanese government.

It can be asked what now is Arab in the medicine taught, learned, practiced and researched by Arabs. A distinguished Lebanese doctor, in a passion of logic, told me, "There are *no* Arab doctors," and spent a good half-hour enlarging on his statement. Arab medical students are taught techniques developed in Russia, Britain, the United States, sometimes by foreign teachers, in foreign-built universities. Many pursue graduate studies abroad, and some become foreign citizens. (My own doctor, in a slight reversal of the usual procedure, was born of Lebanese-American parents, studied medicine in the United States, then returned to practice in Lebanon with an American wife.)

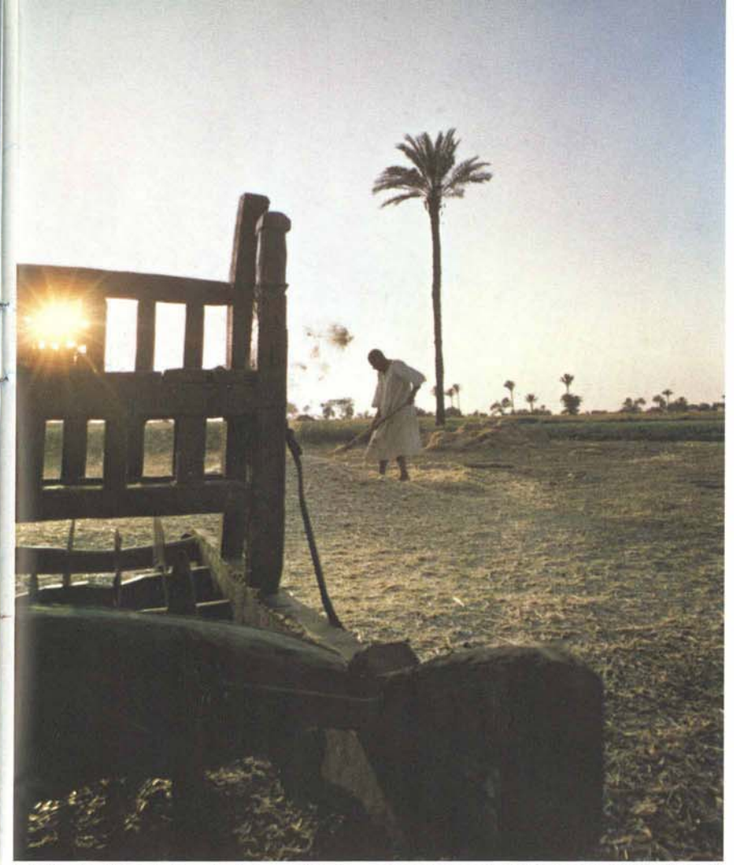
And, in a positive way, the doctor is right. There are, except by the criterion of blood, no "Arab doctors" practicing "Arab medicine". But neither now, is there American medicine, or British medicine, or Russian medicine. Perhaps it is one slightly hopeful sign in a world of splintering disputes that the sick are not victims of the more depressing forms of nationalism; medical discoveries of Communists and capitalists, Asians and Europeans flow freely back and forth, in the medical journals, in conferences and forums. South Africa saw, without much of a quiver, a white Jewish South African receive the heart of a racially-mixed Christian South African at the hands of a South African of Dutch origin, the success of whose work may depend on the experiment of two British citizens, one of Scottish, one of Lebanese descent. In medicine, at least, there are no national boundaries. There is one medicine, a structure to which no nation has not contributed a stone, the symbol not of confusion but of comprehension.

Leslie Farmer, a free-lance writer who specializes in the Middle East, is also a feature writer for Beirut's Daily Star.—

THE CODE OF HAMMURABI



Seen in an aerial view taken near Luxor—ancient Thebes—the mighty river meandering across its broad green floodplain seems overwhelmed by the desert and by Akhenaten's ancient god, the face of the sun.



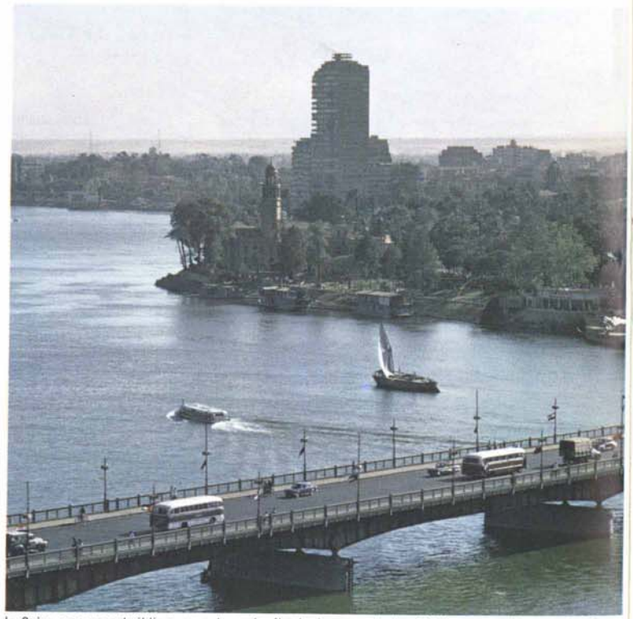
A single palm, like a giant fan, stands above a Delta farmer as he forks his grain into the breeze to winnow the chaff.

The Amazon is bigger, the Mississippi busier. But neither is lovelier. In beauty the Nile stands apart.

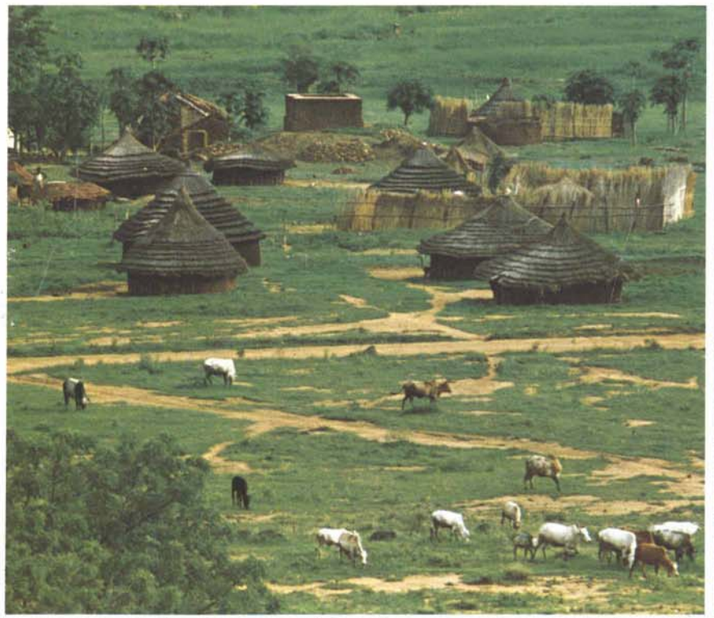
From the African highlands where it begins, to the Egyptian Delta where it oozes into the Mediterranean, the Nile flows through jungles, deserts and swamps, through steep gorges and shallow canals, under bridges, over dams and past huts, houses and the tall apartments of Cairo that house the 38 millions of people whose lives are lived within range of the mighty river.

For photographer Tor Eigeland the immense variety of such places was a constant challenge—one that led him up, down and by the banks of the great river from Juba in the southern Sudan to the great delta that reaches from the outskirts of Cairo to the Mediterranean coast. On steamers and sailboats, sometimes by car, even on foot, he recorded not only the faces of those who live by the Nile (*Aramco World Magazine*, January-February, 1968) but the face of the river itself. The results are evident: an unforgettable portrait of this most majestic of rivers.

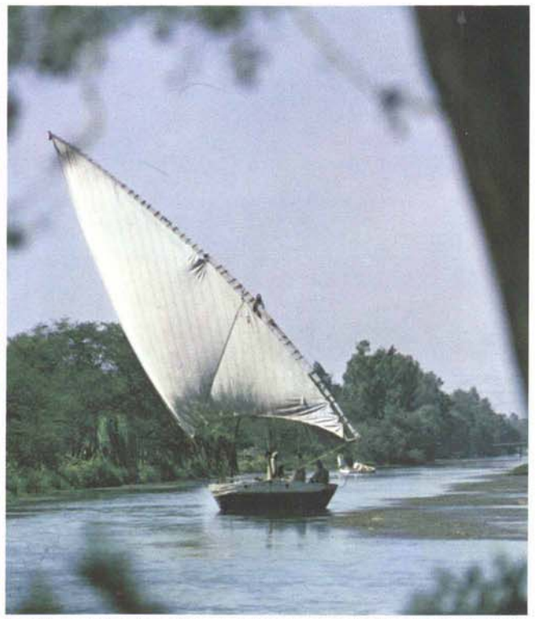
PLACES BY THE NILE



In Cairo, apartment buildings soar above the flat horizon—as do the 400-foot pyramids at nearby Giza.

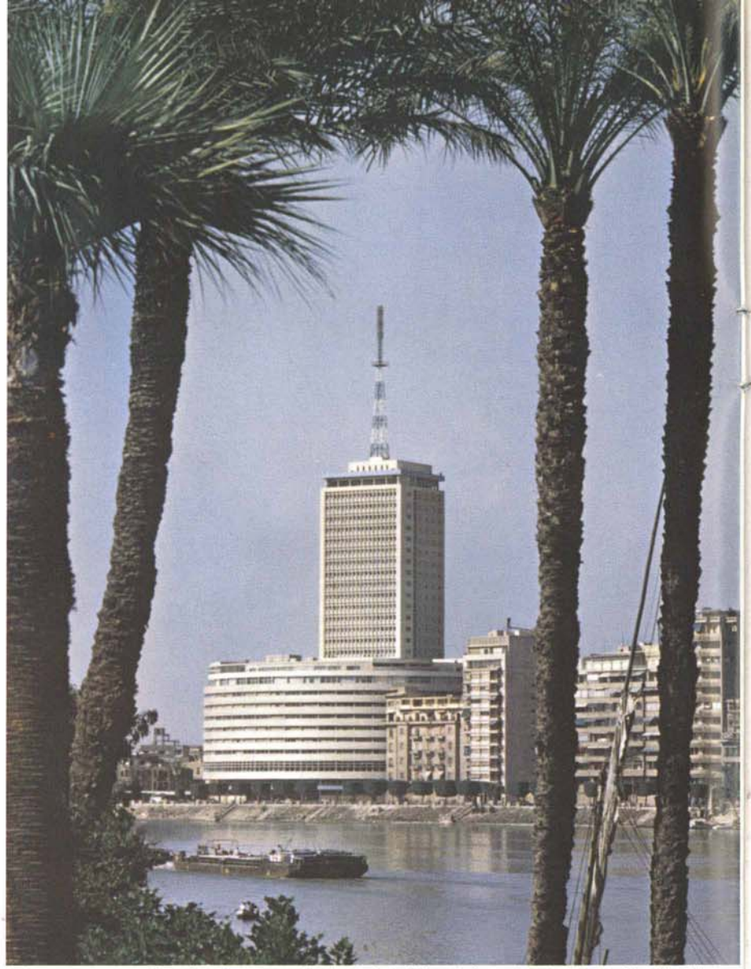


In tropic Juba, where the Nile enters the southern Sudan, the banks are green and wet, dotted with huts of thatch.



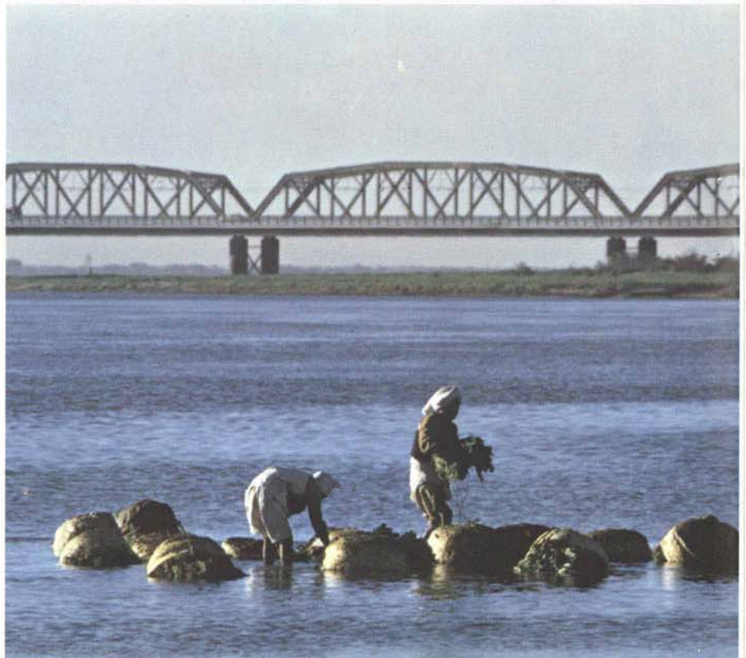
Graceful, lateen-rigged cargo feluccas ply the quiet canals which lace the Egyptian Delta.

Like spindle-legged water bugs, fishing boats stir the morning river.

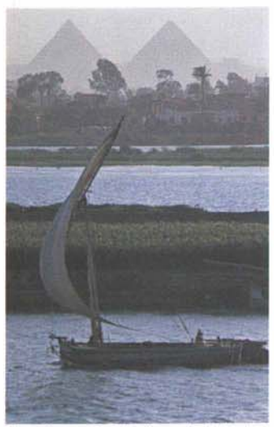


Both concrete towers and supple palms grow on the shores of the Nile as it flows through the heart of bustling Cairo.

At sunset, just below the confluence of the Blue Nile and the White, the passing current turns a creaking wheel that lifts precious water above the banks and pours it like liquid gold upon the land.

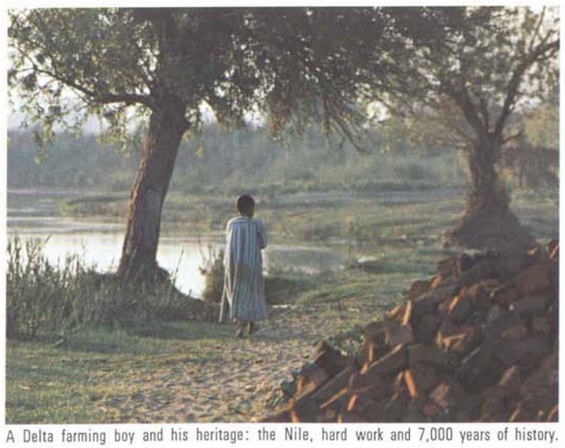


In the shallows of the Blue Nile as it passes near Khartoum, Sudanese farmers rinse crops before marketing them.



The Nile at Giza, hardly touched by time.

Camels in the Delta ferry across a canal.



A Delta farming boy and his heritage: the Nile, hard work and 7,000 years of history.

PHOTOGRAPHY BY TOR EIGELAND

DISCOVERY!

the story of ARAMCO then

CHAPTER 7: DAMMAM NO.7

BY WALLACE STEGNER

ILLUSTRATED BY DONALD THOMPSON

SYNOPSIS: From the day in 1923 when Major Frank Holmes obtained a concession to search for oil in Saudi Arabia, to the day in the 1930's when the first drill bit into the sand of the Eastern Province, nearly 13 years had elapsed.

In that time the Standard Oil Company of California had picked up another Holmes concession on Bahrain, had struck oil there and had begun to look with renewed interest at Saudi Arabia. The company's timing was excellent: at that very point the country's farsighted King Ibn Sa'ud and his diverse entourage of able advisers were deciding that it was time to have a closer look at the country's mineral wealth. Not long after, negotiations began and some three and a half months later the country and the company signed an elaborate agreement. Under it Socal, which was soon to create the California Arabian Standard Oil Company (Casoc), sent in a ten-man beachhead of resourceful geologists to make preliminary recommendations, and after them the restless wildcatters, whose job it was to determine once and for all whether the maneuvering, the negotiations and the theorizing had been in vain.

At first it seemed that it had. For four months the wildcatters drilled away with only minimal success. Then, as 1937 came and went, the drill in Dammam No. 7, the first deep test well, began to probe the final layers. The decisive moment was at hand—the moment that would tell them whether the search was ended or just beginning.

There is a time in any wildcat camp when the bunkhouse begins to yield to the family cottage; Reg Stoner had already anticipated that time when he shipped the first air-conditioned two-bedroom portables out to Saudi Arabia in June of 1936. But it was not until the spring of 1937 that Annette Henry and Nellie Carpenter arrived to make history as the first American wives to live in the Eastern Province of Saudi Arabia. Like rock being cracked by frost, the isolation of Saudi Arabia was broken by a series of small expansions. A cupful of water in a crevice, when it swells into ice, can split a great boulder. The arrival of the first wives was the application of that sort of innocent-appearing but potent force.

Mrs. Henry—the lovely Annette whom Krug Henry had seen, courted and won in an uproarious few weeks in Lebanon—came down from Syria, Nellie Carpenter from Bahrain. They sneaked up on al-Hasa, as it were, by stages. Gingerly, unveiled and stared-at, they bumped along the al-Khobar pier and were brought to two of the six new cottages that squatted baldly on the stone and sand, without a bush, a spear of grass, a weed even, around them. Their view was of a lone derrick among bare *jabals*, a fence enclosing an acreage of scorched earth, a cluster of gaunt power poles. But there were never two women more appreciated, respected and revered. The schoolteacher in a Wyoming cowtown was a social outcast by comparison.

In September they got reinforcements when Don Brown's wife Edna, Erma Witherspoon, Patsy Jones and Florence Steineke arrived together on the British-India boat from Bombay. Even the first four American children, as if to compensate for the unlicked masculinity of the bunkhouse, were girls: Maxine and Marian Steineke, Marilyn Witherspoon, and Mitzi Henry.

Pioneers as much as their husbands were, the women owned the camp, they owned it by right of their civilizing force, their function in turning it into a community. Drillers and geologists went out of their way to bring the children presents and pets. Where the Jubail and Dammam camps had specialized in hawks and wolf-pups, the family cottages were shortly flooded with baby gazelles, hedgehogs, and salukis. Chow Lee and Frank Dang brought the wives bread and chow mein from the cookhouse and, for special occasions, dusted off recipes unused since Berkeley sorority house days. The cottages, each with its air-conditioning unit, were comfortable despite their dreary yards, and the equipment was new and clean.

And yet it was a hard place for a squeamish, timid, or restless woman. Exaggerated—even groundless—thoughts of unknown snakes, unknown germs, unknown dangers for the children, kept them watchful. Unexaggerated, perfectly understandable concern as to how American wives should conduct themselves in this country (where an unveiled woman was then a shock to the conventions) kept them on edge. They had some anxious preliminary discussions about whether they should or should not go veiled, and what kind of clothes were appropriate and at the same time bearable in the heat. The decision, made with considerable uneasiness, was against veiling, but the ladies sacrificed the wearing of slacks or shorts.

One of the difficult aspects of their life at first was the combination of convention and Company caution that kept them within the camp fence. They were never supposed to go out and if they occasionally did, they usually huddled inconspicuously in the back of the cars.

But that was at the very beginning. Before long Steineke was taking the women out on field trips and showing them some of Arabia's desolate reaches of dunes and outcrops, and flat brownish *sabkhas* with their horizons afloat in the mirage and a camel loaded with salt grass moving in the distance as tall and black as a waterspout. Later they got glimpses of Bedouin camps and the *barastis* of irregular soldiers by the wells, saw gazelle break down the wadis, and sometimes observed the curious phenomenon of herds of camels that seemed to have been stained and varnished—when their owners sheared them and greased their hides—and down on the shore by Dammam or al-Khobar saw fishermen wading out to the arrowy points of their fish traps, and townsmen washing camels or donkeys in the salt water to remove lice and ticks.

By an unkindness of fate, only three of them played bridge or were interested in playing it, so they depended on the occasional visitor from Bahrain for a ladies' foursome. The established families traded dinners; occasionally a geologist from one of the field parties, or one of the managerial staff or one of the boys from the bunkhouse was invited over. Invariably he recorded such an invitation in his letters home.

As if there were not enough lonesome Americans in the camp to mother, the women involved themselves in the lives of the houseboys, the cooks and the drivers. Over a period of years, they fascinated themselves trying to unravel the marital condition of Chow Lee, who had a wife in China but who had lived in Venezuela with a woman from La Villa de Rosario. It was said that after the Venezuelan venture was closed down and Lee came to Bahrain he had sent two money orders to the woman but that both had been returned. This was mysterious and interesting. So was the fact that almost every year Lee returned to China to visit his wife, and that every year without fail, whether Lee returned to China or not, his wife seemed to have a new child.

Both Lee and Dang were good cooks. They were the sole bakers of bread for the community, and bread was their biggest headache. Dang brought the first riser across from Bahrain and got it just to the bunkhouse when it blew up with the heat; later they had a good deal of trouble keeping loaves from disappearing, because the Saudi helpers looked upon bread as an expendable luxury. Dang, in fact, departed somewhat suddenly from Arabia after chasing one group of helpers out of the kitchen with a cleaver. Chow Lee solved the problem of the disappearing bread by fiercely, and in the sight of all, wiping every loaf of dough with a ham or bacon rind before he put it in the oven. Since his helpers to a man were devout, practicing Muslims to whom pork was forbidden, he lost no more bread.

The wives collected stories too about Shaubi, a Saudi driver and mechanic, a wry, merry, low-comedy character who was always having troubles and always being urged to prepare for them by carrying spare water, spare fuel pump, spare fan belt, spare spark plugs. Stimulated by the prosperity of working for steady wages, he went away for a while and as he was permitted to do by his religion, came back with a second wife. When the women asked him reproachfully why he went and did a thing like that he gave them back their own doctrine: she was a spare.

Still, it was not all jolly and amusing. The almost frantic expansion of 1936 put strains upon both Company and Government, and the Company's growing activity forced expansion of the Government bureaucracy to handle it. It was not merely that Saudi Arabia as a unified nation was barely ten years old and was still developing its agencies. Problems utterly unknown up to that time in the whole history of the Arabian Peninsula had to be met. In Saudi Arabia, for example, there were not yet any workmen's compensation laws, but when five Arab workers were injured in a dynamite explosion in November, 1936, the problem was acutely before them. So was the problem of the Saudi Arab police, most of them Hijazis, and under a chief of police who did not consider himself bound to pay attention either to the official Government representative for al-Hasa or to Shaikh Abdullah Sulaiman.

In January, 1937, the police treated 15 Bahraini employes so roughly that they quit in a body, and since they were semiskilled men, their loss hurt. Through March there was a series of exasperating incidents. The police assigned to the Dammam camp not only showed little desire to cooperate with the Company, which was after all bearing the cost of their wages, but indicated a considerable truculence on occasion, and a willingness to manhandle Americans they caught in some misdemeanor or other. Violence was their heritage, a camel-stick their natural form of argument. The camp was on edge, the women were uneasy, the roughnecks of the drilling crews were in no mood to submit to rough treatment, the management was walking on eggs for fear some flare-up like the Haenggi incident of 1935 might bring the whole structure of compromise and mutual forbearance down around their ears.

Floyd Ohliger, upon whom most of the job of protest and counter-measures fell, was a good-natured man, and essentially a patient one, but at a certain point in an argument he could harden like a rock. He hardened on April 28, 1937, when he notified Sayid Ali Sultan, the Government representative, that the heretofore innocent, aimless pilferage of company materials had reached such proportions that the Company wanted the Government police withdrawn. Ohliger knew, of course, that the pilferage was not deliberate stealing but the simple assumptions of simple workers that a company as large as Casoc certainly wouldn't grudge a little item here and there. Until April 28 it didn't. But then the line was drawn and on August 4, Abdullah Sulaiman relieved the chief of police, and replaced him with a man much more cooperative in handling the Company's problem, thus easing the situation considerably.

Other events also helped to counteract the unpleasantnesses. The Saudi Government was pleased to learn in April that structure wells Nos. S–A2 and S–A3 at al-Alat, as well as S–A5 at the edge of the Qatif oasis, had encountered large flows of sweet water which was being developed for the benefit of the Bedouins and local farmers.

From the Government, actually, whatever the offi-

ciousness of the local police, the Company continued to receive effective cooperation. In August, 1937, it obtained permission to import 20 radios and to distribute them within the camp as it saw fit; that same permission included phonographs. Music was added to the life of bunkhouse and family cottage, and came close to transforming it; it was wonderful how dead hours could be filled by a radio, how a voice from the air could restore contact with the world that sometimes seemed as far away as Mars. Then, the day after Thanksgiving, they attended in the recreation hall the first professional motion picture ever shown in the Eastern Province—and possibly in all Saudi Arabia. Several people had projectors for their 8-mm. and 16-mm. films, but this was the real thing. Everyone in camp was there.

On December 23, as if to bring to a close in good feeling and reassurance a year that had been disappointing and a little tense, Crown Prince Sa'ud came to Dammam with a great caravan of cars, visited the installations and the camp, received everyone in his great outdoor *majlis*, and held a special audience for the women and even the children, who came up to drop scared and hastily-learned curtsies. Since the Crown Prince did not speak English and the ladies, except for Annette Henry, were new to Arabic, there was little conversation beyond the stilted exchange of amenities by interpreter. But the visit demonstrated the continuing friendliness of the royal family, and it thrilled the ladies exceedingly.

One other thing of importance happened in 1937. Max Steineke went across Arabia and back.

The men in Exploration, charged as they were with surveying and mapping the most remote reaches of the concession, had an early and continuing advantage over the drillers and others tied down to the Dhahran camp and the coast area. They saw Arabia at its most free, its wildest and cleanest, and hardly a one of them did not, even with the additional hardships, prefer the desert to the towns. And even for the geologists, a trip all the way across Arabia was likely to be the biggest adventure of the Arabian experience. Such a trip enhanced and justified the routine discomforts by adding novelty, uncertainty, a touch of danger. Lloyd Hamilton, Bert Miller, and Felix Dreyfus, in 1934, had found their crossing by way of Riyadh the best experience of their lives. Every subsequent trip produced a crop of yarns that remained part of the Arabian canon-stories about cosmic mischances, boneheaded errors, strange encounters, heroic troubles with sand, with *sabkhas*, with wadis in flash flood. Everyone lucky enough to get a trip across Arabia remembered it; everyone lucky enough to make the round trip was to be envied.

There had not been many round trips before March and April, 1937, when Steineke and Floyd Meeker made theirs, and there was probably never a trip quite so fruitful. For this was the first complete look that Steineke got at the Arabian surface geology all the way from the obliterated features of the Arabian Gulf coast to the basement complex of the Hijaz. On the way from Dhahran to Jiddah the party, which included Fred Davies, Hamilton, Max Thornburg, Steineke, and Meeker, besides drivers and interpreters and a cook, had its mind on problems of government relations; but coming back by themselves, Steineke and Meeker could, whenever they weren't having car or road trouble, look at rocks. In a few days of quick reconnaissance, Steineke probably illuminated Arabian stratigraphy as much as all the previous field work had been able to do.

Going out, they had two sedans and three pickups. They traveled without undue haste, and camped in comfort, with a big tarpaulin that stretched across the sedans, parked 15 or 20 feet apart, and made an expansive tent, almost a *majlis*. As was customary, the party stopped in Hofuf to pay its respects to Ibn Jiluwi. As was usual, the Amir did a good deal of listening. As was his habit, he played his trick of murmuring "Qahwa!" ("Coffee!") under his breath and having his bodyguard repeat the order in a sudden savage shout that startled the uninitiated out of their cushions. And as was common practice, the desert veterans gave—but not until asked—some lessons in cross-country travel to the less seasoned members. Max Thornburg, eating dates at the noon stop on the second day, noticed that Steineke did not pop whole dates into his mouth and spit out the seeds, as Thornburg himself was doing, but broke them and ate them contemplatively by halves. Sometimes he absently threw a whole date away. Thornburg inquired about the idiosyncrasy. He was shown the little worm that sometimes lay next to the seed, and abruptly quit eating whole dates. In fact, he gave up dates altogether.

Outside Riyadh a few miles they paused to change into Arab clothes. Their halt was made memorable by a sound of music around a turn in the wadi. Presently there came in sight an Arab on a donkey, blowing furiously—blowing, not playing—on a mouth organ. When he saw them he stopped in confusion and hid the harmonica under his robe.

Like other distinguished guests, they stayed at the Badia Palace, outside the walls of Riyadh, and like all their predecessors they were awakened by the wild shriek and sliding moan and shriek again of wooden pulleys turning on wooden spindles as two or three hundred donkeys began their day of hauling *ghirbas* of water to the well-brink to dump into the ditches that watered the gardens. They visited with the Crown Prince Sa'ud both in his castle and in Badia Palace, and he showed them the palace, including a room full of old-fashioned clocks, no two of which told the same time. They thought it some whim, that the Crown Prince wanted visibly before him the correct time of each country on the globe, but he smilingly denied any such scientific intention. He just liked to hear them strike and chime.

So as to be sure of a supply, the caravan had sent gasoline on ahead to Riyadh, Duwadami, and Muwaih. Except for the loss of time in ceremonial coffee-drinking with the amir of each place, that plan worked well. Water was less easy. The wells they tried to fill up at were generally crowded with camels, and the water hardly fit for animals. Even clean water out of a green *ghirba*, a goatskin with the hair side in, gagged them; it gagged them just as bad when they made it into coffee or tea. About the only good their *ghirba* water did them was to reassure them that they would not die of thirst; they assumed that at some agonized point the stuff would become drinkable. But they had not reached that point, and their tongues were like leather, when, some hours out of Jiddah, they were met by Bill Burleigh, who had a gallon jug two-thirds full of lovely clear, unflavored water. They agreed that it was quite good, though it didn't have much *body*.

So much for a routine crossing without notable adventures. They dined with the King and Abdullah Sulaiman, experienced the luxuries of the Bait Americani, met Philby again, then headed back.

The mishaps that they had escaped coming over were visited on Steineke and Meeker going back. Coming over the first range of mountains on the road that Twitchell's Saudi Arab Mining Syndicate had built, they noticed a very black cloud with a tail that whipped around like a kite's. A few drops of rain fell on the windshield. A quarter of a mile farther on they topped a little hill and were suddenly surrounded by water. Within a few miles, faced by a wadi running several feet of tumultous floodwater, they were forced to camp.

Next day they made about 25 miles, crossing the wadi seven times in the process. Each time the water was deeper, until it floated the floorboards of the cars. They climbed out and removed the fan belts to keep from throwing water on the motors. When they got out of the wadi and onto the soap-slick clay, they put the fan belts back on. In a little while they had to take them off again. Then they put them back on. Then they took them off, put them on, took them off. Their 25 miles of progress had mostly been pushing and wading.

In the morning the ground was a little drier, the going better. They made 125 miles and passed one sign of a changing Arabia: a party of Arabs, including several children, stuck in a broken-down car. Without the spare parts they needed, Meeker and Steineke could not help; they gave the group a five-rupee note as a sign of goodwill and drove on. Another day, and still drying, they made it to Duwadami. The day after that, 'Ain Khuff, and this was what Steineke had been pressing to reach, for near 'Ain Khuff was the contact between igneous and sedimentary rock; new rock and old rock. From here eastward, oil could occur; back where they had passed there was hardly a chance. Though their concession did not extend farther west than the Dahana, east of Riyadh, a study of the rocks just here at the contact might illuminate and bring together all the patchy information they had gathered.

They spent a day around 'Ain Khuff examining synclines and anticlines and hunting fossils, and on March 30 moved camp to the foot of Hassiyan Pass below the Tuwaiq Escarpment. More fossil hunting, with some finds that indicated a narrow band of Paleozoic rocks separating the Mesozoic Tuwaiq Mountains from the crystalline and volcanic plateaus they had recently crossed. Clues. They went into Steineke's field notebook and, more important, into his head.

That night the unpredictable desert dumped another cloudburst on them, and flash floods from the mountains nearly washed them away. Struggling to the summit of the pass the next day, they found a suitable Arabian April Fool's joke; drifts of hail four inches deep, some of the stones still as big as marbles after lying on the ground all night.

There was nothing much that Floyd Meeker—

accompanying Steineke on this fox-hound sniffing around among the rocks and the outcrops—could have said for sure was done; there is nothing much for a historian to summarize as the accomplishments of that geological reconnaissance. They simply went over to Jubaila and Steineke looked around, they went on down through Riyadh and on April 3 arrived in al-Kharj. Steineke's examination of that region, with its slump beds, its great lake-like '*ains* in the hollow rock, its *dahls*, or caves, in the formations that Steineke determined were Jurassic, its fossils, including petrified logs, and its exposure of the clear nonconformity marking the contact of the Aruma beds with the Nubian sandstone, took six days. They had no further adventures, though there was a scare one night when their helpers thought a camel driver at 'Ain Wasia was a party of Bedouin raiders. They had a little grouse shooting, and Floyd Meeker had the opportunity, not especially relished, of drinking bowls of camel's milk proffered by that same "raider." He also had a chance to taste the flesh, reputed to be like chicken, of a two-foot lizard called *dabb*. Meeker stalled by saying they were just about to take off for Dhahran. But he did not escape; his new friends brought the *dabb* along, across the Dahana and into Hofuf, and up through a *shamal* or sandstorm to the home camp, and there presented him with the whole thing.

They arrived in Dhahran with a pleasant sense of coming home, to hear the latest news—that the first wives were coming—and to hear the word, none of it too encouraging, on the deep-test well, Dammam No. 7. Nobody thought of them as having done anything special, though they were envied their glimpse of greater Arabia. But in Steineke's notes—and in his head—were geological jottings that gave them for the first time some inkling of Arabia's structure, and that some years later would lead to the discovery of both the Abqaiq and the Ghawar oil fields.

The Company file on Dammam No. 7 begins with a carbon copy of a cable on torn yellow flimsy. It is dated July 7, 1936, and it says that the wildcatters want to start the deep-test well as soon as the heavy steam rig now en route arrives. For the next five months there are reports on building the derrick foundation, digging the cellar, erecting the derrick, rigging up. On December 7, they began drilling. On March 8, 1937, after a series of exchanges on reamings, cementings and delays while waiting for drill pipe, San Francisco revealed its eagerness and optimism: "...Well No. 7 ... When will reaming job be completed? When will married quarters be ready?" Davies cabled back that the reaming would be done about April first. By that time, three cottages would be ready, and by April 15th another two. (These were the houses that paved the way for Annette Henry, Nellie Carpenter and the other pioneer wives.)

No. 7 had at least the usual number of accidents and delays. On April 10 they were rigging up to fish for a lost bit. On April 16 Davies cabled E. M. Butterworth, who was assistant manager for Socal's new foreign division producing department in San Francisco: "Well No. 7 ... cleaned out with 24½" bit 726', solid bridge caving, large boulder falls in—plugged with cement 200 sacks—located top of cement at 704'."

By May, 1937, everybody around Dammam admitted that the well was in bad shape and was going to be slow. There was a spurt in July that took them down to 2,400 feet, then delays again. On October 6 they had reached 3,300 feet. Tests then, as well as on the 11th and 13th at slighly greater depths, produced the same report: "No oil, no water."

At 3,600 feet, on October 16, they got their first showing of oil—about two gallons, in a flow of thin gas-cut mud. On the last day of 1937, with the hole drilled to 4,535 feet, the well blew out when the control equipment failed. After contact was reestablished, measurements showed the well making 30 million cubic feet of gas a day against 1,600 pounds back pressure. Because of the high pressure they let it blow for seven hours while mixing mud to kill it with, and then killed it without difficulty. There was no oil in the gas it blew.

San Francisco, beginning to worry, watched the progress of the well anxiously. More revealing than any of the communications dealing with stuck drill pipe, broken rotary chains, or fishing expeditions was the cable that Skinner, now in San Francisco as manager of foreign producing, sent Ohliger on November 10, 1937. It reflected the reaction from the uninhibited optimism of 1936, for by now, with No. 2 dwindled to a bare 100 barrels a day and none of the new wells in the Bahrain Zone productive, the board was getting restive. The Company had pulled out of foreign wildcats before; it could pull out of this one, too, and perhaps should, before more millions went down the hole to join those already poured in. Skinner's cable of November 10 instructed Ohliger to do no more work on any of the shallow wells without submitting a detailed proposal first. San Francisco wanted to make a full study of anything more it spent on those holes. And it wanted to see what No. 7 did before it spent anything at all.

Skinner and Davies had agreed long before that it was a waste of money to drill only to the Bahrain Zone, and that the best bet was the Arab Zone. Already the "small board" made up of department heads was beginning to demur at the expense of additional equipment, and Reg Stoner, as general manager, was quietly "borrowing" equipment from Taft and other California operating points for Arabia. That way, it wouldn't have to be accounted for until the end of the year, and by that time Stoner, Gester, Lombardi and the other hopeful ones believed something might have happened.

Distance frustrated them; inadequate communications balked their desire to get close to what was happening. Early in 1938, Gester recalled Max Steineke for consultations, and they had a series of long, intent, speculative conferences over the geological maps. It was a terrible country to prophesy about, for the surface indications were obscure and structure drilling and geophysical work had barely begun. Worse than that, some of the areas where they most wanted seismographic information had hollow limestone formations that reverberated too much for intelligible results.

Should they or should they not? Stoner had heard enough reverberations of discontent from the limestone members of the board of directors to be uneasy. The expenses of Arabia had already run to a good many million dollars, and in late 1937 and early 1938 dollars did not grow on trees. The stock market was nearly as low as it had been at the bottom of the depression; five years of "recovery" seemed to have left them right where they were. They pinned Steineke down. What did he honestly think of the prospects?

Steineke did not like to recommend drilling until he had run the geological and geophysical evidence through a wringer and convinced himself that the gamble was justified. As one of the early geologists put it: "He wanted to know exactly *how* you knew what you thought you knew." But, once he was convinced, he never hesitated about committing himself; he never took refuge in scientific caution; he never alibied by saying "If we had another season's work, then we would *know;*" he was never embarrassed or hesitant about changing his opinion if new data proved him to be wrong. But his opinion had been crystallizing. On top of the geological data that Bert Miller had bequeathed him, remarkably perceptive considering the speed with which Miller's three geological teams had gathered it, he could now put what he had found on his trip from Jiddah with Meeker.

Now here he was, pinned in a corner by the San Francisco department heads, fighting an internal war between his scientific skepticism and his personal enthusiasm, and the enthusiasm won. He had some guesses that he wanted to prove out; he believed in the Arabian venture; he sold them on it.

While he was selling them, Ohliger's crew was drilling past the "fish" that it had been unable to pick up, and on March 4, 1938, San Francisco got the word that blew it back again into the euphoria of the

summer of 1936. Tested on that day, No. 7 flowed at the rate of 1,585 barrels a day. Tested three days later, it flowed at the rate of 3,690 barrels. The drilling party stuck the tester in the hole and couldn't get it out, and the well, flowing as nearly open as possible through the stuck pipe, went on producing at a rate that made them cheer.

Rather than burn the oil for which there was no storage, they flowed it back into No. 1 in an improvised junction operation, and they let it run long enough so they could tell something about the continuing productivity of the C member of the Arab Zone. They were lucky, although they didn't realize it at the time. Unlike Bahrain oil, which is "sweet," the crude that they were getting was "sour," having a high content of toxic hydrogen sulfide. In Iraq, several of the crew that brought in the discovery well had been fatally poisoned by walking through a small ravine where hydrogen sulfide had accumulated. All that the Dammam crew knew was that the oil and gas from the well smelled bad, and none of them smelled it enough to be hurt.

This was the way it went: March 16, 2,130 barrels; March 17, 2,209; March 18, 2,128; March 19, 2,117; March 20, 2,149; March 21, 3,732; March 22, 3,810; March 28, 3,420; March 24, 3,275; March 25, 3,308. And so on through April 22, when Ed Skinner cabled Ohliger that from San Francisco's point of view there was no reason to continue the test. By then, the total production was over 100,000 barrels. Ohliger estimated that No. 7 could produce 2,000 barrels a day without impairing the reservoir conditions. Soon thereafter, No. 2 and No. 4 were deepened to the Arab Zone and also turned out to be good producers. Dammam was a commercial field.

This was the music that San Francisco liked to dance to; at once it began to dance. Bill Eltiste had come back to Chicago early in 1938 to persuade some tire company to make molds for special desert tires, and also to get some automobile manufacturer to design experimental cars and trucks for off-road use. He got from Marmon-Herrington a promise to build a big heavy-duty 10-ton 6×6 truck, mounted on 13.50×20 six-ply dual tires, and extracted from the Company reluctant permission to have Autocar Corporation build a few smaller trucks using balloon tires of the same size. By the time he got to San Francisco from his automotive conferences in Chicago, the strike in No. 7 had been made, and Eltiste was dazed with offers of mechanical aid. Stoner no longer had to steal what Arabia needed. Experimental trucks? Sure. How many? You ordered one? Better order four or five more. Autocars? Sure. Get enough so you can operate. Wire and up that order to 36.

Nothing was too good for al-Hasa after March 4, 1938. Within five days of the cable announcing the strike, San Francisco had notified the field that it was sending out a central air-conditioning plant for the bunkhouses and mess hall. What had died down to a feeble guttering flame spurted into a great flare as oil from the Arab Zone flowed into it.

They had never, no matter how wearily they might have desired it, been able simply to explore their concession area and drill holes in its crust in search of oil. Inevitably they had become a loan agency, a training program, an unofficial department of water supply, a geological and geodetic survey, a mapping bureau, a port-construction authority, a highway commission. Now the Crown Prince Sa'ud involved them in international diplomacy by inviting the Earl of Athlone and his wife, the Princess Alice, to visit Saudi Arabia early in 1938.

The reaction in certain quarters was prompt and furious. Mussolini denounced the visit as a bald effort on the part of Great Britain to curry favor with Saudi Arabia and to "interfere" in the politics of Asia and Africa. The Princess Alice was, after all, a granddaughter of Queen Victoria and second cousin to King George VI of England; her husband was the brother of Queen Mary and uncle of the King. The throne could hardly have been more directly represented except by the King and Queen themselves. But Mussolini's fulminations did not deter what the papers liked to call "the royal pair." Far from canceling their trip to Jiddah, they let it be known that they might go on to Riyadh and perhaps all the way across Arabia to the Arabian Gulf and the island of Bahrain. On the strength of that chance, Lloyd Hamilton wrote Lenahan suggesting that the Saudi Arab Government might appreciate it if the Earl and Princess Alice were invited to visit the Dhahran camp. He also suggested that the Company's cars might be better equipped for desert travel and in better mechanical condition than the Government's, and that if Ohliger could spare a little transportation it would be a pleasant gesture to offer it.

Lenahan hesitated to make any such invitations or offers. For one thing, as the commercial representative of an American company, he did not want to intrude on a strictly British-Saudi show, or interfere between host and guest. For another, Britain and Saudi Arabia had a disagreement going about the undefined boundaries where Ibn Sa'ud's Kingdom shaded off into British-protected Aden, Dhofar, Oman, Muscat, and the shaikhdoms of the Trucial Coast, and since Casoc's concession ran to those same disputed boundaries, it was maintaining a scrupulous neutrality on the issue for fear of getting embroiled. But for the moment, at least, Lenahan need not have worried. When he met Princess Alice at a reception in Jiddah she told him she would love to visit the oil camp, and Prince Faisal, who was arranging her itinerary, said that his brother, Crown Prince Sa'ud, had enjoyed such pleasant hospitality at Dammam the previous December that he was sure the Princess and the Earl would find it delightful.

That put Casoc in the Visiting Dignitary business —where it has been ever since. Lenahan cabled Ohliger to prepare overnight accommodations for the Princess and the Earl, a secretary, a maid, Hafiz Wahba the Saudi Minister to London, and Charles Gault, the British Vice-Consul, and to have two station wagons at al-'Uqair to meet the party as it came over from Hofuf. Next day he raised the number of important personages who must be accommodated from six to seven.

That was the exact day, March 4, when they tested No. 7 and got their jubilant cable off to San Francisco. Royal visits in the circumstances were likely to be a nuisance, but Ohliger took his eye off the well long enough to cable that he could find accommodations for six, not seven, and he could have one station wagon and a truck at al-'Uqair, but not two station wagons, and not to make any offers of additional transportation because he didn't have it.

On March 12 Lenahan forwarded to Ohliger an urgent telegram from Hafiz Wahba, requesting eight cars and guides to meet them, not at al-'Uqair, but at Hofuf. In the midst of the hullabaloo of the flow tests, Ohliger managed to throw somebody temporarily out of work and steal his transportation. While he was sending two sedans, a station wagon and a truck to Hofuf on March 14, King George of England was congratulating Ibn Sa'ud, through Princess Alice, on the discovery of Dammam No. 7 that so happily coincided with her good-will visit.

In Jiddah Lenahan was explaining to one excited minister after another that the discovery of oil did not necessarily mean discovery "in commercial quantities," and that extensive flow tests would have to be conducted, and another well or two put down to the Arab Zone, before commercial production was assured and the gold payments that it entailed were due. On the Jiddah pier an Italian ship was unloading a shipment of field guns and ammunition, sold by Italy to Saudi Arabia perhaps as a futile answer to the British good-will tour.

These were considerations that did not greatly trouble the Dhahran housewives. What troubled them was the suddenly appalling thought of entertaining royalty, and doing it in these unpretentious cottages crouching on the flats under their naked power poles. Since there was no other place to put them, the royal party would have to be content with the married cottages; the married couples temporarily doubled up to make room. But what did royalty eat? And what did you say to royalty when you were introduced? And which foot did you put back of you when you dropped a curtsy? Or did you curtsy at all—did you maybe just shake hands and say how-do-you-do?

It is to be feared that the visit of Princess Alice and the Earl of Athlone preoccupied the ladies of the camp rather more than the continuing good news from the tests of No. 7. They plotted and rearranged, furnished the guest cottages with their combined best. They chose Fay Rector to cook for the party because she was the best of them in front of a stove. As for the problem of how to address royalty, they never did solve it. The Princess solved it herself. Appearing among them full of energy and charm, utterly unfazed by her trip across Arabia, curious about everything, overlooking their clumsy attempts at court manners, she had them talking before they knew how it happened, and when Mrs. Rector stopped short in the middle of a sentence and said half in laughter and half in confusion, "You know, I don't know what to call you," the Princess said at once, "Why, call me Alice." "All right," Mrs. Rector said, "if you'll call me Fay."

Alice was tremendous. She was a greater success than Dammam No. 7. When she left she was on terms of intimacy with them all and the first thing she did when she got back to London was to write for the recipe of Fay Rector's angel food. Fluttered by its second royal visit in three months, Dhahran settled back to being an oil camp again, but for some time there was a brisk exchange of letters and recipes between the Arabian Gulf and London.

TO BE CONTINUED

THE CREAM OF WISDOM

BY FUAD RAYESS

While other nations were still coining phrases, the Arabs were compiling them.

If proverbs are a sign of wisdom, the Arabs are wise indeed. Out of the wellsprings of their history they have accumulated an almost incomparable treasury of acute observation, perceptive comments and sage advice on all aspects of life.

The sources of Arab proverbs are numerous and old, some reaching back deep into history. As early as 1107, for example, Abu al-Qasim az-Zamakhshari completed a book of proverbs that were already old. He called it *Al-Mustaqsa fi Amthal al-Arab* ("The Sought After Arabic Proverbs"), and included in its two volumes 3,461 proverbs, along with notes on their sources and their meanings. Compare this with the "Durham Proverbs" which are thought to be the earliest known collection of Anglo-Saxon sayings. They take up, according to the Oxford Dictionary of English Proverbs, a mere "three leaves ... in the middle of an 11th-century hymnal."

Even earlier, a scholar named Ahmad ibn Muhammad al-Maidani published a book containing 4,766 proverbs in alphabetical order. It was called *Majma' al-Amthal* ("A Collection of Proverbs"), and according to a note in the author's introduction it was based on 50 other books containing proverbs. While other nations were still coining phrases the Arabs were compiling them.

The richest source of Arabic proverbs, of course, is the Koran. There are few verses (*ayah*) that have not been used as proverbs and to this day they permeate conversation, literature, speeches and even legal decisions.

— Never will God suffer the reward to be lost, of those who do right.

—the Koran, Yusuf 90

— God is with those who patiently persevere.

—the Koran, Anfal 46

— Man can have nothing but what he strives for.

—the Koran, an-Najm 39

After the Koran the richest source is surely the *Hadith*, the public and private sayings of the Prophet which were handed down orally from generation to generation, then compiled and recorded in books. At one time it was estimated that about 600,000 had been attributed to the Prophet but when six traditionalists set themselves on the task of authenticating all to the Prophet, many could not be confirmed and were discredited. These men—al-Bukhari, Muslim, Abu Daud, Ibn Majah, at-Tirmizi and an-Nisai—singled out 212 individuals as the men and women most likely to have had access to the Prophet and his associates, and thus would have been able to quote him accurately. They also issued books, the most famous of which was *Sahih al-Bukhari*. This book, a collection of 7,275 authentic sayings of the Prophet, has been described by some Muslim jurists as "the most reliable book after the Book of God...."

— The remedy of time is patience.

— Work for your future as if you are going to live forever, for your afterlife as if you are going to die tomorrow.

Arabic literature and poetry have also been a rich source of classical proverbs. One of the most widely quoted poets is Zuhair ibn Abi Sulma, a pre-Islamic wise man who summed up the logic and wisdom of his time in beautiful verse which is still quoted after more than 1,300 years and who is said to have spent one full year in composing some of his poems. But the most quoted Arab poet is Abu at-Tayyib al-Mutanabbi, a prominent poet of the Abbasid era (750-1258). Like Shakespeare, he achieved a peak in his achievements unequaled by anyone since.

— Pay trust to whoever trusts you and do not betray who betrays you.

—Conversations, Abu Daud and at-Tirmizi

— Charity makes no decrease in property.

—Conversations, Muslim

— Surely the worst of the evils are the evils of the learned, and surely the best of good is the good of the learned.

—Conversations, ad-Darimi

To Westerners, unfortunately, the subtlety, the cleverness of many Arab quotations is lost, sometimes because of unfamiliarity with the background that is essential to comprehension, sometimes because the sayings, like some wines, simply don't travel. One such saying is "He returned with Hunain's slippers," meaning "He failed on his mission" or "He accomplished nothing."

— The worst of men in God's view on resurrection day is the learned who doesn't benefit others with his learning.

—Conversations, ad-Darimi

— Feed the hungry, visit the sick and free the captive.

—Conversations, al-Bukhari

— God is not kind to those who are not kind to others.

—Conversations, by consensus

— Have mercy on those in the world, and those who are in heaven will have mercy on you.

—Conversations, Abu Daud and at-Tirmizi

Hunain, a cobbler, was annoyed one day by a tight-fisted Bedouin who bargained all day for a pair of slippers, then refused to buy them. Hunain, deciding to get back at him, rode out ahead of the Bedouin, placed one of the slippers on the road where the Bedouin was sure to pass and the other slipper further on.

When the Bedouin passed by and saw the first slipper he said to himself, "This is exactly like the one I wanted to buy from Hunain. It is too bad the other slipper is not with it." Seeing that he could make no use of it he left it in its place and moved on. Before long he reached the other slipper and decided to go back and get the first one too. He was in such a hurry, however, that he left his camel and gear behind, and Hunain took the camel and ran away leaving the Bedouin to return to his tribe with nothing but Hunain's slippers.

It's a simple story but many Westerners, looking for a clever twist, or a pointed moral, find it flat, whereas in Arabic it is delightful.

These stories, however, are in a minority. Most Arabic proverbs immediately ring a bell—suggesting maybe that proverbs are really no more than the cream of the everyday experiences of ordinary people everywhere. Or to put it another way, in their basic needs, hopes, fears, it seems the lives of common men are much the same everywhere.

— He who is devoid of kindness is devoid of grace.

—Conversations, Muslim

— Learning is a treasury whose keys are queries.

—Conversations, Abu Naim

— The dearest to me are those of best character.

—Conversations, al-Bukhari

Oddly, the variety and aptness of Arabic proverbs has had a clotting effect on Arabic writing. With so much traditional wisdom on hand there was little incentive for the writer to reach for fresh modes of expression. As late as 1959, for instance, new collections of proverbs were still being issued. One was Muhammad al-Abodi's collection of 1,000 proverbs from the Najd, the central area of Saudi Arabia. Another called *Modern Lebanese Proverbs* was a compilation of 4,248 colloquial proverbs collected in a single Lebanese village by Prof. Anis Frayha of the American University of Beirut.

— He who does not shield himself from vilification receives it.

—Abi Sulma

— In seeking honey expect the stings of bees.

—al-Mutanabbi

— Ride the tributaries to reach the sea.

—al-Mutanabbi

— A drowning man cares not about getting wet.

—al-Mutanabbi

In the last 20 years, however, the surge in literature has opened the path to the originality of thought and the freshness of expression that is vital to any language that is to thrive. Where else, after all, will new proverbs come from?

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"... the everyday experiences of ordinary people everywhere."

English	Arabic
– Much ado about nothing.	– *I hear noise but see no grinding.*
– Easy come, easy go.	– *What comes with ease goes with ease.*
– One is known by the company he keeps.	– *Send your son to the marketplace and see with whom he associates.*
– Man proposes but God disposes.	– *Man plans and God manages.*
– Necessity is the mother of invention.	– *Need brings ways.*
– A friend in need is a friend indeed.	– *A friend is known when needed.*
– A bird in the hand is worth two in the bush.	– *A bird in the hand is better than ten on a tree.*
– The absent are always in the wrong.	– *The absent may have an excuse.*
– The love of money and the love of learning rarely meet.	– *A seeker of knowledge and a seeker of money never meet.*
– Appetite furnishes the best sauce.	– *Hunger is the best cook.*
– Too many cooks spoil the broth.	– *Too many cooks burn the food.*
– Save something for the rainy day.	– *Save your white coin for your black day.*
– Familiarity breeds contempt.	– *Repetitive visits cause boredom.*
– Let the punishment fit the crime.	– *Rewards fit deeds.*
– United we stand, divided we fall.	– *One hand does not clap.*
– Love is blind.	– *Love is blind.*
– One must eat to live, and not live to eat.	– *We as people eat to live and not live to eat.*
– Hope springs eternal in the human breast.	– *How tight can life be without the space of hope?*
– Time is money.	– *Time is gold.*
– Early to bed and early to rise, makes a man healthy, wealthy and wise.	– *Sleep early and wake up early and see how healthy you will be.*
– God helps them that help themselves.	– *God helps his subjects so long as they help one another.*
– As ye sow so shall ye reap.	– *Who works achieves and who sows reaps.*
– Never put off till tomorrow what you can do today.	– *Never postpone today's work till tomorrow.*
– There is nothing so powerful as truth.	– *Truth is a haven.*
– Experience is the best teacher.	– *Ask a man of experience rather than a doctor.*

THE RIYAL: a miracle in money

BY THOMAS W. SHEA

PHOTOGRAPHY BY BURNETT H. MOODY, AHMAD MONTAKH

From inflation and debt — strength and stability...

In 1957 the economy of Saudi Arabia was skidding dangerously. Inflation was out of control. The value of the Saudi riyal had slipped to half what it had been. Oil revenues were down some $50 million and the government was nearly half a billion dollars in debt.

Six years later the situation had changed beyond belief. The national debt had been paid. New highways were reaching out in all directions. Schools and hospitals were going up. The riyal was, literally, as good as gold and a rickety economy that had endured with little change for 2,000 years had been transformed into a modern financial structure as sound as any in the world.

A miracle? In a sense, yes. But a miracle wrought by three men: a forward looking prince from the House of Sa'ud, who not long after would become His Majesty King Faisal ibn 'Abd al-'Aziz Al Sa'ud, and two knowledgeable and determined financial experts.

As recently as the early 1940's Saudi Arabia had an economy that, to say the least, was undeveloped. Most people were subsistence farmers, herdsmen or petty traders, and business activity depended largely on thin columns of camels trudging inland with cloth, grain, and a few luxury articles, or carrying dates, Arabia's only important export, from the widely scattered oases out to the ports for shipment abroad. Although paper currency from abroad was used along the coast, the main medium of exchange in the interior was the Maria Theresa dollar, a large silver coin minted in Europe but still bearing the profile of the Holy Roman Empress, the flamboyant Imperial Seal of Austria, and the date, 1780. Until oil was discovered, income was derived mostly from customs duties on imports and the income from tens of thousands of pilgrims who poured into Jiddah every year en route to Mecca. The only fluctuation in the economy occurred when the pilgrims arrived. And without them—and their small hordes of gold and silver coins, Indian rupees, British pounds and Dutch guilders—the country would have been hard pressed to find extra money for imports.

In those days the government's role in the economy was based on the Islamic dictum that "things exchanged shall be of equal value." "Money" meant coins made of metals having intrinsic values equal (as far as possible) to the exchange values of the coins and when the government paid its bills it did so whenever possible in silver—for soldiers, businessmen and low-ranking employes—or gold—for larger transactions. Coupled with the Islamic opposition to payment of interest, this approach to finance limited the functions of banking to settling importers' foreign accounts, exchanging the various foreign coins which freely circulated in the country and storing money. Money changers abounded in the pilgrimage centers, but until 1948 there was only one bank in the country, the Netherlands Trading Society, which had been established in Jiddah in 1926.

In 1925, however, the year after King Abd al-'Aziz consolidated the country by conquering the Hijaz, the government did attempt to establish a national currency by issuing its first coin. It was the copper-and-nickel qirsh. Two years later the silver riyal, valued at 22 qirsh, was also issued. The exchange rate of the riyal was established at 10 riyals for each British gold sovereign, the gold coin circulating most widely in the Kingdom at that time.

At this value, unfortunately, the Saudi riyal was a "full-bodied" coin. That is, the market value of the silver it contained was approximately equal to the official rate at which the government would accept it in exchange for gold. Money changers and merchants were quick to notice this. When the world price of silver rose so high that the value of metal contained in the riyals exceeded the official exchange value of the riyal, they were equally quick to exchange gold and other currencies for silver riyals, then melt the riyals and sell them as bullion to silver brokers. At such times, silver riyals disappeared from circulation.

In 1939 the company that would become the Arabian American Oil Company (Aramco) made its first oil payments to the Saudi Arabian Government. They were the first of the revenues that would later change the Saudi economy so drastically, but at the time they were of minor importance—certainly insufficient to offset the economic decline that set in as World War II got under way. Income from pilgrimage virtually ceased and interruptions in shipping caused critical shortages in food and clothing. The U. S. government helped—by extending lend-lease aid in the form of 9.3 million ounces of silver, minted into 25 million Saudi riyal coins—but by early 1944, the economy of Saudi Arabia was still in a state of suspended animation. It was a period of breathless calm before the onset of the tumultuous changes which, within two decades, would reshape the whole economy of the country.

The changes actually began in 1945 with the expansion of oil production, the injection of large amounts of cash into the economy, and the expansion of the government's payments and purchases. Capital investments in the oil industry stimulated a demand for local wage labor in the Eastern Province and created markets for large quantities of imported equipment and construction materials. This activity in turn generated the need for port facilities, airports, storehouses, roads, and other supporting physical facilities. The demand for money—for cash, that is—soared.

The Saudi Government believed that the only proper way to meet the increased demand for money was to put more gold and silver coins into circulation. Accordingly, for a two-year period beginning in 1948, Aramco paid its oil revenues in foreign gold coins which were packed in kegs and flown to Jiddah every month. The Saudi Government also placed with the U.S. Mint a succession of orders for millions of full-weight, Arabic-inscribed Saudi silver riyals.

The riyals were assigned an official exchange value equivalent to the cost of the silver they contained, plus mint charges and transportation costs. In 1944, when the government bought most of the coins, their delivered price was about 30 cents each. Even after the war, however, as world silver prices declined, and the value of the riyal in the Jiddah exchange market dropped as low as 21 cents, the government continued to charge buyers of riyals (mainly foreign firms which needed them to meet payrolls) 30 cents each, on the grounds that "things exchanged shall be of equal value."

Insistence on hard money had unexpected side effects too, particularly for companies like Aramco which, in the 1950's, had a payroll running to five million riyals a month. With only one denomination of silver coin available a month's wages for a typical worker would weigh about 10 pounds. To meet the entire payroll the company had to transport, store, guard and count out 60 tons of silver every month. It also had to find extra storage space, provide a fleet of trucks and hire dozens of laborers to load and unload the sacks of coins plus a large staff of sorters and counters.

Inevitably, the country's uncomplicated financial structure began to break down. Sufficient for the simple economy of the previous age, it could not possibly stand up to the pressures of modern economic activity. In the absence of effective machinery to control the increasingly complex pattern of government receipts and disbursements, government expenditures began to exceed income by ever-growing amounts. The Kingdom's first detailed government budget—published in April, 1948—proved unworkable because the value of the Saudi riyal in which the budget was expressed was constantly changing in terms of the numerous foreign currencies which circulated widely in the country, and the values of these currencies were constantly changing in relation to one another. In addition, oil income was paid in gold or foreign exchange, but about half of the government's expenditures —for its payroll—were met with silver riyals, and riyals were frequently in short supply. The rates at which riyals and qirsh were exchanged for one another varied from time to time and from place to place. Even the country's geography conspired to force change: because of the vast distances and poor communications between the oil producing area, the country's administrative capital and the financial center, the development of orderly financial transactions was almost impossible. Nor did the general absence of banks help. Although by 1948 a number of foreign banks had begun to open branches in the main centers of commercial activity —Jiddah and the Eastern Province— there were to be no banking facilities elsewhere in the country for another five years.

By 1951 the government realized that it needed to set up a more orderly monetary system. It also realized that this meant creating an administrative apparatus able to channel into the economy enough money to fuel business activity yet avoid inflation. It would also have to insure that the rapidly increasing oil revenues be used in accordance with the government's wishes. Accordingly, in the summer of 1951, the government brought in a team of foreign financial experts, backed by the U.S. Point Four Program, to draw up a program of monetary reform. The main features of this program were implemented in October, 1952, when the Saudi Arabian Government announced the formation of a modified central bank. It was called the Saudi Arabian Monetary Agency (SAMA).

SAMA's primary responsibilities were large: to stabilize and maintain the external and internal value of the Saudi riyal, hold the nation's monetary reserves, buy and sell gold and silver for the government account, advise the government on the issuance of new coinage and regulate the activity of commercial banks and money lenders. The agency was expressly forbidden to lend money to the government or private individuals, to issue paper currency, or to pay or receive interest. A governing body presided over by the Minister of Finance was appointed, with an American financial expert as its first governor, but effective control was kept in the hands of the minister. It wasn't until 1958, after a nearly disastrous financial crisis, that SAMA was accorded genuine independence.

In 1952, shortly before SAMA was formed, the government, still convinced that "hard" money was the only good money, had decided to meet the country's growing need for currency by issuing its own gold coin. The coin, called the Saudi sovereign, was practically identical in weight and fineness to the British sovereign and was made full legal tender. It could be freely exchanged by SAMA at the rate of 40 silver riyals (nearly eleven dollars) per sovereign, and gave Saudi Arabia a full, bi-metallic money standard.

Like other countries that had tried —and abandoned—it, Saudi Arabia's experience with a bi-metallic standard was not a happy one, and for the same reason: the world market prices of gold and silver do not remain in constant proportion to one another and even minor changes in the world market prices of the metals are sufficient to drive coins of one or the other metal out of circulation. In Saudi Arabia, the silver in the riyal eventually became more valuable as silver than as money and wound up in foreign bullion markets. The gold in the sovereigns, on the other hand, was more valuable in sovereign form than as gold, which encouraged counterfeiters.

Soon after the issue of the gold sovereign, counterfeiters began to reproduce large numbers of full-weight coins which only a few experts could distinguish from the genuine ones. The spread between the value of the gold sovereign (nearly $11) and the world market value of the gold in the sovereign (about $9) was not much, but it was sufficient to provide counterfeiters with an adequate incentive to meet the risks and costs of stamping, transporting, and circulating the coins.

The disappearance of silver began in 1955, when world silver prices rose by about 6¢ an ounce, or about one per cent above the previous year's average. Paradoxically, one of the forces contributing to the rise in the price of silver was the unusually large volume of silver purchases which the Saudi Government had made during that year for the purpose of minting riyals. Whereas the Saudi Government was willing to redeem silver riyals in circulation for only 27¢ in foreign exchange, the world value of the riyal's silver content rose to more than 30¢. This narrow margin was sufficient to induce riyal holders to sell them for bullion. By the end of 1956 a large proportion of the silver riyals minted by the government had been shipped abroad to bullion markets, despite heavy fines imposed on exports of silver.

In the meantime SAMA had come into existence and, in what was to be an unusual chapter in world monetary history, had found a way to introduce paper currency.

Paper currency was not unknown in Saudi Arabia. Coastal merchants accepted Indian rupees, East African shillings and even paper scrip issued by Aramco for purchases in company facilities. But it was not in general use and SAMA authorities, believing that circulation of full-bodied coins was a waste of the country's reserves, thought it should be. But since the charter expressly prohibited the agency from issuing paper currency, officials had to find a way which would not conflict with the law. They finally hit upon the idea of issuing paper "pilgrim receipts" as a sort of traveler's check to meet the seasonal demand of foreign pilgrims for riyals. Since government circles desperately needed an effective way of resolving chronic inconveniences to merchants in the pilgrimage centers by large seasonal fluctuations in the demand for silver riyals, the financial experts' proposal was not as unwelcome as it might have been. In previous years, a sharp increase in the public's demand for Saudi riyals would develop regularly during the month of the pilgrimage as hundreds of thousands of foreigners arrived at the holy places. This would force up the riyal's exchange value. Then, with the departure of the pilgrims, the demand would collapse. Since merchants and money changers objected to holding large stocks of riyals in between pilgrimage seasons, it didn't take much of an increase in the value of silver to induce them to export the riyals as bullion. By the time the next pilgrimage season arrived, the shortage would again be acute and replacing them would be both expensive and time consuming.


The Maria Theresa thaler was in use for more than a century.

Against that background, agency officials persuaded the government that the demand for currency could be more cheaply and expeditiously met by issuing paper "pilgrim receipts," fully backed by silver riyals. They received government approval in 1953 and immediately issued a small number of notes in denominations of 10 riyals. In 1954 they issued even more, this time, in both five- and ten-riyal denominations.

The pilgrim receipts, freely exchangeable for silver riyals and entirely backed by silver held in government vaults, were an immediate success. Furthermore they quickly came into general use throughout the Kingdom, for they were well made and durable,

His Majesty King Faisal engaged two financial experts in October 1957:

Anwar 'Ali and Ahmad Zaki Saad, both of the International Monetary Fund.

difficult to counterfeit, and far more convenient to handle. They also filled an important gap in the national currency system, which hitherto had no denomination between the riyal and the 40-riyal sovereign—which was rather like an American trying to do all his shopping with only silver quarters and 10-dollar gold pieces. By the end of 1954, more than 150 million riyals' worth of pilgrim receipts were in circulation and were rapidly displacing both the gold sovereign and the silver riyal as the principal medium of exchange. In 1956, when the silver riyal was becoming scarce, one-riyal pilgrim receipts were also issued.

Unfortunately however, the government, in 1955, succumbed to the great temptation facing all governments which rely on paper currency: to attempt to provide financing via the printing press.

Before 1955 the strain imposed on Saudi Arabia's rudimentary financial institutions by the country's abrupt entry into modern commercial and industrial life had been great, but not catastrophic. And under King Abd al-'Aziz, government spending had, to a large extent, been kept in check by the monarch's strong predilection for austerity in personal living—a traditional feature of Bedouin life. After his death in November, 1953, however, restraints on consumption gradually disappeared, and foreign exchange payments by Saudi Arabia began to rise much faster than income. Before long the country was deeply in debt.

An ominous symptom of the impending financial crisis appeared in July, 1955. Under a new decree, two important restrictions on the expansion of the currency supply were removed. One had prohibited the monetary agency from issuing paper money. The other had prevented it from lending money to the government. Although the pilgrim receipts were actually paper money, their issuance in 1953 had been contingent on the understanding that they were needed for the pilgrim trade and that they would be entirely backed by hard money payable on demand. Their wide acceptance, and the fact that they were not, as a rule, presented for redemption in hard money, inevitably tempted the government to issue them in ever larger amounts. Worse, the country gradually abandoned the requirement that the receipts have 100 per cent hard money backing. Now the government could meet its riyal bills simply by taking a loan from SAMA or by ordering additional pilgrim's receipts to be printed. To add to the problem, local banks began to extend large loans to members of the government, mainly on the security of overvalued real estate holdings.

The mere increase in the supply and turnover of riyals, however, does not in itself adequately explain the severe inflation which hit Saudi Arabia between 1956 and 1958. An increase in the money supply and turnover is quite a normal phenomenon for a country which is undergoing the types of economic changes found in Saudi Arabia during the 1950's. In the first place, the swift increase in oil income in the form of foreign exchange and precious metals would have provided support for the currency. In the second place, much of the increase in total money expenditure within the country was a normal, healthy feature of economic development. Large numbers of people were shifting from self-subsistent agriculture and animal husbandry, which involved only incidental cash transactions, to a monetary economy which involved dependence on money wages for income and on money outlays for subsistence.

The real problem was that the increase in the supply and turnover of riyals was greater than that which could be supported by the monetary reserves set aside from increasing oil income and by the monetization of the economy. A great deal of spending was taking place without even being routed through the domestic monetary system. Some individuals in the government, for example, maintained private accounts with overseas banks and many of the transactions in these accounts, (receipts and disbursements of foreign exchange) did not involve the repatriation of foreign exchange reserves to SAMA. Thus, the gold, silver, and foreign exchange actually routed through SAMA provided insufficient backing for the expanding amount of riyals issued for domestic use. As the printing presses turned and the supply of riyals chasing foreign goods increased relative to the foreign exchange earned and repatriated to Saudi Arabia, the value of the riyal went down relative to both goods and foreign currencies.

A second problem was the normal reaction of all individuals who hold a currency which is weakening: they exchange it for other currencies, or for gold, jewelry or merchandise. Saudi Arabia was no different. The widespread effort to reduce holdings of riyals tended to increase the turnover of riyals and increase spending. That, in turn, reinforced the inflationary pressures.

In 1956 still another problem arose. The second Arab-Israeli war broke out and oil production fell off sharply. Revenues from oil, which had reached $341 million in 1955, fell to $290 million —a level at which they remained almost without change until 1959 and from which they did not appreciably recover until 1961. This, on top of unchecked government spending, excessive borrowing and the growing flight of capital, weakened the exchange value of the riyal even more. By early 1958 it had plunged from the official rate of 3.75 riyals to the dollar to an all time low of 6.25 riyals per dollar. Simultaneously, prices throughout the country soared. By the beginning of 1958, the country faced uncontrolled inflation, almost complete exhaustion of its foreign exchange reserves, and nearly half a billion dollars of government debt. Disaster was not far off.

It was at this point that Crown Prince Faisal ibn 'Abd al-'Aziz Al Sa'ud, then Viceroy and Prime Minister, went into action. Neither unaware of what had been happening, nor insensitive to its perils, he had already, in October, 1957, engaged two financial experts to design and implement a program of fiscal and monetary reform. The experts were Ahmed Zaki Saad, an executive director of the International Monetary Fund, and Anwar 'Ali, director of the Middle East department of the IMF.

It would have been hard to improve on the Crown Prince's selections.

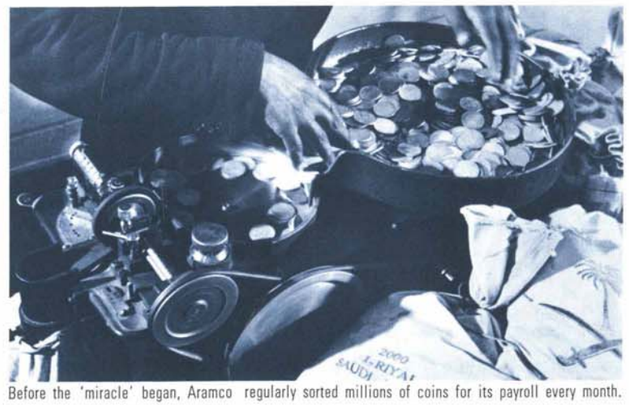
Between 1934, when he won an MA in economics at Ismalia in Lahore, and 1958 when he became governor of the Saudi Arab Monetary Agency (SAMA), Anwar 'Ali had served in such challenging jobs as undersecretary in the Ministry of Finance in India, deputy undersecretary in the Ministry of Finance in Pakistan and director of the National Bank in Pakistan as well as the post with the International Monetary Fund.

Ahmed Zaki Saad, who was born in Egypt, attended the universities of Cairo and Paris and spent nine years on foreign diplomatic assignments, carried similar credentials. He spent six years as undersecretary of state in the Ministry of Finance and had served as governor of the National Bank of Egypt, executive director and governor of the International Monetary Fund and governor of the International Bank for Reconstruction and Development.

Despite their obvious qualifications, however, neither Anwar 'Ali nor Zaki Saad could have achieved anything substantial if the leadership of Saudi Arabia had not been in the hands of a man who could provide the second prerequisite of effective economic reform: the ability to put into effect the remedies the experts prescribe.

In the Crown Prince, fortunately, Saudi Arabia had such a man. Able and popular, the second son of the country's founder was then serving as Prime Minister and Foreign Minister. No economist, he saw, nevertheless, that only when government spending did not exceed income could there be fiscal stability. He decided to throw the full weight of his prestige and all his considerable ability as a leader and administrator into the effort to clamp controls on excessive spending. Since Faisal was already a popular leader whose frugal personal life reflected that of his eminent father, and since he had wide experience in the various ministries, his influence was crucial. Without it, according to both 'Ali and Saad, their technical contributions would have been useless and the fiscal overhaul they had proposed would have been out of the question.

The objectives of the reform program were clear: to balance spending and income, pay off the national debt, curb inflation, and—above all—stabilize the riyal without disrupting business. In view of the existing circumstances they were also extraordinarily ambitious. As



Before the 'miracle' began, Aramco regularly sorted millions of coins for its payroll every month.

Workmen load 4,000,000 silver riyals minted in 1955 in Mexico City for the Saudi Arabian Government and sold to Aramco.

the Crown Prince and his aides knew too well, getting drastic fiscal and monetary reforms accepted and successfully implemented during a severe crisis by a government lacking experience in monetary and fiscal management would require an unusual amount of tact, persuasion and imagination.

Success meant taking decisive measures, yet introducing them cautiously, and without imposing unenforceable controls. Curbs on imports, for example, had to be imposed, but at the same time, a continued supply of consumer staples at reasonable prices had to be assured. Similarly, non-essential commodities had to be limited, but without encouraging large-scale smuggling that the government at that time would have been unable to prevent. Import licenses and quotas could be used but sparingly, because the civil servants needed to administer them were in short supply. Price controls were out for the same reason, and also because they would probably affect the country's business climate adversely.

There were ways, however, and Saudi Arabia employed them all. One simple but effective step was to establish a dual rate of exchange for the riyal. SAMA sold foreign exchange at the fixed official rate of 3.75 riyals per dollar for budgeted foreign exchange and simultaneously introduced a licensing system permitting a list of essential goods to be imported in limited quantities at the official rate. Foreign exchange for all other imports, except automobiles, could be bought without restriction from SAMA at the flexible free market rate, which by mid-1958 was about 5.50 riyals per dollar. Imports of automobiles were banned because they accounted for a large proportion of total imports—and because enforcing the ban was easy.

The effect was to help curb the foreign exchange drain sharply. Meanwhile, riyal profits realized by SAMA from the sale of foreign exchange at free market rates were earmarked for debt settlement, and budgeted expenditures were cut to a level below forecasted income receipts in order to realize additional funds for debt repayment.

The object of establishing a dual foreign exchange rate for the riyal was to bring the free market rate and the official rate for the riyal together gradually with minimal losses for businessmen who had made investments at the time when the value of the riyal had fallen to a low level. SAMA realized its objectives by assigning an important fraction of its monthly revenues to an exchange stabilization fund, which it used to supply importers' requests for foreign exchange. Because the government cooperated by holding its expenditures in check, the size of this foreign exchange fund increased, and SAMA was able gradually to lower the price at which it sold foreign exchange to importers. By mid-1959, the ban on automobile imports was removed; by December, the riyal had appreciated to about SR 4.50 per dollar, a point about half-way between the official rate and the free market rate at the time the financial reforms were introduced.

On December 31, 1959, the government announced devaluation of the riyal from 3.75 per dollar to 4.50 per dollar, the then prevailing free market rate. But to head off a sharp rise in the prices of food staples and drugs, hitherto licensed for import at the official exchange rate, the government also authorized subsidy payments to importers of these goods in order to offset the foreign exchange loss caused by devaluation. Although other licensed commodities, including clothing and capital goods, were not included in the subsidy program, the general decline in economic activity caused by the government cutback in spending prevented their prices from increasing.

The devaluation of the riyal was followed by a formal abandonment of the old bi-metallic system. The Saudi gold sovereign was withdrawn from circulation, and provision was made to replace the old pilgrim receipts with a full-fledged paper currency. The paper money was issued in 1961 against a 100 per cent reserve of gold and convertible foreign exchange (mainly American dollars) held on behalf of SAMA. As for the silver riyals, most of them had long since disappeared into foreign bullion markets.

Within 18 months of the inception of the program—by January, 1960—it was clear that it was a success. The country's inflationary spiral had been reversed, the international exchange value of the riyal had been stabilized, a modern, efficient monetary system had been created and the government had begun to accumulate and earmark a substantial amount for debt retirement—all at a cost of a moderate decline in business and some unemployment.

The second phase, debt repayment, began in 1959 and was completed within five years. In that time, the government repaid $190 million of foreign debts, more than $150 million of debts to the Monetary Agency, and more than $40 million of debts to domestic business firms. By 1963 Saudi Arabia was completely out of debt and ever since has been one of the few countries in the world with no national debt.

By 1960 the government was sufficiently in control of its financial affairs to turn its attention to economic development. Following the report of a World Bank mission sent to Saudi Arabia that year to make recommendations concerning economic development priorities, the government embarked on a program to equip the country with the economic and social infra-structure of a modern state. This development program included the construction of a network of paved highways linking all major population centers in the Kingdom, enlarging and modernizing port and airport facilities, providing universal free education throughout the country, introducing a nationwide public health program, and furnishing Saudi municipalities with roads, sewers, water supply systems and sanitary food markets.

The government's program of economic recovery and development was aided by the resumption of a strong upward trend in oil income beginning in 1959. In that year, oil revenues were approximately $300 million; by 1962 they had risen above $400 million a year; in 1967, they were more than $800 million per year.

The Saudi Government has so far been able to finance its development program entirely from current revenues, while maintaining a large gold and foreign exchange reserve. By the end of 1967, there were nearly 1.5 billion riyals—almost $333 million—in circulation, of which almost a fourth was backed by gold and the remainder by convertible foreign exchange, mainly dollars. In addition to these assets, the Monetary Agency's banking department, which acts as the fiscal agent for the Saudi Government, holds assets in the form of gold, silver, and foreign exchange which have, during the last two years, ranged in size from $350 million to $625 million. This is equivalent to between 6 and 12 months of imports at current import levels.

Now the Saudi riyal is linked with other world currencies by an agreement with the IMF which fixes the par value of the riyal at 22.2 U.S. cents per riyal, or 4.50 riyals to the dollar, a rate which has remained unchanged since 1960. Riyals are issued in the form of monetary agency notes valued at 1, 5, 10, 50 and 100 riyals. Each riyal is divided into 20 qirsh, which circulate in the form of cupro-nickel coins of 1, 2 and 4 qirsh. Each qirsh is further divided into 5 units called "halalahs", a unit introduced for accounting purposes only, which permits the division of riyals into decimal fractions. (One little-known fact about the riyal is that a thread of pure silver is imbedded in each note—a symbol, perhaps, of the strength of the currency.)

The currency supply has been rising at a rate of more than 10 per cent per year since the monetary reforms of 1959. This increase has been needed primarily to meet the expanding volume of business activity, and has been accompanied by continued stability in the general price level. The expansion of banking facilities since the reforms has also been impressive. There are today three Saudi and seven foreign banks operating in Saudi Arabia, with branches in 19 cities and total deposits of more than $200 million. In addition, the government has recently established an agricultural bank and is planning to establish an industrial bank.

The country is also attempting to diversify its economy in order to reduce its dependence on oil. The autonomous government agency, Petromin, has entered into agreements with foreign firms for the production of fertilizers and sulphur for export from the country's extensive natural gas resources. An extensive program of mineral exploration is under way. Teams of foreign experts are engaged in a detailed nationwide survey of the country's underground water resources as part of a comprehensive program for developing agriculture, thus reducing the country's dependence on imported foodstuffs. Numerous systematic feasibility studies of industrial development possibilities are in process.

The government's monetary reforms, introduced at a moment of the nation's history when its economic problems seemed almost insurmountable, have enabled Saudi Arabia to mobilize its great income from oil for the purpose of systematic nation-building. As a result, Saudi Arabia is one of the world's very few less-developed countries to be in a position to accomplish the difficult task of creating a stable, expanding economy without the need for outside financial help, and without even incurring the burden of a national debt.

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Egyptian vultures, still common in Jordan, wheel effortlessly through the sky, endlessly searching for carrion in the precipitous gorges below.

JORDAN'S NATIONAL PARKS

BY GUY MOUNTFORT/PHOTOGRAPHY BY ERIC HOSKING

Teddy Roosevelt, the father of national parks, prodded most Americans into realizing that even their great tracts of land couldn't stand up forever against the ravages of man. In Jordan an alert king and a handful of wildlife experts are doing the same thing for the Jordanians.

A few years ago concerned Jordanian officials suddenly realized that even deserts can suffer from man's neglect. A whole new area of the young kingdom—the desert to the east of the marginally productive highlands—badly needed help. Goats were stripping the plant cover. Bedouin families were burning up precious shrubs—most of the plants growing on a quarter acre of land—every time they brewed a pot of coffee. Desert springs were drying up. Wildlife was vanishing.

Half a century ago, a man with a gun could live off the desert in Jordan. Gazelles and Houbara bustards could be shot almost everywhere. There were plenty of Arabian oryx, and ostrich eggs could provide an occasional meal. But since 1916 (the year the U.S. National Park Service was established), Jordan —through over-hunting—has seen the wild ass, the fallow deer, the Syrian bear, the ostrich and the oryx vanish. The cheetah, both the Arabian and Dorcas gazelles and the Houbara bustard, all of which were once plentiful, now exist only in very small numbers.

In the spring of 1963, an alarmed King Hussein invited a group of British scholars, scientists and naturalists to conduct an extensive survey of the rugged mountains on the eastern side of the Dead Sea valley and the deserts to the east of the mountains. An expedition of internationally known experts in conservation, botany, ornithology and archeology went to Jordan and covered 3,000 miles—chiefly over desert tracks—collecting plants, tagging and counting birds and photographing the terrain and the fauna, before preparing recommendations on the conservation of the desert's natural resources for the kingdom.

The experts visited mountain areas 5,500 feet high, the Dead Sea shore 1,300 feet below sea level, the Red Sea coast at Aqaba, the rocky canyons of Wadi Ram in the far south. Then, in 1965 they focussed on the extensive swamps and marshes of the Azraq oasis in the east—the only permanent standing fresh water in several thousand square miles of desert.

These pools, lying some 70 miles to the east of Amman in the midst of this vast wilderness, are crucial to the nomadic Bedouins and to the wildlife of the desert. For in the great Arabian desert, of which eastern Jordan forms only a small part, there isn't a single river. The marginal highlands bordering the Dead Sea and along the Jordan and Rift valleys all drain westwards. What little rain falls on the desert is spasmodic and the rate of evaporation is so excessive that its effect is very brief. Only about three per cent of the moisture is able to penetrate the hot surface.

The 1963 expedition gave first priority to defining the status of the endangered animal species of Jordan on behalf of the International Union for the Conservation of Nature and the World Wildlife Fund. The scholars carried out exhaustive searches for some of the disappearing wildlife, such as the Houbara bustard. This magnificent bird, almost as large as the European great bustard, demands wide expanses of desert for breeding and is very difficult to locate even when it has not been hunted to the point of extinction as in

Wadi Ram (above) was one Jordan park site suggested by experts along with the Petra area and (below) the vast Azraq oasis.

An aerial view of part of the Azraq oasis shows the expanse of swamps which attract desert wildlife as well as migrant birds.

The spur-winged plover lays its eggs on open marshy ground.

The Egyptian vulture ***(Neophron percnopterus)*** nests in caves.

A lesser short-toed lark feeds a tidbit to a hungry chick.

A stone curlew ***(Burhinus oedicnemus)*** has long legs, big eyes.

Jordan. Although the teams searched everywhere, all they found was a fresh feather in the north, and a nest in the south containing two eggs—which had just been sucked by a young goatherd.

The smaller birds of the desert, however, were numerous and 216 species were identified, of which 96 were breeding. These included no fewer than 10 different species of larks, many singing beautifully. The Azraq oasis attracted by far the largest variety of birds because of its importance to migrants. Every day the population changed as flocks continued their journey northwards. The expedition caught several hundred with mist nets and attached rings to their legs before releasing them as part of the migration studies. One such migrant, a wryneck, was recovered two weeks later in Russia, having flown a distance of about 1,400 miles from Azraq. Two ringed swallows were also recovered in Russia shortly afterwards.

Among the many small animals studied were the hairy-footed jerboas and the Palestine mole rats. The latter are almost blind, sausage-shaped, little creatures which tunnel into the hardest ground with their long, permanently-growing incisors. They do great damage to crops and grain in Jordan. So powerful is their tunneling that they often throw up their "mole hills" in asphalt roads.

The need to protect what remained of Jordan's desert wildlife and vegetation, added to the fact that the country had a wealth of archeological treasures and spectacular scenery, led to the decision that Jordan should create wildlife reserves in conjunction with national parks. The experts recommended three localities, the most important of which was the 1,500 square miles around the Azraq oasis. The second was Petra, including the remnants of the mountain forest of Wadi Araba, a total of about 800 square miles. The third, called the Rift National Park, was on a slightly smaller scale and centered on the magnificent *jabals* of Wadi Ram.

The Royal Society for the Conservation of Nature was formed as a result of these recommendations. With King Hussein as Honorary President, the society set out to conserve and revive the wildlife of Jordan by the rigorous enforcement of strict conservation laws —and such education measures as the use of helicopters to drop conservation leaflets on remote villages and Bedouin camps. The Azraq Desert National Park is already a place of international importance with a team of scientists from the University of Amman and from other countries studying the rehabilitation of the desert and also the anthropology of the local tribes.

Jordan's desert wildlife has obtained an eleventh-hour reprieve. The "Bull Moose" would have approved.

Guy Mountfort, a noted ornithologist, is co-author of A Field Guide to the Birds of Britain and Europe *and author of numerous other books including* Portrait of a Desert, *which describes the 1963 expedition to Jordan.*

The pin-tailed sandgrouse ***(Pterocles alchata)*** is one of six colorful species of this family occurring in Jordan. The "pigeons", as the Bedouins call them, are still plentiful, some breeding locally.