Aramco World
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Return Requested

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CSF

A MAN WITH A PLAN

becomes. Idleness and corruption grow. Luxuries change into necessities. Money takes on an increasing importance, and, paradoxically, has less value.

Those who think that inflation is a modern discovery should consider this sentence from the *Muqaddimah:* "A city with a large population develops a competition for goods, and the result is rising prices in the bazaars." Ibn Khaldun concludes, as might any contemporary economist, that "the financial stability of the city begins to deteriorate, with a concomitant deterioration in the body politic."

This pathology of cities is obviously relevant to Ibn Khaldun's philosophy of history. So, conversely is the health of cities.

Following Aristotle's ideas, he explains that cities are a very necessary part of civilized life. Since human beings prefer to live together in groups, it follows that their habitations must be located together. And therefore some cities will arise spontaneously, if they are not deliberately constructed.

Nothing about the city, according to Ibn Khaldun, is of greater concern than its site, the physical layout of its location. If the city is of spontaneous origin, the site is likely to be a good one, for people will not willingly gather where living conditions are bad. On the other hand, the layout of streets and buildings may well be poor, dictated by chance, necessity and individual whim instead of a rational planning authority. Damascus is mentioned as a case in point for Ibn Khaldun—so well situated that it was inhabited from the earliest times, yet it is full of narrow, winding streets and back alleys.

The city deliberately founded and encouraged to grow by one man usually is well constructed internally, like Baghdad with its geometrical divisions and broad, handsome boulevards. But Baghdad's excellent position on the Tigris is not emulated in all "artificial" cities. Too often the founder seeks only a few good conditions and ignores the rest. "Thus, those who founded some of the towns in the Hijaz concentrated on pasture and water suitable for their camels. They overlooked food and water for themselves, and for their other domesticated animals like cattle, sheep and goats."

Building material is another problem over which city planners have sometimes faltered. Ibn Khaldun criticizes his compatriots for working too much with wood and adobe, suggesting that they import stone and marble—the endurance of which would be worth the extra cost. As proof he mentions the Pyramids.

The correct administration of any city calls for proper zoning, a problem that plagues many a twentieth-century city. Ibn Khaldun's argument implies that faulty spacing, the intermingling of different districts—residential, industrial, financial, recreational—is an invitation to chaos. The main thing, he says, is to have order in zoning so that each element in the life of the city may enjoy the conditions most appropriate to it. Under this heading, he explicitly notes that parks should be spaced at intervals for the benefit of the entire population.

Ibn Khaldun has a long section on the arts and crafts of the city. Earlier than Adam Smith, he realized the significance of the division of labor—the fact that in urban life no individual can produce everything he wants, so that some citizens confine themselves to carpentry, others to medicine, others to trade, until all the needs of the citizens are met.

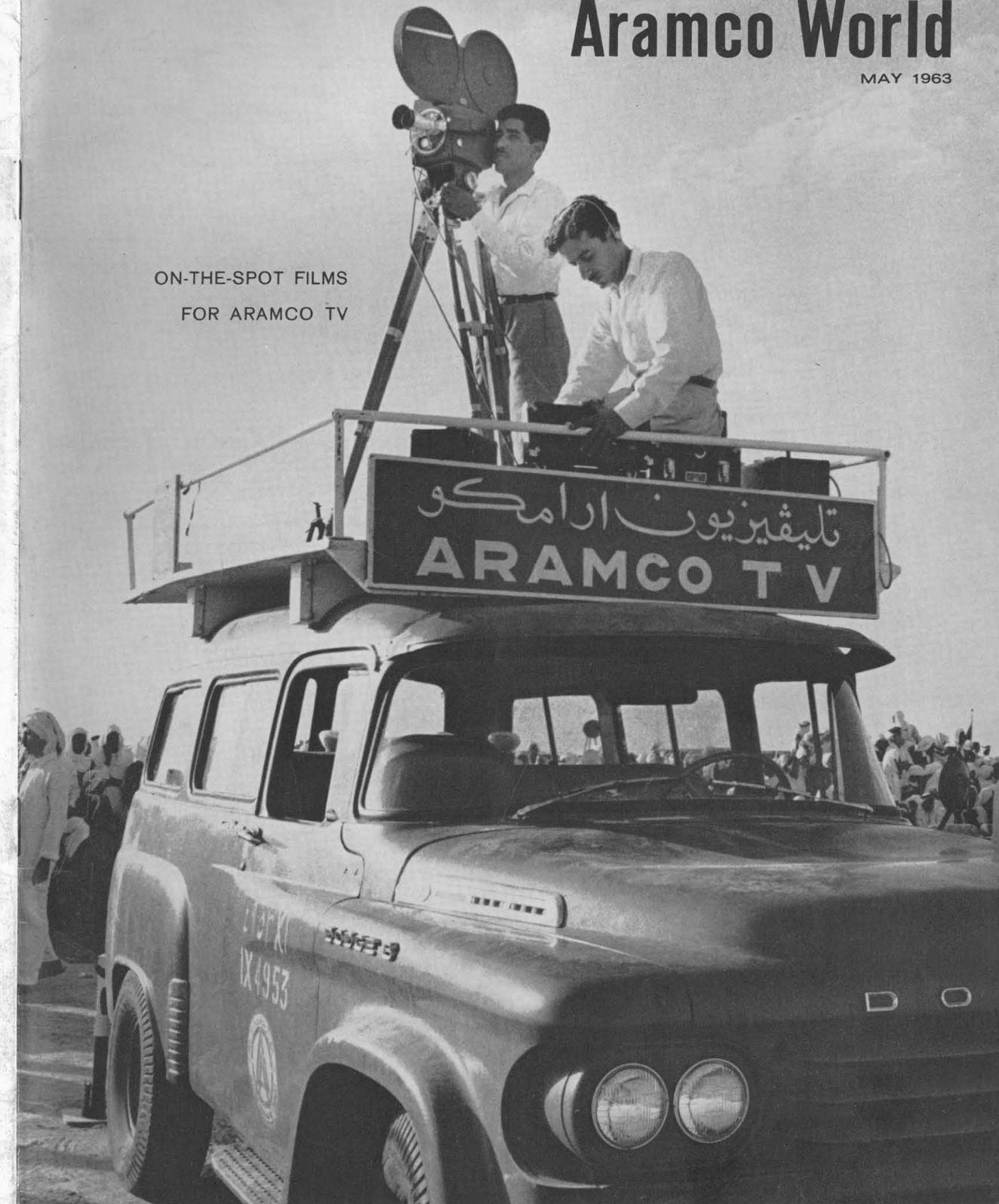
Commerce, too, has a special place in Ibn Khaldun's analysis of cities. Commerce, he states, caters to goods that cannot be manufactured locally, and however much the Islamic philosopher of history might deplore the emphasis on luxury, he was realistic enough to write this: "The residents of Damascus could do without Chinese porcelain or Indian spices, but wealthy Damascenes will not do without them, now that they are to be found in the bazaars."

Ibn Khaldun does not forget the arts that are non-productive in the ordinary sense. They do not produce food, clothing, or housing. Nevertheless, he exhorts city governments to support poets, musicians, painters, writers and book publishers. He suggests, moreover, that cities encourage science by founding scientific schools and institutes. His opinion here refers not only to such studies as law and theology, but also the practical training of apprentices in metalwork and cloth dyeing.

The startling modernity of Ibn Khaldun's thought means that he has words of wisdom for city planners of every time and place. His broad theories are still correct, his practical solutions still applicable. Above all, Ibn Khaldun of Tunis wanted cities that were good to live in. ■

Aramco World
MAY 1963

ON-THE-SPOT FILMS
FOR ARAMCO TV



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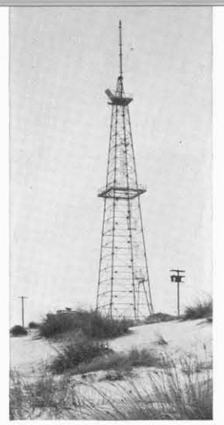
Second oldest Arabic-language television station in the Middle East, Aramco TV puts together a daily schedule with a dual mission—education and recreation for its 100,000 viewers in Saudi Arabia



ONE EVENING several months ago an American on a business trip to Dhahran, Saudi Arabia stirred his after-dinner coffee and watched the flickering image on his host's television screen come into focus.

"This may surprise you," his host said.

The visitor felt right at home as he saw Perry Mason walk across a courtroom to the witness stand. For a few seconds he had the odd sensation that he was in his own living room in New Jersey rather than sitting a few miles from the Persian Gulf watching an Aramco Television broadcast.

Then came the surprise. On the screen, Mason assumed the sober frown that millions recognize as the silent signal that justice is about to triumph. He slowly canted his head toward the nervous witness and solemnly asked:

"Alasta *anta* allathi atlaqa an-nar?"*

The unsuspecting American visitor had been trapped in a transcultural version of the old badger game in which the greenhorn is the butt of a friendly joke. He almost dropped his coffee as the dubbed-in voice continued with a stream of Arabic that seemed to drop nonchalantly from Perry Mason's lips.

"You're *kidding*," the visitor said in disbelief.

"Guess you didn't know that Perry could rattle off perfect Arabic," his host replied. "Quite a jolt, isn't it?"

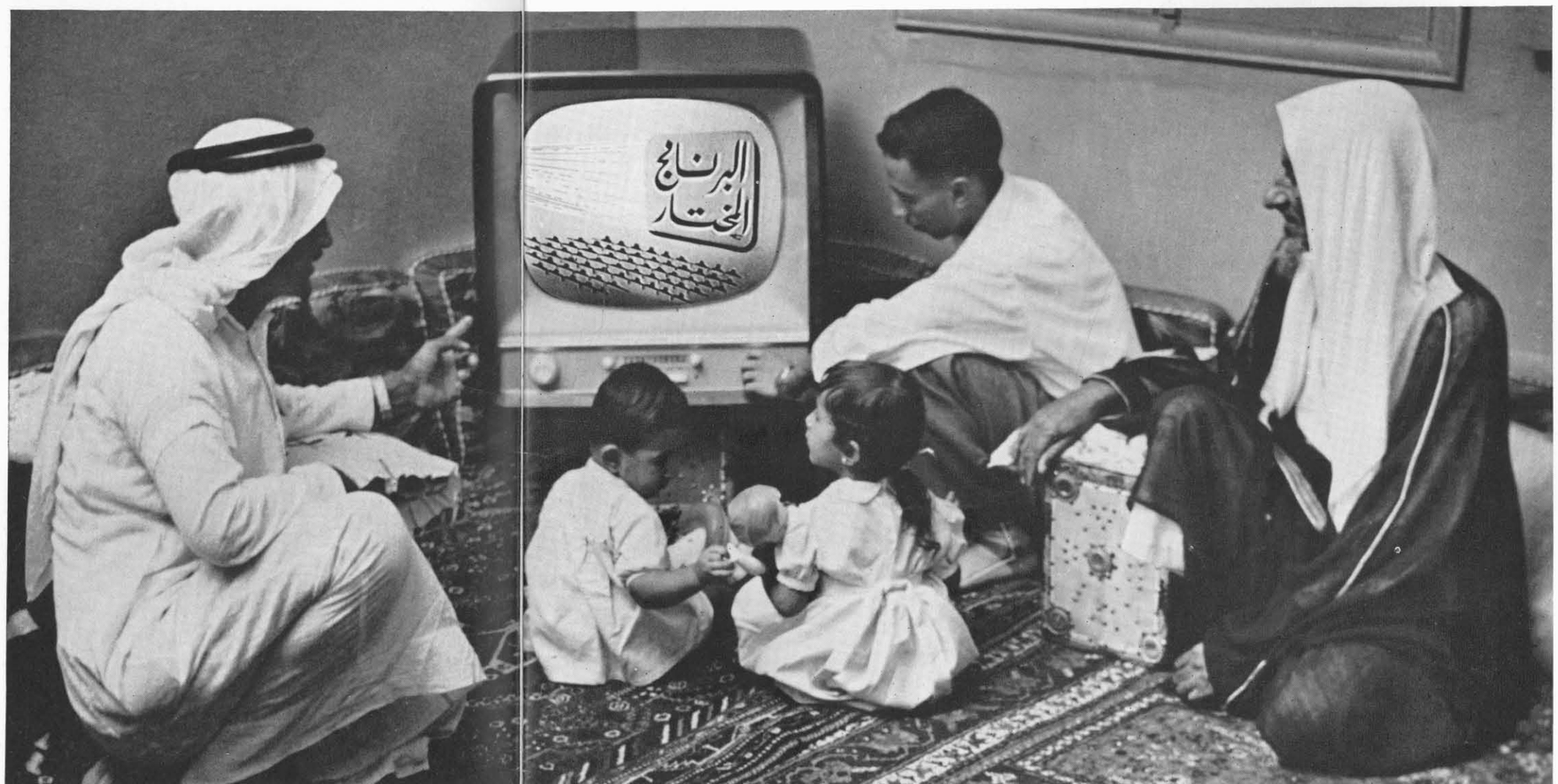
The visitor was actually a victim of a mental short circuit. He had, of course, seen many French, German and Italian movies with dubbed-in English dialogue. But his mind could not quite accept the switch: an *American* film with *foreign* dialogue added.

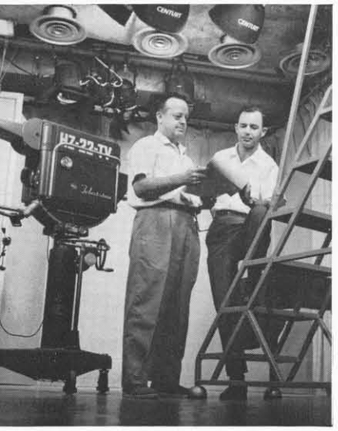
The vast majority of the Saudi Arab audience for whom the show really was intended was, however, having no such

* "Weren't *you* the one who actually fired the gun?"

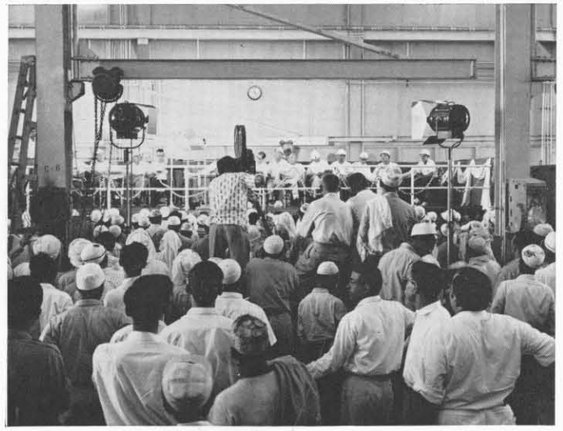
ARAMCO TV ON THE AIR

Four generations of the family of Aramco employee Ibrahim ibn Suleman (second from right) watch notice of film in their home at Rahimah, Saudi Arabia. Retired oil rig supports antenna that sends out signal.



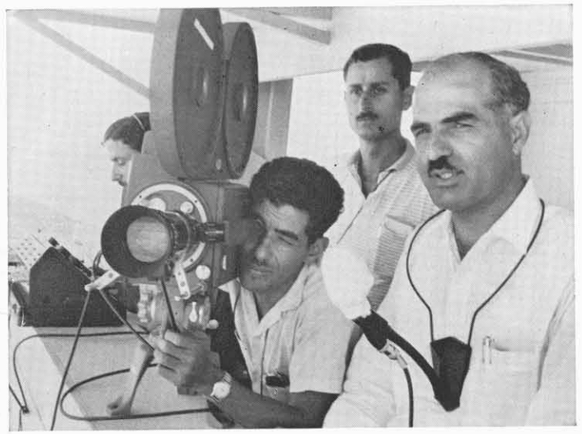


Aramco TV producer Jimmee Fullerton (left) discusses script with William Scott when station was new in 1957.



Recognition of achievements in industrial safety, with members of Aramco management presenting safety awards to employees in appropriate ceremonies, gets coverage on Aramco Television.

With Mohammed Sutahy, Aramco TV's William R. Morrall (left) checks reproduction quality of film just processed by equipment at left.



Aramco Television camera and sound crew films soccer game from specially constructed booth overlooking Aramco's Sports Center in Dhahran. Complete games are filmed for a later showing.

ARAMCO TV ON THE AIR

problem. It is likely that nearly every one of the 100,000 or so viewers within range of Aramco Television's signal was thinking of nothing more than the ancient drama of good triumphing over evil which unfolded before his eyes. To those Saudi Arabs it was the most natural thing in the world for Perry Mason to be speaking good Arabic.

About an hour before Perry Mason went on the air Aramco TV had begun its program of daily broadcast, scheduled according to local suntime, with readings from the Koran, the Sacred Scripture of Islam. The marked contrast between the two presentations reveals much about Aramco Television, the Arabic-language station operated by the Arabian American Oil Company primarily for its nearly 11,000 Saudi Arab employees and their families.

The station is an unusual—perhaps unique—effort by an American industrial company to operate an educational-recreational television station in a foreign country with the language, cultural and entertainment preferences of that country as a basis for programming. Aramco Television—Channel 2, with the call letters HZ 22 TV assigned by the Saudi Arabian Government—has a staff of 65. The producer, chief engineer, operations supervisor, two maintenance and training technicians and a secretary are American. Another five are from the Levant. The remaining 54 staff members—assistant producer, script writers, camera operators and technicians—are Saudi Arabs.

Readings from the Koran, in deeply moving Arabic cantillation, open each day's telecasting following Sunset Prayer. This chanted recitation has, of course, a strong religious appeal for the Muslim audience. But what about Perry Mason? What philosophy of programming brings this defender of justice to the desert?

Part of the answer, which we shall look at more closely in a few paragraphs, lies in the basic problem Aramco faced in trying to pioneer a daily schedule from scratch without anyone close at hand who had prior television experience. A more immediate answer is provided by Jimmee V. Fullerton, the station's producer.

"Perry Mason was chosen," he says, "mainly because of the human drama involved which, we feel, appeals to people regardless of their nationality. Also, you must remember that Arab culture has a strong tradition of justice."

In other words, try to find in the culture of the country elements that are dramatized on those television shows that are available on film. Conversely, avoid all program material that might offend custom or religious tradition. Then, within these limits, be as certain as possible that the show will capture the sympathy and imagination of the viewers through the "human drama" contained in its story line.

During the more than five years that it has been on the air Aramco Television has learned to walk this tightrope with increasing sureness and success. Its weekly schedule of broadcasts lists a variety of programs that reflects the station's dual mission: education and recreation.

Each week there are five feature-length Arabic films and four English-language films with Arabic sound dubbed in. The original English-language sound tracks accompanying the latter-type films are broadcast via radio for the understanding of non-Arabic speaking members of the viewing audience, who constitute something less than four per cent of the total.

During a typical week the station broadcasts seven features originally conceived for U.S. television audiences. These include such familiar favorites as "Disneyland," "Sea Hunt," "Checkmate," "Rawhide" and the long-running "Ozzie and Harriet Show."

The aforementioned "Perry Mason Show" runs about fifty minutes without commercials. Watching commercial-less television on Aramco TV is a strange experience to those accustomed to the other kind. The artificial structure of dramatic shows, with a climax leading into every advertising announcement, shows up plainly when the usual "message from our sponsor" is left out.

Aramco Television gives extended coverage to major local news events such as the visit last March to the Eastern Province of H.R.H. Amir Faysal, Prime Minister of Saudi Arabia. The station's film and sound crews recorded most of the Crown Prince's public and ceremonial appearances during his week-long visit in the area.

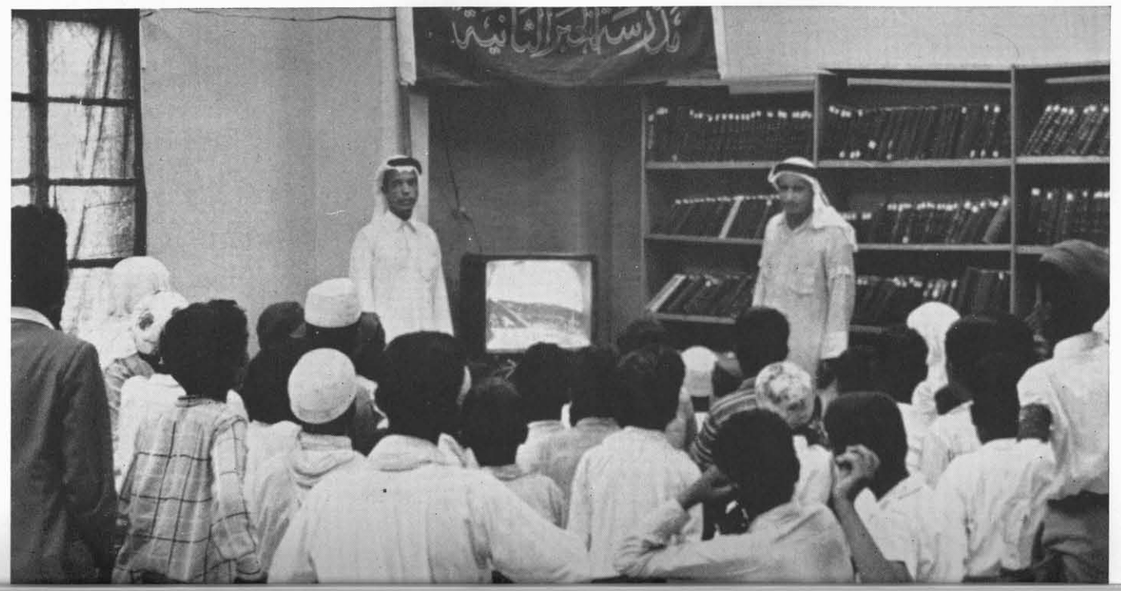
For the athletically-oriented members of the viewing audience, the station offers a variety of major international sports events, as well as the filmed "Telesport Digest," and complete basketball, bowling, golf and wrestling programs. Soccer, which in Saudi Arabia occupies much the same place as baseball does in the United States, gets thorough coverage during its season. Complete matches between various company teams and those from other parts of the Kingdom and the world are filmed for later showing.

That universal hero, the cowboy, has found a home in the desert with an assist from TV. Saudi Arabs, like Londoners, Parisians and Romans, have taken enthusiastically to American horse operas.

To counterbalance the admittedly pure entertainment value of the sports, adventure and western shows it offers, Aramco Television devotes nearly a third of its air time to education. Classes in Arabic and English are presented, and through their appearances hundreds of viewers have written the station for television text books.

Other educational shows include "Channel 2 Bookshelf" (a survey of Arabic literature); "Your Home" (practical

On occasion, special educational films have been telecast in Saudi Arab Government schools within area of Aramco Television's signal.



On his arrival last March at Dhahran International Airport for a visit to the area, H.R.H. Amir Faysal ibn 'Abd al 'Aziz, Prime Minister of Saudi Arabia, was greeted by delegation headed by H. H. Amir Sa'ud Ibn Jiluwi (at his left), Governor of the Eastern Province. Aramco Television is equipped to put important local news events such as this on the air within a few short hours after their occurrence.

Aramco employees from Abqaiq, Dhahran and Ras Tanura match their knowledge for prizes on "Three District Quiz," moderated by Fahmi Basrawi.

ARAMCO TV ON THE AIR

instruction for the housewife); "Auto School" (a review of safe driving practices); "Your Health" (family hygiene); "Agricultural Show" (new farming methods); and "Science Classroom," and the American network television series, "Modern Biology."

The station broadcasts many shows which combine education and recreation. One example is a weekly series with the familiar question-and-answer format, the popular "Three District Quiz." This long-time feature takes the first part of its title from the fact that the employee-contestants come from Abqaiq, Dhahran and Ras Tanura, the three principal centers of company operations in the Eastern Province of Saudi Arabia.

All the contestants competing for modest prizes on "Schoolbook Answers" are youngsters attending nearby Government schools, and the questions they are asked come directly from textbooks actually used in the classrooms. (Here is a good example of television providing a spur to do one's homework.) The interview program, "A Cup of Coffee," brings before the Aramco cameras local Saudi Arab personalities with a noteworthy occupation, hobby or point of view.

Each week the station features the "Arab World Men of Letters" program. This show has brought to Aramco Television's studio in Dhahran such distinguished authorities as 'Abd al-Quddos al-Ansari, the Saudi Arab historian; Isma 'il Mudhar, Egyptian specialist in scientific and literary subjects; Anis Makdisi, a Lebanese professor of Arabic literature; and Mahmud Taimur, a well-known novelist and short-story writer from the U.A.R.

The variety and balance of the current 32-hours-per-week schedule is a long step forward from the station's pioneering days of just six years ago. Aramco Television went on the air for the first time on September 17, 1957. The inaugural broadcast, which was also the first Arabic-language television broadcast to originate in Saudi Arabia, was a reading from the Koran.

Speaking parts in Arabic are dubbed into feature film by members of Aramco Television's staff. Arabic is used for every program shown.

The reading was followed by a talk by Fahmi Basrawi of Aramco Public Relations, who explained to the small audience, estimated to be 1,000 or fewer, the purpose of Aramco Television. The first evening's schedule was rounded out with the showing of the motion picture *Jazirat al-Arab* (*The Island of Allah*), an historical film produced by Aramco which recounts the life and mission of the late King 'Abd al-'Aziz Ibn Sa'ud in creating the modern Saudi Arabia.

On the second day the schedule consisted of two filmed television shorts: "Whirly Birds" and "I Search For Adventure." The evening after that introduced the now-veteran "Your Health" show, featuring a discussion of malaria control. Thus, in that first week of operation the station had established its basic education-recreation format and the utility of television as a communications medium in the area.

The initial week of operations also established the practice of utilizing program materials produced in the United States, which in those days was the only country with an available inventory of filmed shows that could be leased and rerun like motion pictures.

The Saudi Arab viewing audience was enthusiastic from the start. One of the strongest traditions of Arab life is the closeness of the large families—the old tribal core. It was quickly discovered that television could be enjoyed as a family affair by young and old alike. That small first audience formed a nucleus of staunch friends of Channel 2.

Since there was no trained talent available on the scene, Aramco Television had to recruit and train its own speakers and teachers as it went along. Trying to create live Arabic-language dramatic shows was then out of the question. Today, through its "New Faces" show, the station is endeavoring to discover and develop performers for future television plays.

Aramco Television was the second Arabic-language station to go on the air in the Middle East. The first was an outlet telecasting from Baghdad. More recently TV stations have been established in Cairo, Beirut, Damascus, Kuwait, Abadan and Tehran. In Saudi Arabia, the U.S. Air Force once operated a small station at Dhahran Airport for the American personnel attached to its Military Training Mission there. The station, telecasting in English exclusively, predated Aramco TV by one year. It went off the air in 1961.

There were about 200 sets within range of Aramco Television's broadcasting signal when the company station first started. It is estimated there are now about 15,000 sets within receiving area of the station. Thus, as a side benefit, the station has created a brisk, sustained market for television receivers sold through local Saudi Arab merchants.

Most of the coffee shops in the Eastern Province cities of Dammam and al-Khobar recognize the value of television-watching on their premises as a traffic-builder and have installed receivers for their customers' enjoyment. It is doubtful that many of these local proprietors, however, have ever heard of Fred Allen's acidulous definition of television, which might very well be roughly paraphrased as "an animated decalcomania on a coffee house wall."

Television receivers are becoming increasingly common in the homes of Saudi Arabs living in the Eastern Province, as in the living room of this Aramco employee, who resides in the Persian Gulf city of al-Khobar.

Like any medium so literally in the public eye, Aramco Television is often commented on, both favorably and adversely, by individual viewers and the local press. Each month the station receives more than 12,000 pieces of mail from viewers responding to televised contests and sending the station suggestions and rebukes. Positive criticism is always welcome as a useful guide to programming. The carefully maintained balance of daily fare is a true reflection of audience preferences. Though shows of an educational nature occupy almost one out of every three hours Aramco TV is on the air, the local press keeps asking in print that programs in this category be given even greater emphasis. The audience, however, prefers more entertainment shows.

Aramco Television's major operations problem—its limited radius of service—is being overcome with the installation of a new repeating transmitter which will nearly double its clear-picture area.

The growth of television over so much of the Middle East has brought with it a number of Arab producers equipped to develop and package their own shows on film. Sooner or later the Middle East equivalent of the western is bound to show up on the gravel plains and sand dunes of the desert. Arab desert lore is filled with the great deeds of Bedouin heroes, and the vast desert itself offers possibilities of breathtaking panoramic backgrounds for some great chase scenes.

The day of Middle East "westerns" may eventually come, but in the meantime, at the one-story, stone headquarters building of Aramco Television, there is plenty to do. Script-writing, film processing and editing, dubbing Arabic voices for English, planning and programming far into the future, each busy staff member is occupied with his own specialty all day long and often far into the evenings. Their collective effort is aimed, however, at one single-minded purpose: to provide recreation and education to an expanding Saudi Arab audience. ■

Skills passed father-to-son guarantee a high standard of workmanship among the

CRAFTSMEN OF TUNISIA

IT IS EARLY MORNING in the Souk el Attarine. Hundreds of people jam the narrow cobbled thoroughfares of this huge market in Tunis as they hurry toward the daily auction of materials, brightly colored silks for which the capital of Tunisia is famous.

The vaulted tunnels leading to the auction place are lined with hutch-like stalls casually displaying their owners' wares. Here a cross-legged cobbler fashions a pair of *belghas,* heelless North African slippers of soft creamy leather. Across the way a silversmith shapes a jewelry box of Byzantine design, while his neighbor sits dreamily atop a pile of pastel-striped blankets from Djerba. A smiling vendor hawks the beauties of carpets from Kairouan. Another bargains with a customer interested in a vase from Nabeul.

Two or three hundred years ago the scene might have been the same, and it is likely that the merchandise so colorfully offered for sale would have varied little.

Tunisia, located on the northern tip of Africa just across the Mediterranean from the Italian island of Sicily, has been the crossroads for a series of great civilizations.

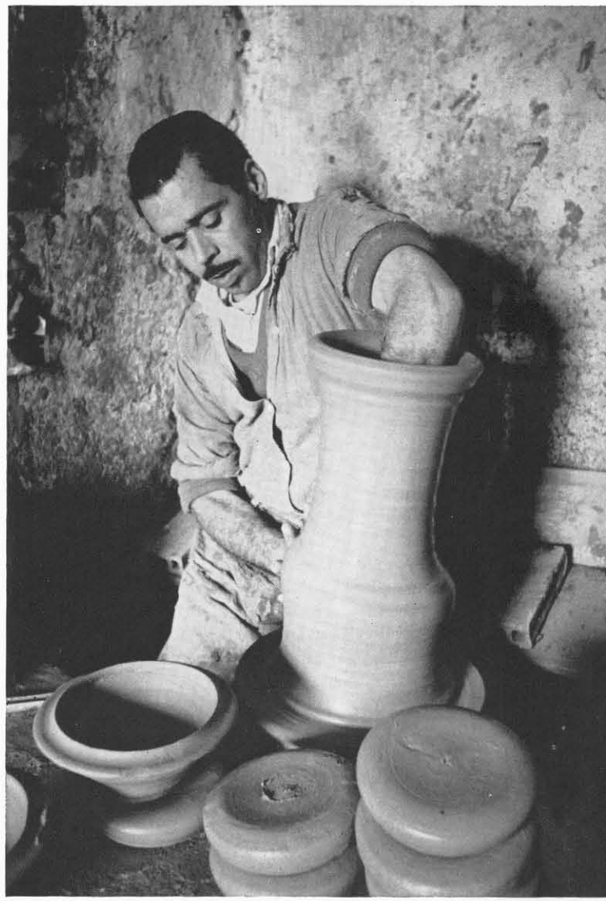
First the Phoenicians established their settlements of Phoenicia and Carthage in the twelfth century B.C. A thousand years later the Romans invaded and set up a rebuilt Carthage as their second city after Rome. The Moors settled in Tunisia after the fall of Cordova in 1492, and Arab occupation began in the seventh century. It lasted until Turkish rule in the sixteenth century. Then came the Italians and the French. One by one the civilizations played out their destinies on Tunisian soil.

Aside from the magnificent ruins that dot the Tunisian countryside, these traces are most evident in the arts and crafts of the country.

Perhaps the best-known of Tunisian handicrafts are the carpets of Kairouan. The city was founded in 668 by Okba ibn Nefaa and was the residence of Omayyad and Aghlabite governors for centuries. Kairouan supplied the caliphs of Baghdad with a yearly tithe of 120 carpets.

Kairouan is one of the few places in Tunisia where the women do the weaving, chatting gaily as their deft fingers ply the shuttle. They turn out two types of carpet—pile and

A father-and-son team of weavers works on a straw carpet in the Tunisian city of Gabes. The large carpet pictured here required a week to complete.



Master potters of Nabeul, assisted by apprentices, shape vases and pitchers that show a distinct Greek influence in design.

CRAFTSMEN OF TUNISIA

short-nap. The latter are subdivided into *mergoums,* which have a diamond pattern worked into a neutral ground, and *klims,* formed by alternate strips of natural-colored wools. Most sought after are the *zerbiyas,* which are pile rugs. Their traditional design of a central motif bordered by an arabesque pattern is largely responsible for the widespread appreciation of Kairouan carpets.

Wander into one of the ateliers in Nabeul where pottery is made and the setting may remind you of the ancient Roman mosaics in the Bardo Museum near Tunis. The men at the pottery wheels look remarkably like their forebears.

In nearby Dar Chaabane, practically every man in the village is a stone sculptor. Tunisians prize the local art of *nakch hadida,* and many homes have carved lintels, doorways and patio arches of this delicate white stonework. The carvers work in soft sandstone, suitable only for dry climates, for rain would soon wash away the designs. The pattern is stenciled on the stone with damp charcoal and the sculptor follows the marks with his chisel, turning out cobweb-like lacework distinguished by a Moorish feeling.

On the island of Djerba, known to readers of Homer as the spot Ulysses called "the Isle of Lotus Eaters," a number of unique arts and crafts are practiced. For centuries the potters of Djerba have molded baking jugs and water jars whose pure forms recall classic Greek amphorae.

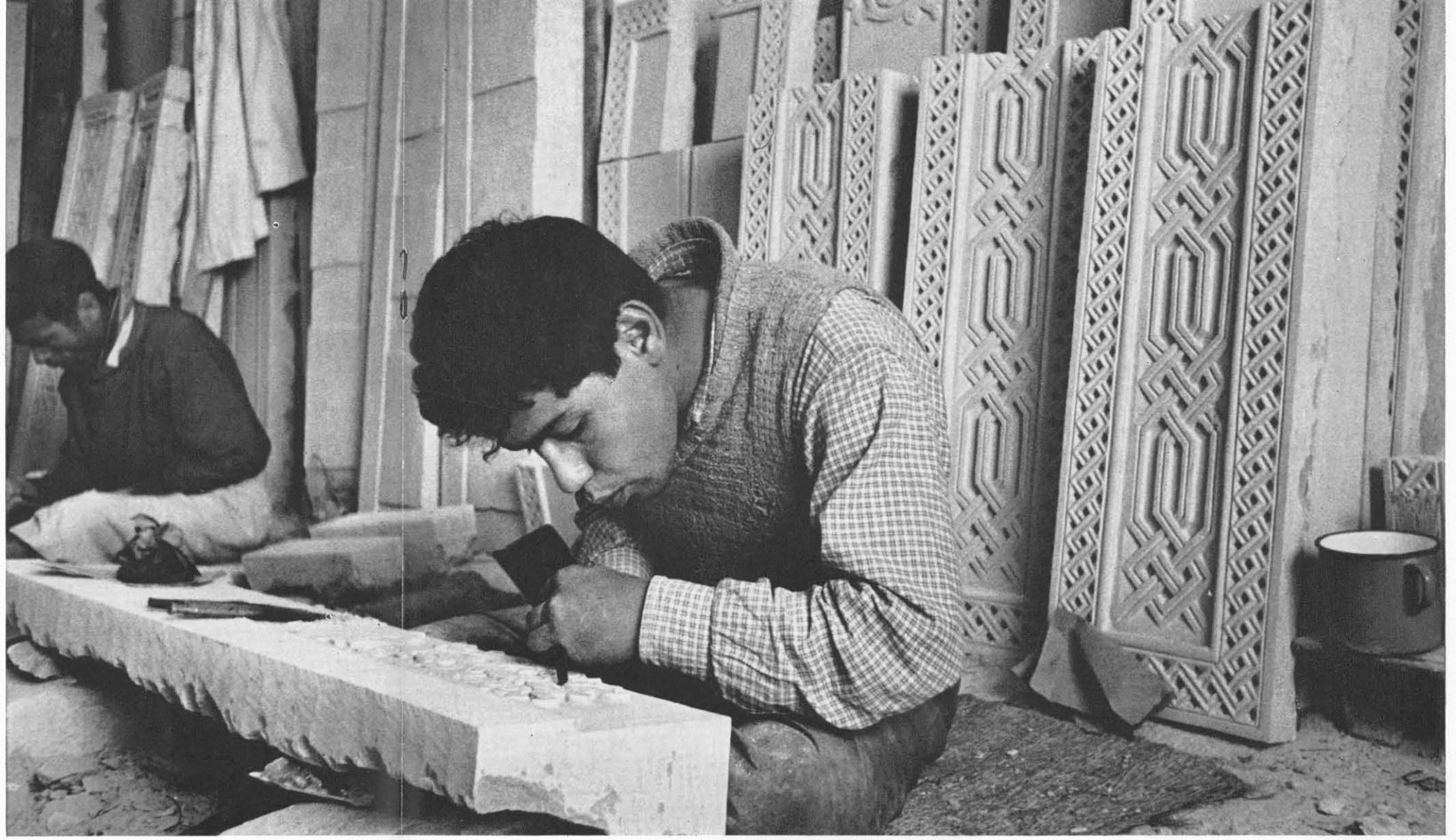
Lambs' wool and camels' hair from the island and silk from the continent are woven into fine cloth. Looms are simple but the weavers use them with speed and agility. Carpets from Djerba are less sophisticated than those of Kairouan. Highly colored and uncomplicated in design, they resemble loosely woven wall hangings or blankets.

Spanish Muslim influence can still be seen in the elaborately inlaid leather saddles made in the *suqs* of Kairouan and Tunis. But the Moors brought to North Africa an even more traditional craft — the manufacture of *chechias.* A close-fitting red skull cap, the *chechia* begins as a long hand-knitted white woolen tube. Submitted to a series of dippings in spring waters and ancient dyes, which gradually shrinks the tube, the *chechia* is then dried, pressed and given a nap by teaseling with a bulrush.

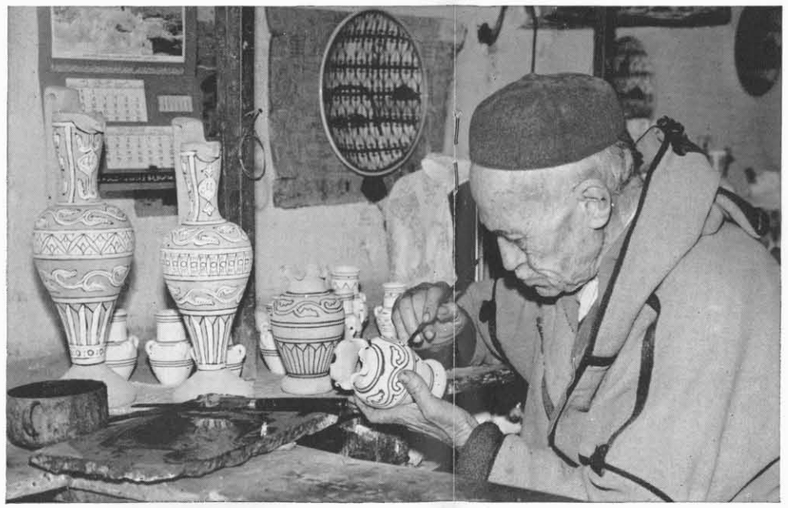
At Cap Bon, descendants of the Turks produce finely netted silken curtains. In Sidi Bou Said, Byzantine birdcages with filigreed domes and minarets are lined up for market. *Chebka* lace made with Irish thread in Bizerte, carved wooden utensils from Sfax, wrought-iron tables from Nabeul and engraved copper plates from Sousse are among other handicrafts that, although very old, bear the stamp of Tunisian individuality.

Tunisia is a land of arts and crafts. Almost 500,000 people make their living from handicrafts, either on a family basis or in small enterprises. Their work is protected by the Government's Office de l'Artisanat, which maintains standards of quality and has begun to introduce mechanization into some of the less creative steps of craft production.

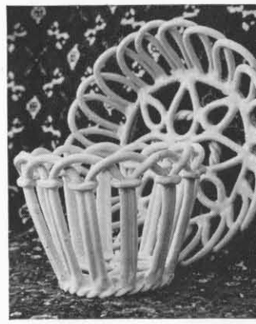
The Tunisian artisan, renowned throughout the world for his traditional designs and careful workmanship, has little need to change the techniques of his ancestors. ■



With mallet and chisel, sculptors in Dar Chaabane fashion Moorish designs in ornamental stonework. The material is a soft sandstone, suitable for dry climates only, for rain would wear away the design.



At Nabeul, pottery is hand-painted, then fired in outdoor kilns. This artisan is wearing typical Tunisian dress—*chechia,* a red skull cap, and a one-piece gown-like garment called a *kachabia.*



Delicate baskets made from lacquered reeds are popular handicrafts in the Tunisian cities of Gafsa, Tabarka and Ain Draham.

Near Hama, in northern Syria, 2,000-year-old wooden water wheels scoop water from the Orontes River to irrigate the surrounding farmlands.

THEY TAMED THE RIVERS

Before Middle Eastern farmers developed the art of irrigation, each year brought drowned fields one season, dry fields the next

THE RIVER'S silt-brown waters turned flashing gold in the first sunlight of a new day. To the farmer on the riverbank it was a sight filled with vivid memories, familiar signs and ancient questions.

The farmer saw that the river (later called the Euphrates) had risen during the night. He was reminded of a saying his father had taught him. On a morning like this his father had told him he was now old enough to learn the secrets of the river and how it gave life to the desertlands. "Water," the father had begun, "like fire, is a good friend but a bad enemy. On desertlands, water is the strongest power the gods hold over man."

Words spoken father-to-son 7,000 years ago held the wisdom the people lived by. Not for another 1,500 years would the written word be invented, but word-of-mouth lessons about how to keep life going were the richest inheritance each generation gave the next.

The farmer could tell by the sun's position on the horizon and the rise of the river that the flood season would come soon. By such signs, knowing nothing of calendars, he and the people of his village marked the seasons. They would have welcomed better ways to forecast nature's changes and moods, because in this arid land survival depended on advance preparations for too much water or too little.

A small song bird added its music to the murmur of the river. Here at the lower reaches of the Euphrates he and his friends were regular visitors when the warm days returned. The bird's arrival was another warning. Upriver the floods might have started even now.

The farmer noted these signs. This year the village had chosen him to organize the river watch. If the gods were angry this season, and the watch under his leadership failed to give the alarm, the village would make him pay, perhaps with his life. It was a harsh custom, but when the life of the village was entrusted to those on guard, there seemed no other way.

On this sunlit morning such dark thoughts did not stay long. Tradition gave an extra section of land to the man in whose hands the village put its safety. It was better to think about the larger harvest the farmer would enjoy.

True, some in the village said the watch leader's fields were larger than he deserved. That was to be expected. But the farmer had no real fear that talk would do him out of his land, although after the floods it might be hard to find. Many of the dividing lines would be washed away or buried under mud. The mud, river-borne silt from the faraway mountains, brought new fertility to the soil. That was good. It also brought a new round of dispute to the village. That could not be helped. After the floods the redivision of the lands, without arithmetic or geometry, was a makeshift chore that too often left hard feelings.

The farmer, by later standards, did not know much. But compared to the past rather than the future, his people were wealthy in farming knowledge. Their skill provided the village with wheat, barley and peas. Sheep and goats were raised for their wool, meat and milk. At about this time cattle were coming into use among farming peoples, for meat, milk, hides and their strength as beasts of burden. Ox-drawn plows and wheeled carts were replacing planting sticks and back-packs.

In other ways the villages along the Tigris and Euphrates were not typical — because they were on the desert. Farming began where crops could be grown by rainfall alone, in the highlands of the Fertile Crescent. This belt of moderate but adequate rainfall starts at the northwest corner of the Arabian Peninsula and sweeps north inland from the Mediterranean, then curves north and east through the elevated lands at the headwaters of the Tigris-Euphrates rivers, and turns southeast to touch the Persian Gulf. The lands lying generally to the south of this crescent are semi-arid or dry-as-dust desert. They include a large part of the Arabian Peninsula and most of the Tigris-Euphrates valleys. The desert soils in this region are often highly fertile. But without the addition of water they cannot grow the quantities of food needed to support large communities.

The farmer's village and others like it owed their existence to a hard-won answer to a difficult problem.

Here was born the idea of irrigation, in the arc of semi-desert bordering the higher lands of good rainfall. In the Arabian Peninsula and other parts of this semi-arid crescent,

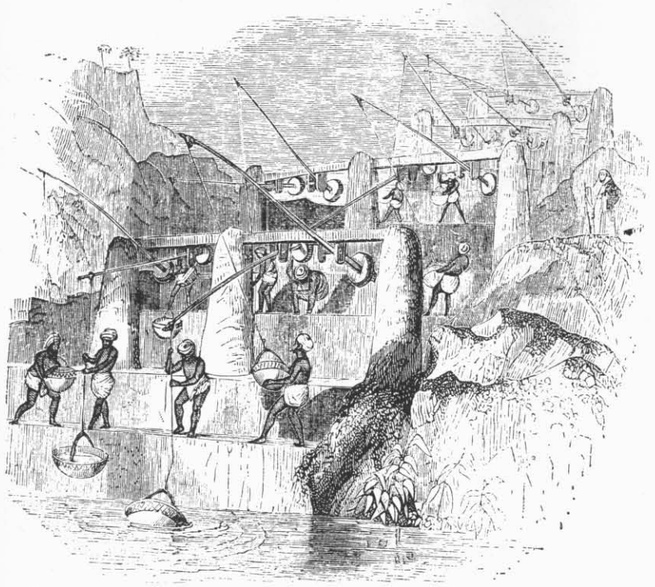
Controlled use of water literally can make the desert bloom. In Saudi Arabia a year-long survey is currently being made with the goal of irrigating 10,000 acres of the Qatif oasis in the Eastern Province. Pictured studying free-flowing wells are survey team members (left to right) Atif Bokhary of the Saudi Arab Government Ministry of Agriculture, Faysal Ruwayha of Aramco's Agricultural Development division, and Martin Fogel, a consultant to Aramco.

it was discovered that terraced plots could be watered by building catch dams and ditches to collect the run-off from a surrounding watershed. This method for adding run-off to scant rainfall was a big step toward the kind of agriculture later developed along desert rivers like the Tigris, Euphrates, Nile and Indus.

Below the site of the farmer's village, the first settlers saw the marshes at the mouth of the Euphrates as the best place to live. The loam soil was rich and deep. There was no lack of sweet water. In fact, there was too much. Drainage ditches and dikes could keep the water off the land in most seasons. But no earthen structure could fully control the worst floods. So the village itself was built as a refuge on a man-made platform of earth. Even this artificial hill could not escape occasional disastrous floods that might come but once a generation. For insurance against this danger an even higher central mound was constructed. It held the common granary and village temple and was a final point of safety and defense against floods or attempts to rob the village of its food reserve.

This ground plan was a necessity for the village, and later for the first cities, which sprang up along the Tigris-Euphrates valleys. Unlike the Nile, whose annual floods are comparatively gentle and easy to live with, the twin rivers went on rampages capable of wiping out the work of years. The stepped mounds, some of which still can be seen there thousands of years later, were an effective answer to the river's grim challenge.

After these early farmers found a way to avoid being drowned by floods, they had to face another problem: How to get enough water on the land in the growing season.



Counterpoised sweeps, known as shadoofs, were used for centuries in lands of the Middle East to raise water step by step from rivers.

On the Tigris-Euphrates the floods came many months before the autumn planting season, the summer months being too hot for field crops. The flood-borne silt benefited the land, but for irrigation purposes the river waters had to be tapped at low stage.

The drained marshes could be irrigated by opening the dikes when high tides backed up the rivers and raised their surface levels above the fields. (The two rivers, today joined in the Shatt-al-'Arab, are thought to have been separate for their full lengths in those days.)

Irrigation by tidal power could be carried on easily by each village working alone. But upstream from tidewater each mile added higher obstacles to small-scale irrigation and demanded large-scale systems. For the next 300-400 miles natural levees line both rivers. Further up, above the levees, the rivers have cut their way below the surrounding plains.

The problem, then as now, was how to get water from the river at low stage over the levees or cut banks to the fertile desert beyond. Bucket-chains, -wheels and -sweeps sufficed for small-scale irrigation and have been used for this purpose into modern times.

The farmer's recent ancestors had devised a further improvement. Silt-deposits have raised the river bed and levees so that even low-water mark is usually above the nearby parched earth. The farmer's forebears saw that a cut in the levee would let gravity take the river water to the desert. The plan worked. To harness the resulting man-made flood, a short canal was dug from the cut in the levee along the higher edge of the area to be farmed. Water from the canal flowed with the land's slight grade through a network of irrigation ditches.

A simple idea. But geography made it immensely important. The desert between the Tigris and Euphrates rivers could now be irrigated by canals linking the rivers. Upstream from the levees, dams could raise the waters to the level of the plains. Such gigantic projects would take the manpower of many villages. They would take new skills in engineering and organization. All that was in the future, yet the possibility could now be seen. Thus the irrigation canal was an essential link in a chain of discoveries which led to a change as big as that from the hunter's wanderings to the settled village of the farmer. From this stage in the accumulation of knowledge, invention, like water running down hill, followed a natural course which gave man a new way of life. In generations to come the first cities were built in the Tigris-Euphrates valleys. With them for the first time came the basic civilized arts: writing, astronomy, calendars, arithmetic, geometry, construction, engineering, architecture, food distribution, law and government.

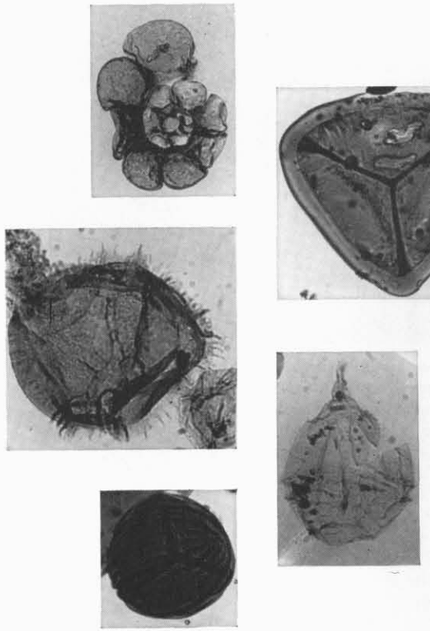
Neither the farmer nor his descendants could imagine the civilized arts which were to crown their pioneering efforts. They could see no further into the future than the need to support a population which increased as much as the food supply allowed. But it was that ever-increasing food supply, won by taming the flood waters, that allowed the famous cities of the Fertile Crescent to prosper — to become, in fact, the "cradle of civilization." ■

In Aramco's Exploration Department laboratory at Dhahran, Saudi Arabia, micropaleontologists D. O. Hemer (foreground) and H. A. McClure and lab assistant Ahmed al-Mana (left) have prepared some 2,000 specimens of microscopic plant spore and pollen fossils for stratigraphic analysis of potential new areas for oil exploration.

The New Science of Palynology

Oil explorers are taking a very close look at the tiny fossil remains of pollen and spores

TINY GRAINS of pollen and spores scattered millions of years ago are aiding the Arabian American Oil Company (Aramco) in its continuous search for new deposits of petroleum. Company oil drillers bring up, embedded in rock cores and cuttings, pollen, spores, and other acid-insoluble fossils such as Hystrichosphaerids and dinoflagellates. These fossils, composed of a cellulose-like material, are highly resistant to biological and chemical decomposition. The rock fragments, recovered from a wide range of depths and locations in Aramco's concession area in Saudi Arabia, find their



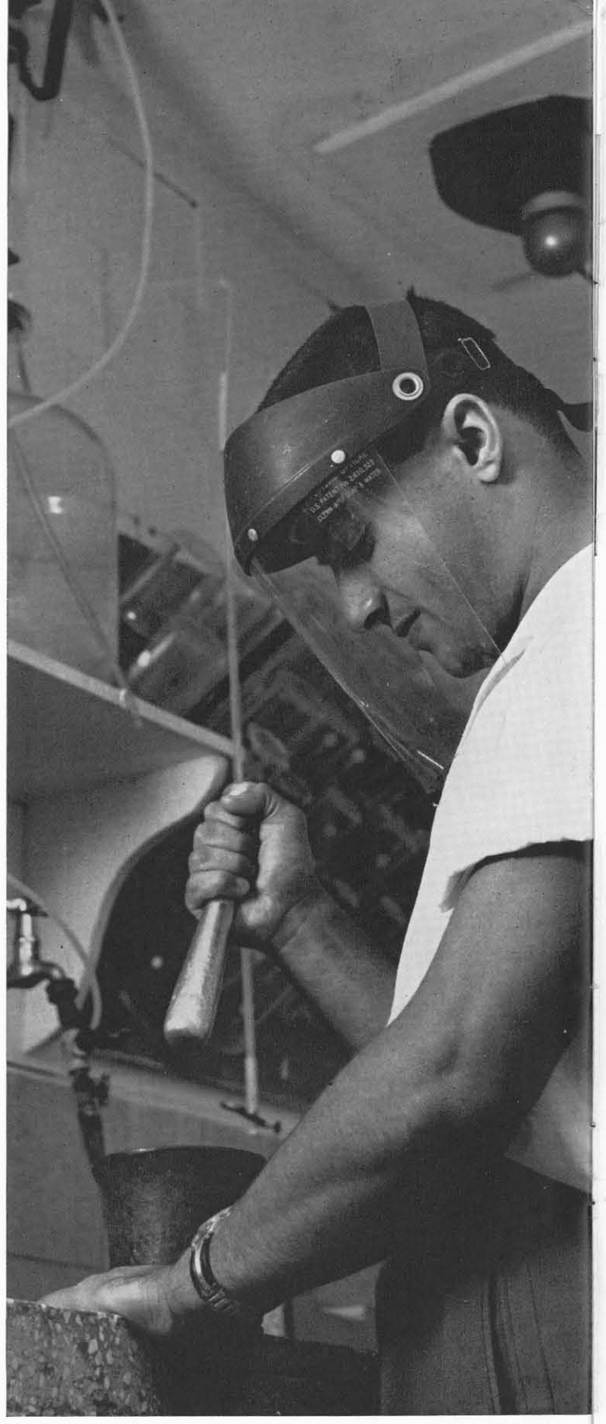
The New Science of Palynology

way to the Exploration Department laboratory specializing in the newest branch of micropaleontology—the science of palynology.

A technician extracts the fossils, about 50 millionths of a meter in size, by an intricate series of steps involving crushing, acid baths, mechanical shaking and repeated separations of residue in a centrifuge. The resulting specimens are then mounted on slides and photographed through a powerful microscope. After being carefully catalogued, the mounted and magnified fossils are ready to be turned over to trained palynologists for interpretation.

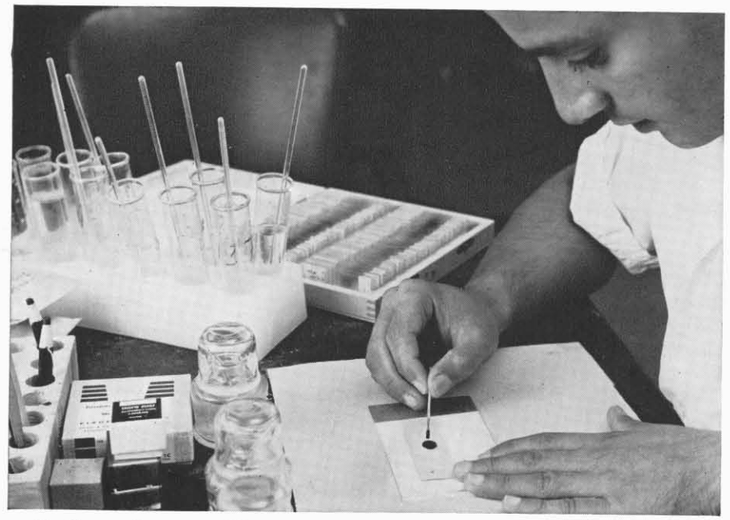
Microfossils studied under high magnification reveal characteristic sizes, shapes and ornamentation which place them into readily recognizable groups. Through experience and by comparing microfossils at hand with illustrative literature and typical examples from the company's collection, Aramco palynologists are able to establish the age of the sediments from which the specimens were taken.

Petroleum geologists are always on the lookout for evidence of ancient shorelines, the sites of most of the world's oil deposits. The palynologist compares recently extracted, acid-insoluble fossils with specimens associated with shallow marine and brackish water sediments where the hunt for oil has been successful. Then, by correlation, he can designate those areas that appear to be most favorable for concentrated oil exploration. ■

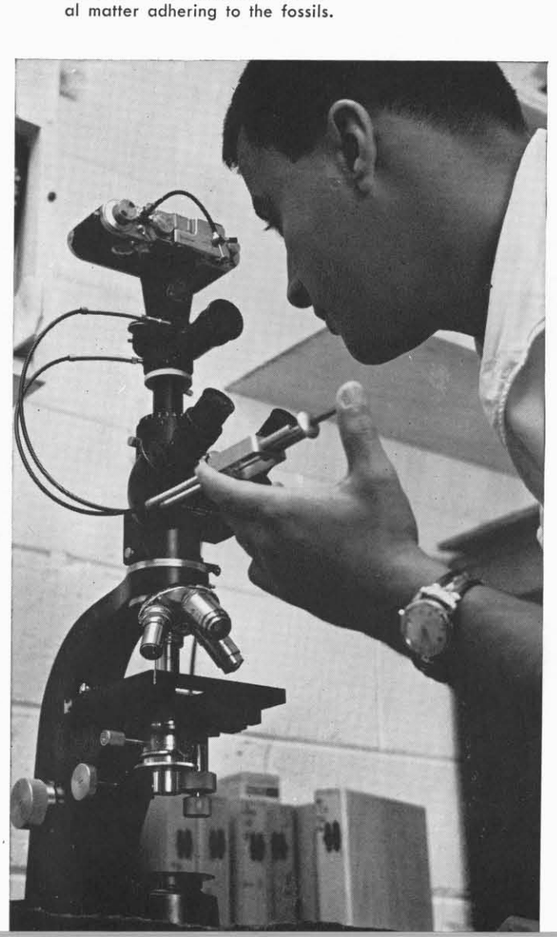


1 Lab assistant Ahmed al-Mana takes the first step in extracting microfossils by crushing rock cores and cuttings with a mortar and pestle. Fossils, as seen at upper left in greatly magnified form, are too small to be harmed by such pounding in the lab.

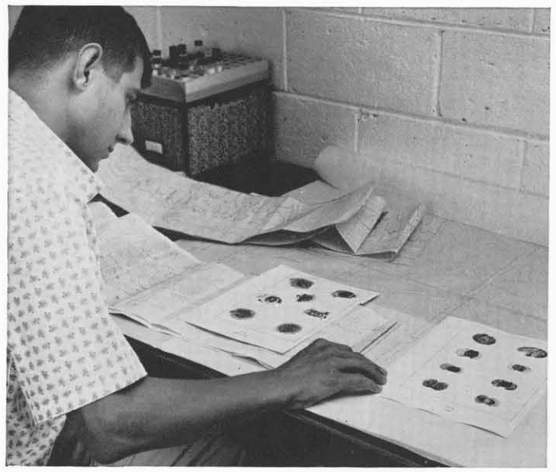
2 Rock particles are then dissolved in acids and processed in centrifuge (top) and ultrasonic generator that uses air waves to aid in releasing tiny particles of mineral matter adhering to the fossils.



3 Next, microscope slides are prepared by placing fossil concentrate in polyvinyl alcohol and gently spreading the combination on a small piece of glass, then dehydrating the contents in an oven and sealing them.



4 Slides that result are photographed through a microscope. Enlarged prints are then cataloged and filed for study.

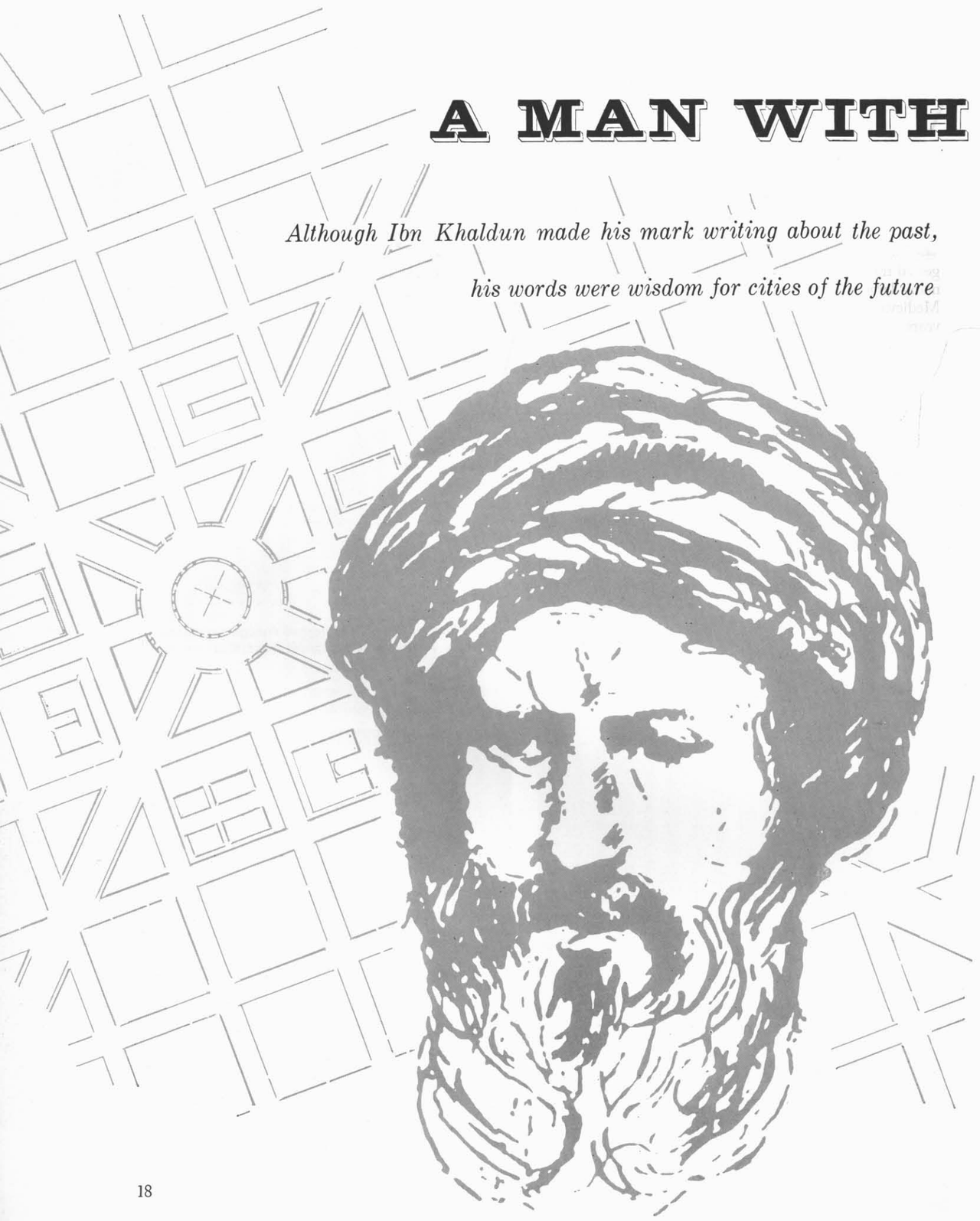


5 Micropaleontologist D. O. Hemer interprets the data obtained from microfossils by correlating the information on drilling logs with enlarged photographs of specimens taken at various depths during Aramco's drilling operations in Saudi Arabia.

A MAN WITH A PLAN

Although Ibn Khaldun made his mark writing about the past,

his words were wisdom for cities of the future



ANYONE who has ever been irritated by honking, congested traffic, the endless sprawl, or the smoke and smog of many large cities around the globe ought to read the old Medieval philosopher Ibn Khaldun of Tunis. Six hundred years ago this renowned Islamic thinker developed some ideas on city planning that remain amazingly pertinent in the twentieth century.

Ibn Khaldun was interested, for example, in the quality of the air blowing through a city. Once while escorting a friend around Gabes in his native province in Tunis, North Africa, he remarked: "Gabes would not be habitable except for the removal of the dense palm grove that used to surround the city. Before then, the air was stagnant because it could not get past the trees. . . . Now that the trees are gone, the air circulates. . . ."

The city planners of Pittsburgh may never have read what Ibn Khaldun said about Gabes. Yet they were acting on his theory when they decided to clear up the smog of the coal and steel works that used to hang heavy over the metropolis at the confluence of the Allegheny and the Monongahela rivers. The circulation of pure air revitalized modern Pittsburgh as it had revitalized Gabes during the Middle Ages. The same principle is being applied today in cities as far apart as Leeds, England, and Kuwait on the Persian Gulf.

The place of Ibn Khaldun in the annals of city planning has never matched his reputation as a historian. He is remembered primarily as a *philosopher of history,* in fact the founder of the subject. Before any other historian of East or West, he undertook to explain systematically the nature of civilizations and the reasons for their rise and fall. Before Montesquieu, he investigated the influence of climate on culture. Before Toynbee, he related universal religions to universal empires.

Perhaps Ibn Khaldun's most remarkable parallel is with Spengler. The late German philosopher of history took it as his fundamental thesis that cultures are like living organisms: they go through a cycle of birth, growth, equilibrium, decay and death.

Ibn Khaldun developed exactly this theory centuries ago. In the *Muqaddimah,* or preface to his *Universal History,* he relates that the life of a city runs a course somewhat analogous to the life of a man. "Reason and tradition show that at the age of forty a human being's growth and strength die down. He ceases to develop and begins to deteriorate. Just so is it with civilized culture, because the natural limit cannot be passed without revealing its effects. The limit varies more widely with cities than with men, but the principle is the same."

Pursuing this idea, Ibn Khaldun was led to the study of cities, perhaps the most significant product of civilized life. He traveled widely in the Islamic world of his time, inspecting every kind of settlement from hamlet to metropolis. He brought back voluminous notes on the splendid cities he visited—Tunis, Cairo, Damascus, Baghdad, Cordova, Seville. He made the pilgrimage to Mecca and paused along the way to gather on-the-spot information about life in the desert villages.

When he sat down in his study to write his great work, the *Muqaddimah,* he knew that much of it must be devoted to city planning. This is the part of his book that seems so up-to-date today.

Ibn Khaldun argues that no city can endure indefinitely at the high-tide of its prosperity. The longer the city lasts, the higher its development, the less active its population

An old idea given new application in Saudi Arabia, city planning is evident in communities of the Eastern Province. An aerial view of Dammam shows numerous houses being built, many under Aramco's Home Loan Plan, wide streets, and schools with recreation area (center).