ARAMCO WORLD
505 PARK AVENUE
NEW YORK, N.Y. 10022
RETURN REQUESTED

Mr. & Mrs. Paul J. Swartz
1612 South Bend Ave.
South Bend 17, Ind.

CSF

BULK RATE
U. S. POSTAGE
PAID
New York, N. Y.
Permit No. 10

ARAMCO WORLD

January—February 1966

How They Find the Oil

ARAMCO WORLD

VOL. 17 No. 1 PUBLISHED BIMONTHLY JANUARY-FEBRUARY 1966

Published by the Arabian American Oil Company, a Corporation, 505 Park Avenue, New York, New York, 10022; T. C. Barger, President; J.J. Johnston, Secretary; E. G. Voss, Treasurer. Paul F. Hoye, Editor. Designed and printed in Beirut, Lebanon, by the Middle East Export Press, Inc. In the United States, all correspondence concerning Aramco World should be addressed to T. O. Phillips, Manager, Public Relations, Arabian American Oil Company, 505 Park Avenue, New York, New York, 10022.

HOW THEY FIND THE OIL

In swamps and jungles, on the high seas, in arid deserts... the search for oil, the long, hard search, goes on and on—1

By Daniel da Cruz

MUSIC IN THE MIDDLE EAST

From the lurching rhythm of the camel's desert stride... a basic beat and the roots of a musical tradition—12

By Afif Alvarez Boulos

CITY OF THE PALMS

An obscure village, it rose to power, wealth and glory... and became Palmyra, the greatest of the caravan cities—16

By Jan van Os

TIME OF TRIAL

Through the quiet hours of the day from dawn to sunset... the fast of Ramadan, a holy, exacting act of worship—18

By Nabih Amin Faris

THE LITTLE 'ID

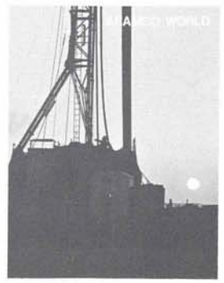
With the glitter of moonlight and the thunder of cannon... the end of a long fast, the beginning of a long feast—21

By Fuad Rayess

SKI LEBANON!

On the huge open slopes high above the Mediterranean... a mountain full of skiers and an avalanche of plans—24

By William Tracy



The cold morning sun of the northeastern Saudi Arabian desert rises on a T-32 stratigraphic drilling rig. Working around the clock, the exploration crew will spend up to three months piercing the earth to levels beyond 10,000 feet before jackknifing the derrick on its trailer to move—along with the mobile city which houses its crew—across the empty desert to a new site a hundred or so miles away.

Photography by Thomas F. Walters

HOW THEY FIND THE OIL

BY DANIEL DA CRUZ

Exploration crews today live and work in gleaming mobile cities equipped with shops, kitchens, dormitories, showers, washing machines and freezers.

When exploration crews set up a new campsite they immediately raise a radio antenna so as to maintain contact with headquarters.

"WANTED: Earth scientist with rugged physique, excellent health, strong nerves and inquiring mind. For outdoor job involving constant travel, exacting work, irregular hours. Those afraid of snakes, jungle fevers, foreigners, frostbite, sunstroke and solitude need not apply."

Anyone answering such an advertisement with complete confidence would be a promising candidate for oil exploration work. If he also happened to be a young man who bounded out of the house without jacket or tie in his haste to answer it he would be nearly the *perfect* candidate, for youth, informality and enthusiasm are valuable qualifications as well in a profession that blends imagination with intense physical and mental activity.

At the present moment there are over 25,000 "explorationists" roaming six continents in an unremitting search for oil. They include geologists, geophysicists, paleontologists, mineralogists, stratigraphers, geochemists, hydrologists and many other specialists. Also today there are proved world-wide oil reserves estimated at about 350 billion barrels already located underground. This would be enough to last more than 30 years—at the present rate of consumption. But oil economists, looking into the future, predict that consumption rates will *not* remain steady. Taking into account population growth, heightened economic activity, rises in the overall standard of living, as well as increased use of petroleum in petrochemicals, new protein food additives and other products, they foresee continuous growth in demand.

A senior vice president of New York's First National City Bank, member of a business fraternity noted for its conservatism, places the annual energy demand growth of the free world at 2½ per cent, and points out that oil and gas supply three-quarters of all energy requirements. The chairman of British Petroleum, speaking before a meeting of the American Petroleum Institute, saw free-world oil demand as doubling by 1980 and increasing another 50 per cent by the year 2000. He warned against complacency over the future supply picture, remarking that "our descendants will be unlikely to thank us if all our geologists, geophysicists and drilling crews take a vacation."

In earlier days oilmen could use relatively simple but wasteful methods of finding oil and getting it out of the ground and still remain in a sound financial condition. Now, even though demand for its products is climbing, fierce competition in the world oil industry leaves little room for the casual operator. Locating oil sources by surface or near-surface indications or by random wildcat drilling is being replaced by ever more sophisticated exploration techniques: subsurface geology, core drilling, deep drilling and geophysics. Even if oil is found, however, there is still no guarantee that the story will have a happy ending. It is vital nowadays for oil industry management to weigh carefully such considerations as the size of a new field and the cost of developing it efficiently, the length of pipe required to connect it to an outlet and the proximity of an adequate shipping port before an exploration man can be certain that the results of his discovery will ever reach the marketplace. The answer to the question no longer rests solely on the existence of oil in a given spot on earth, but on a multitude of economic, political, social and logistical factors which would wrinkle the brow of a horny-handed prospector of old who sought oil with a gleam in his eye, a divining rod in his hand, and unshakable optimism in his heart.

Our old-time prospector went about looking for oil blissfully ignorant of where it came from and the physical laws governing its underground movement. He probably couldn't have cared less. Even today there is no universal agreement as to how petroleum came into being—or when. It is generally acknowledged, however, that oil is found in nearly all ages of rock, going back some 500 million years to the Cambrian Age, when the organic debris of innumerable tiny invertebrate animals or simple vegetable matter carpeted ocean floors. As the layers of dead cells were buried deeper and deeper beneath deposits of sand and ooze, physical and chemical forces still but dimly understood converted part of the organic substances into oil. In some places an overlying deposit of material such as clay, silt, sand or lime effectively sealed in the petroleum.

Though the organic theory of oil's origin is now generally accepted, a minority of geologists still espouse the inorganic theory of petroleum formation. In this view, carbon emanating from the core of the earth, in passing through sedimentary rocks, reacted with the hydrogen and oxygen they contained to produce petroleum, a theory which fits nicely with that of the ancient Greeks who gave the substance its name: *petros*—"rock," and *elaion*—"oil."

In any case, geologists agree that oil can occur in quantities ranging from a few hundred to over 100 billion barrels in a single reservoir, in deposits from a few inches in thickness to more than 1,500 feet (as in Kuwait's Burgan field), and from depths of at least 20,000 feet to the surface of the earth, where the largest known body is the Trinidad pitch lake, which once contained 200 million barrels of tarry oil and asphalt. Petroleum may also occur in sandwich-like strata separated from each other by impermeable rock: Venezuela's West Guara field has 47 such producing strata, one above the other, and there, as elsewhere, the practice has been to drill through low-yield strata, if necessary, to get at the richer ones beneath.

If the same rules applied to science as to politics, in which the majority view usually prevails, the petroleum geologist's lot would be far happier, for the underground oil reservoir's configuration would neatly reflect the layman's impression that it is something akin to an underground swimming pool—larger and deeper certainly, but requiring only a pump of adequate dimensions to drain it dry.

Alas! Like most stereotypes this one has only a germ of truth. Far from being a hollow chamber, the oil reservoir generally is hard sandstone or limestone. This rocky substance, even though solid in appearance, actually has interstices between the separate granules that form it, giving it pore space. These microscopic pores in reservoir rock can contain petroleum in its natural state, much as the pore spaces in an ordinary sponge can hold water.

The three essentials for the underground accumulation of petroleum are a source of oil, a porous and permeable reservoir rock in which it may gather, and an impermeable layer of cap rock to trap it. The impermeable cap rock is the geological analogue of the diving bell which, flaring down and out, sustains the diver with its trapped air. Since petroleum first began to be formed far below the earth's crust it has migrated inexorably upward, slowly and steadily, impelled by the heavier water below. Astronomical quantities may have thus percolated to the surface and evaporated into the atmosphere. Where it comes up against a layer of impervious rock such as shale or anhydrite, for example, its vertical progress may be arrested and if other conditions are right it may accumulate in the underlying reservoir rock and form a "pool." Such "pools" are, of course, the object of the petroleum explorationist's quest.

The active search for crude oil underground dates back little more than a century; before that the stuff was considered pretty much of a nuisance. Oil was doubtless regarded as such by Shadrach, Meshach and Abednego, who were thrust into the "fiery furnace" by King Nebuchadnezzar, fortunately to emerge unsinged. That "furnace," fueled by natural gas seeping out of the ground, probably ignited aeons ago by lightning, burns on today above one of the world's richest oil fields, in Kirkuk, Iraq. Although American Indians used crude oil from surface seeps to caulk their canoes and for medicinal purposes, it wasn't until the second half of the 19th century that science learned that refined petroleum products made excellent fuels, lubricants and illuminants.

In the first rush for oil, explorers searched out surface seeps of crude oil, set up their primitive cable tool rigs, and started drilling, on the reasonable assumption that there must be more where that came from. The results were entirely satisfactory—until the seeps were exhausted. But already a sharp-eyed Canadian named T. Sterry Hunt had been observing the topographical distribution of oil seeps, and had devised a theory to account for them. He noted that many seeps originated on elongated dome-shaped structures and reasoned that if structures were repeated in the rock layers below, like a nest of inverted mixing bowls, then petroleum rising from the depths toward the surface would be trapped under or between these layers. Hunt termed this type of structure an "anticline." There remained this question: where had the seeps come from, if the oil was trapped in the anticline. Simple. It has oozed up through minute cracks in the rock.

In 1888, I. C. White put Hunt's theory to a test by drilling four "wildcats"—wells outside known productive areas—and promptly brought in three producers. Ever since, the anticlinal theory has been a gospel that has lost none of its appeal or validity to exploration geologists. It has worked just as well for the Arabian American Oil Company (Aramco) in comparatively recent times as it did a century ago, when Hunt first propounded it. Saudi Arabia's huge Ghawar field, about the size and shape of Long Island, with oil-bearing strata some 250 feet thick, is a classic example of an oil field that was found on an anticline.

Such well-defined surface anticlines, like the bulge in a gunman's jacket, often betrayed the existence of more anticlines underneath, and these unseeable structures required far more advanced techniques than mere observation to locate. Whereas in the past explorationists had been guided by surface features such as seeps, domes and anticlines, they now began to probe beneath the surface of the earth with instruments, attempting to discern patterns in the structure of the earth's crust which would tell them: "Drill here!"

One of the first really scientific devices perfected in the search for oil was the torsion balance, used as early as 1901 in mapping lake bottoms. Based on Newton's principle that gravitational pull depends on the weight of an object and its distance from the measuring device, the torsion balance was able to map such subterranean features as an anticline because the gravitational pull of the rock at the bottom of the dome, being nearer to the instrument on the surface, was greater than that of the same rock on the anticline's edges. The variations in the gravitational field led geologists not only to anticlines but to lodes of iron ore, which are heavier than the surrounding stone, and to salt domes, which are relatively light.

The discovery of salt domes by gravimetry turned out to be a profitable application of the method. Salt will flow plastically under differential pressure and thrust itself upward through a weak spot in the overlying rocks. Following the formation of these salt domes, migrating petroleum often is trapped on the flanks and beneath impermeable rocks capping the dome. Oilmen have exploited this phenomenon by drilling above and on the periphery of salt plugs, some of which are miles in diameter, and discovering oil fields. The gravity meter (a refinement of the torsion balance) is now allied with a new generation of instruments, including the airborne magnetometer. This instrument points like a large finger from the tail of an aircraft and can map the magnetic field of hundreds of miles of terrain a day without exposing the crew to so much as a mosquito bite.

With field parties which seek to fathom the earth's mysteries by sonic and electronic methods, however, it's quite another story. On wide-swept deserts they must apply the same concentration, the same scientific approach that more comfortable men practice in quiet, dust-free laboratories. Somewhere in the world at this moment oil explorationists are wading knee-deep in steamy marshes, rolling across the desert in trucks loaded with high explosives, paying out cable from the stern of seismic ships in rough seas, flying precise patterns over empty veldt, or just swatting ineffectually at swarms of voracious sand flies.

It's almost becoming an aphorism among veteran petroleum geologists now that oil exploration never stands still. Practitioners are forever probing new locations and trying new techniques. Consider as one instance the present scope of exploration: where once efforts were concentrated on promising areas like Texas and Venezuela and the Middle East, the search for petroleum has extended to the ends of the earth, not excluding the high seas. Where once the geologist needed little more direction than the axiom, "Find the anticline and drill," he now has to be able to distinguish fault traps, lenses, pinch-outs, reefs (oddly enough, just what the term suggests—ancient coral reefs whose pores provide an excellent habitat for oil), stratigraphic traps, unconformities and combination traps, none of which, of course, are visible on the surface. The new concepts, in a sense, are simply an extension of Hunt's fundamental thesis that for oil to accumulate there must be a permeable reservoir rock and, above it, an impermeable cap rock. The irony is that despite a quantum jump in our knowledge of subsurface geology since early in this century we still have no surefire way of knowing whether a promising trap actually contains oil except to drill into it.

Because there are no sure answers, the explorationist never stops asking questions. Better than anyone else he knows that only one out of ten wildcats drilled today will yield petroleum in commercial quantities. He knows too that a wildcat 6,500 feet deep will cost an average of $200,000 in the United States. In the Middle East the

cost would run more than twice that figure. Simple arithmetic, therefore, dictates caution, a hedging of bets, the use of every weapon in his arsenal of exploration tools, for massive failure could spell corporate hard times.

The search for oil today begins, prosaically enough, in the research library, where all available literature on the area to be prospected is combed for clues which may elucidate the chosen region's geology. In the United States the next step is to obtain exploration leases in the area; in foreign lands this process often becomes a full-scale diplomatic operation, requiring adequate compensation to the host nation in return for an exploration concession, and development rights if oil should be found. Geologists, cartographers, aerial photographers, magnetic and gravity survey teams are then mobilized, often working simultaneously in their special fields to obtain a broad picture of the geological character of the surface and what lies below, which will serve as a guide for the more intensive exploration that follows.

The search for petroleum has become so sophisticated a science that many oil companies engage outside specialists to supplement their own exploration efforts. One such survey organization has been exploring for Aramco the flat, almost featureless northeast corner of Saudi Arabia. Backed by the oil company's logistical support, the team of 12 Americans and 62 Saudi Arabs comprises a close-knit group that works seven days a week at such a rapid clip that its mobile camp must be moved every few days merely to keep within commuting distance of the work at hand.

It is hard to conceive of more grueling, lonely labor anywhere. The desert in this part of Arabia offers limitless plains of stone-strewn, tight-packed sand, interrupted here and there by patches of low scrub, and absolutely nothing else, from horizon to horizon, but hot wind and relentless sun. The survey organization's mission can be simply stated: go out into this empty desert and come back with a series of accurate cross sections, or profiles, of the subsurface structure along straight lines stretching almost (it must seem at times to them) to infinity.

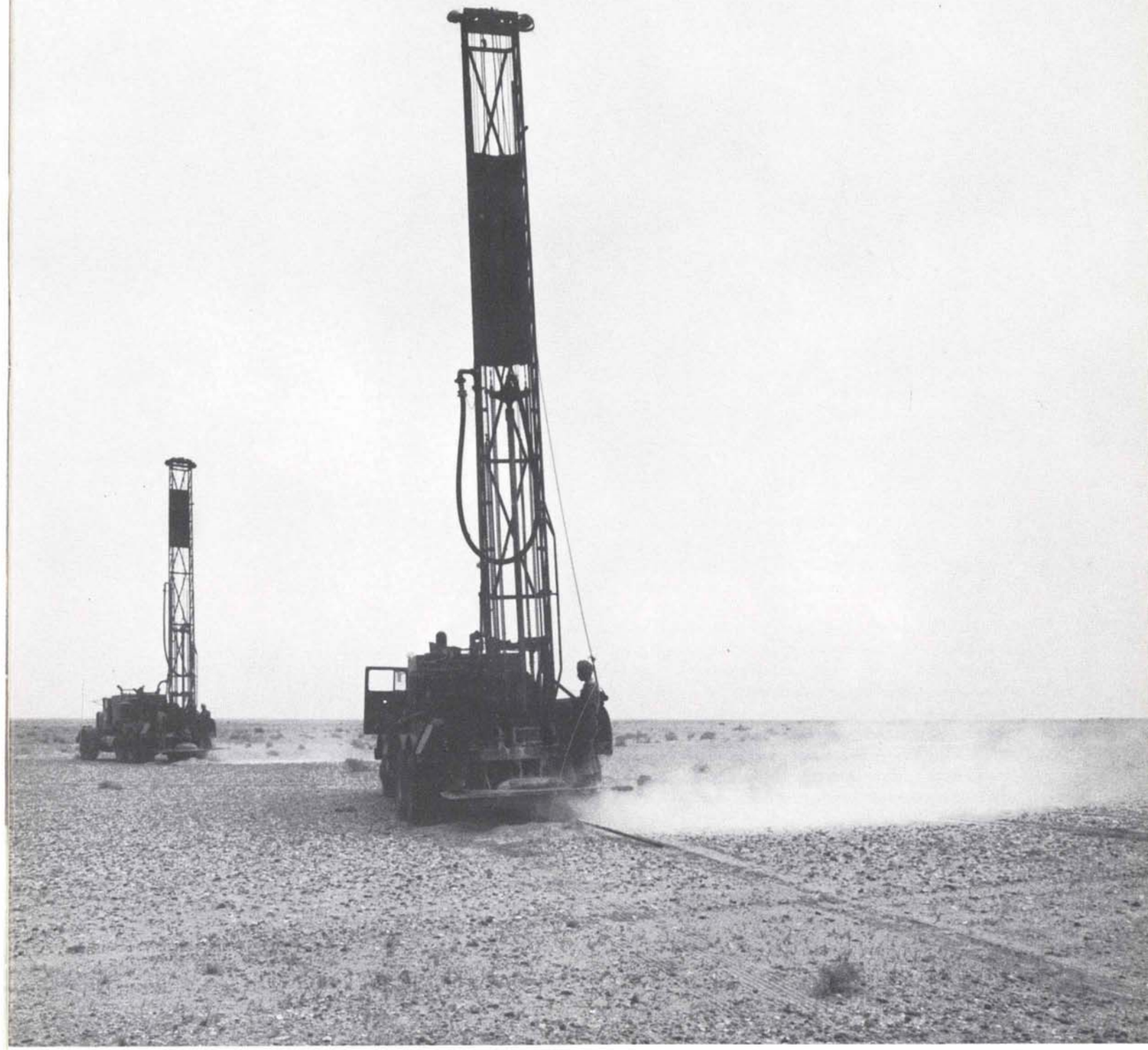
There being initially no lines, straight or otherwise, to follow, it is the duty of the surveyor to provide one. The survey party is the first out in the morning in a four-wheel-drive truck, speeding up the line to the last stake it planted the day before. The surveyor hauls out his transit, his rodman and other assistants hurry forward, and so begins a day that will see them lay out markers some 30,000 feet along lines which when tied to other lines will describe a series of quadrangles whose sides must have a linear accuracy of better than 999 parts in 1,000. Elevations, sometimes carried for 100 miles without the points, must be just as close. Each day takes the surveyors farther from camp, so that by the time the camp is finally moved up to the vicinity of their last stake they may have to drive back and forth some 60 miles a day each way without, however, having to worry about the traffic.

Behind the surveyors, moving at a more ponderous pace, lumber three large truck-mounted drilling rigs. At intervals of 3,600 feet they stop 110 feet apart, raise their masts, and bore 90 feet into the earth, using blasts of air to cool their bits and disperse the cuttings. They don't tarry long. Usually within an hour they have lowered their masts and moved on to the next location marked by the surveyors, leaving behind three neat holes in the desert floor and a set of tire tracks soon to be obliterated by the wind.

Long after the drillers have vanished over the horizon the seismograph crew pulls up and begins to unload at each hole sacks of what appears to be fertilizer. Actually it *is* fertilizer—ammonium nitrate—but after 50 pounds of the substance are sprayed with one gallon of diesel oil the mixture becomes highly explosive. The shooter carefully inserts an electric blasting cap into a can of blasting agent primer, wires three more powder cans to it, and lowers the string to the bottom of the hole by means of the electric wire which will detonate the charge. Then he pours three sacks—150 pounds—of the loose explosive into each hole on top of the primer charge, adds a few buckets of sand as ballast, and finally attaches his three wires to the firing mechanism in his truck.

Meanwhile, others in the seismograph party have been working on a line parallel to the shot holes, laying down a string of geophones. Using the seismograph truck as their point of reference (it is parked opposite the middle shot hole, 450 feet away), the crew sets groups of geophones on the ground at hundred-yard intervals in each direction from the truck, so that the extreme ends of the line are 7,200 feet apart. In effect, they have rigged 24 separate groups of receivers, all able to feed any signals they receive back to the seismograph truck in the middle of the string. When all the receivers are ready for the shot, the shooter signals his men for silence, for geophones are so sensitive that even a herd of goats grazing 500 feet away can produce distorting sound waves. At a nod the shooter presses his plunger and a muffled *boom*! stirs the earth underfoot. Four seconds later, the goats may safely graze once more.

Minutes pass before the door of the seismograph truck, a vehicle crammed with $150,000 worth of electronic equipment and a single arresting pinup picture, swings open and the operator holds up his thumb to indicate a perfect shot, in the other hand displaying a limp strip of photographic paper representing four seconds in the life of a shock wave. Fresh from the developing solution, the strip is a hand's breadth wide and about the length of the one that got away. It is crowded from one end to the other with irregular wavy lines. At the end of an average day the seismograph crew will have six or seven such seismograph

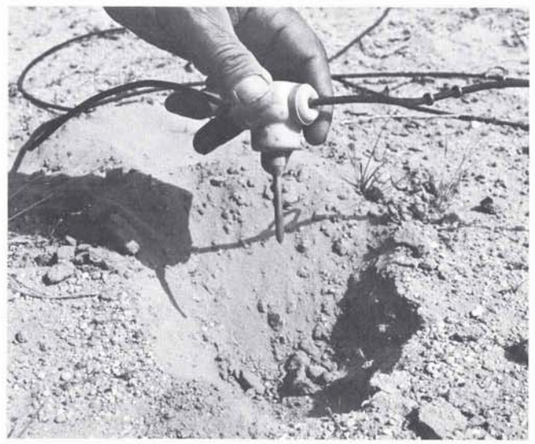


Truck-mounted drilling rigs, whose masts fold down over the cab when truck is in motion, follow on the heels of survey parties and at regular intervals drill "shot holes" for explosive charges.

Third in line after surveyors and drillers is shooter E. W. Taylor, who attaches electric wire to a charge of Nitromon prior to lowering charge and wire into the shot hole.

traces, and these wavy lines on strips of photosensitive paper are why the crew is there.

Moving along up to five miles a day, the seismograph crew sets off explosive charges that ignite simultaneously and send shock waves deep into the crust of the earth, which then rebound upward from each successive layer of rock encountered, to be recorded one by one as they reach the surface and the geophones. To the layman the wavy lines are an utter, unintelligible mishmash. They are little more to the geophysicist until the "noise" has been removed. For it must be noted that since shock waves are propagated in all directions, some of them race from the shot holes directly across the intervening topsoil to the geophones during the short interval that other waves are penetrating into the earth and echoing back from as far as 20,000 to 30,000 feet down. The horizontal "noise" waves tell the geophysicist nothing he wants to know, and elaborate means, including the use of data processing computers, are invoked to remove their traces.



A crewman plants a "geophone" in the ground to eliminate the noise of the wind.

What is left, provided interpretation is expert, is a pattern of up to six significant reflections, each representing a reflecting stratum of rock. When plotted on graph paper the results of the shot will appear as a 3,600-foot cross section of the earth, as much as four miles deep, along the surveyor's line.

Variations in seismographic technique are enormous, and most of them are designed to reduce surface noises by a suitable combination of shot pattern and geophone array. The vexatious variable that complicates this task is the speed of shock waves, which depends mainly upon the density of the substance through which it travels: about 1,100 feet per second in air, from 6,000 to 8,000 fps in compacted soil near the surface, and up to 18,000 fps in limestone, to list a few of the media encountered. The problem of interpretation would be eased considerably if the velocities of the first 500 to 800 feet of the subsurface were known. Seismic explorers attempt to bridge this knowledge gap by drilling 300-foot holes and shooting to determine the "near-surface velocity."

Even if reflection seismography were a flawless technique it would tell the geologist no more than at what levels, down to approximately four miles, he would expect to find the principal formations in which, hopefully, oil is trapped. He would learn much about the geological structure but next to nothing about the geological composition of the area he was investigating, including, of course, the possible presence of petroleum-bearing formations.

After a charge is fired observers check record of shock wave left on sensitized paper.

To fill in the gaps in the seismologist's geological model, therefore, geologists have recourse to structure and stratigraphic drilling. Structure drilling, which calls for wells one to 20 miles apart, goes only to relatively shallow depths of 500 to 3,000 feet, seeking key horizons or strata which will indicate the deeper structure. Stratigraphic wells search for lithologic data from deeper horizons, of 12,000 feet or beyond, and are spaced farther apart than in the case of structure drilling.

At "Strat Five," a stratigraphic rig that has been drilling near the Saudi Arabia-Iraq Neutral Zone, the primary purpose of the well, as in all stratigraphic wells, is to discover the lithologic character of all rock units at the point being drilled, and to note the differences in composition and texture of potential reservoir rocks to obtain trends in those which are improving.

At the well site, as the drilling bit passed the 11,200-foot mark, the drilling foreman of Strat Five explained the procedure. "In areas of interest we take 60-foot cores which are analyzed by the geologist on the spot and then taken to our Oil Operations Laboratory in Dhahran where core plugs are cut out and tested for permeability and porosity. This gives us a pretty good idea of the composition of the subsurface at various levels. Between coring runs, of course, we screen out cuttings from the drilling mud, which is pumped down through the bit, lubricating and cooling it, then back up to the surface. Microscopic examination of these samples provides sort of a moving picture of the material through which we're drilling."

Some of the most vital information to come out of a stratigraphic well is obtained by logging, an inch-by-inch examination of the hole by means of mechanical and electric instruments. The quantity and variety of useful data made available by logs is enormous. Electronic gear lowered by cable into the hole measures the electrical self-potential, resistivity and other characteristics of the rocks penetrated by the drill, from which it is possible to calculate the rocks' porosity and the nature of reservoir fluids present. Radioactivity logging, in use for only about 25 years, has the advantage of being able to bring out useful information through several layers of steel casing, or even through cement. Gamma-ray logging, one variety of this relatively new branch, takes advantage of the fact that all rocks contain varying amounts of radioactive material; the information it provides is similar to that obtained by lithologic logging. Since shales generally have more radioactive material in them than do sandstone or limestone, presence of the former type of rock is revealed in the gamma-ray curve. In a second variety of radioactivity logging, an artifically-induced bombardment of wall rocks within a well bore produces a neutron curve which reveals the presence of liquids in the surrounding rock and therefore acts as a kind of porosity log.

The men on a stratigraphic crew are fortunate. They can walk to the rig from their living quarters, and gen-

erally have less of a gypsy existence than their colleagues on seismographic crews. On Strat Five, the crew may be on one location for as long as two and a half months, working around the clock, to complete the stratigraphic well and the shallow well necessary to supply water for the drilling operation.

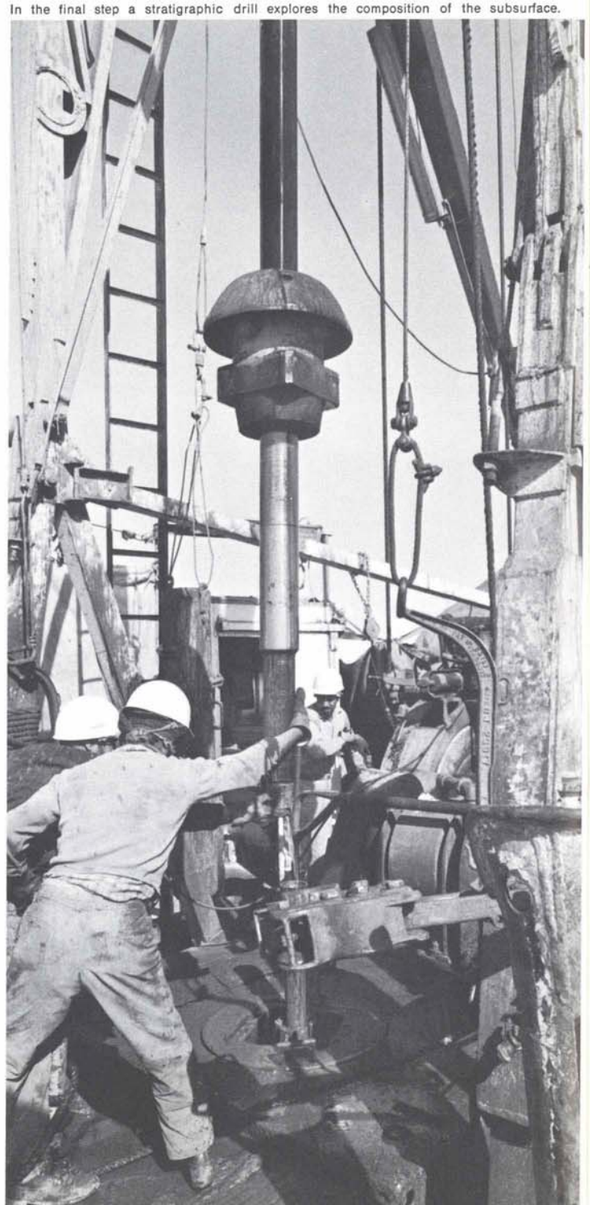
Sun-darkened, dehydrated, isolated and eye-sore from wind-blown sand, the drillers and seismograph crews find relative comfort in their camps at the end of a day's work. Sometimes a seismo truck doesn't quite make it and spends the night wandering up and down the desert looking for the twinkle of light that means home. Usually, however, crew members get in by the last light of day, shower away the accumulated dust and fatigue, and gather in the air conditioned (desert shade temperatures can soar to 125° F.) dining trailers. Over plain but expertly-cooked fare, the table talk is an easy blend of the day's problems, reminiscences of home and family, and recollections of possibly amusing, perhaps hair-raising experiences on assignment in faraway lands—Sumatra, Borneo, Mexico and Brazil, Africa or the Canadian Arctic. But the talk is brief because these are bone-weary men, and dawn and another round of hard work suddenly seem very near. In ones and twos they drift off to their bunk trailers to think solitary thoughts before they fall asleep, of their next vacation near rivers and green forests, or perhaps of a camp move on the morrow, which will leave their present site as achingly empty as it had been before they came there.

Many believe that all the great fields of the world have already been discovered. As early as 1650 Rumania was producing oil. Russia's Baku fields go back to 1871, Mexico's to the 1880's, Texas' Spindletop to 1901, Kuwait's and Saudi Arabia's to 1938. Some of the most important newer sources of oil were located in Libya, Algeria and Nigeria in the 1950's. Veteran petroleum consultant B. W. Beebe might have had all these in mind when he said, "Oil and gas are not found by flashes of genius but are the product of rigorous observation and tenacious, dogged, often dreary work and study." The frenetic activity all over the world of structure drill and stratigraphic crews and seismographic teams certainly bears him out. Each new field, however, means not only more oil for now, but a contracting world in which the explorationist must exercise his unique talents, a stiffer challenge to him to discover oil in places where it has never been thought to exist before.

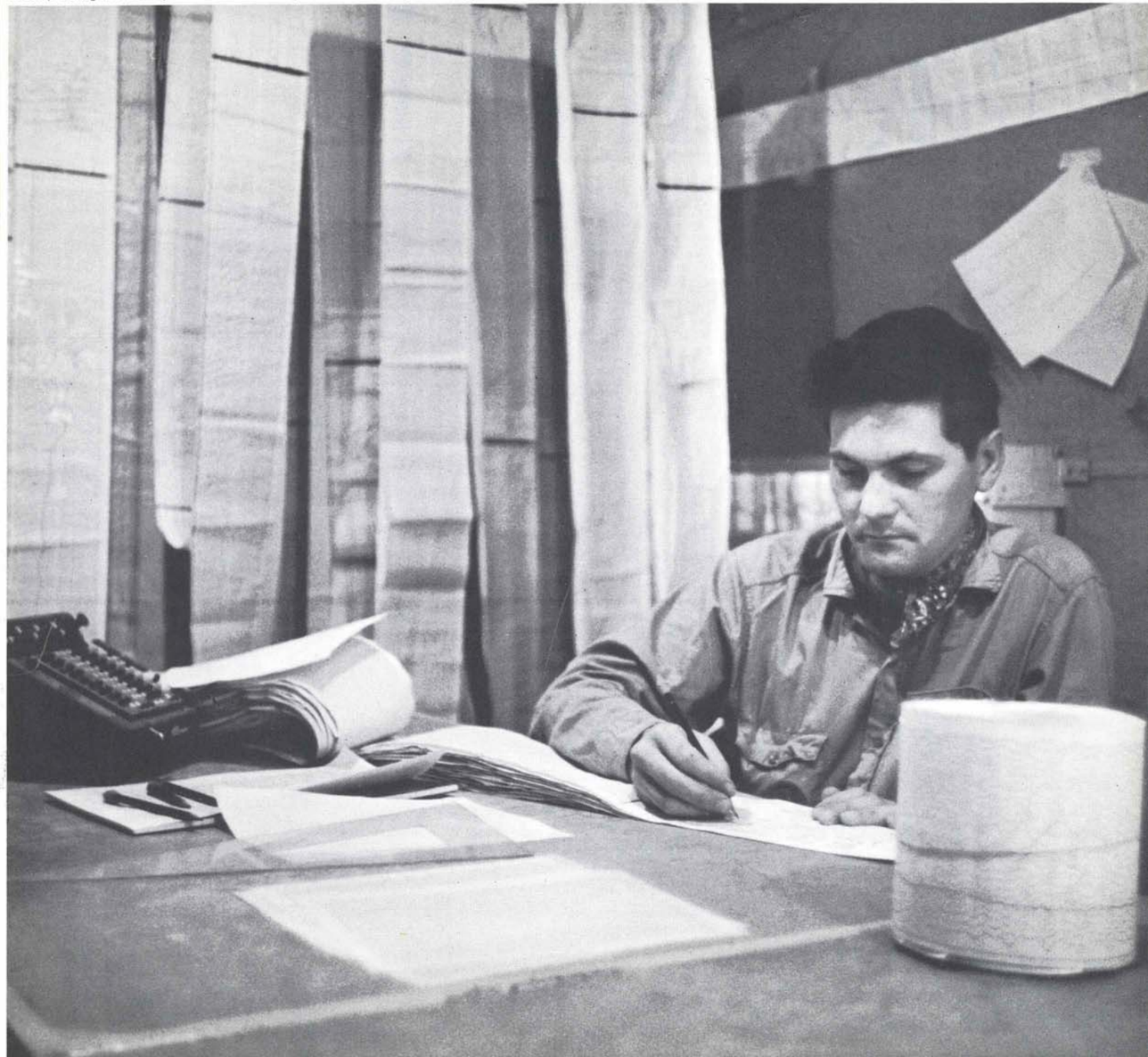
To all of which the oil explorationist, a man of boundless faith, has but one answer: "If it's there—we'll find it."

Daniel da Cruz is a regular contributor to Aramco World *and other Middle East publications.*

In the final step a stratigraphic drill explores the composition of the subsurface.

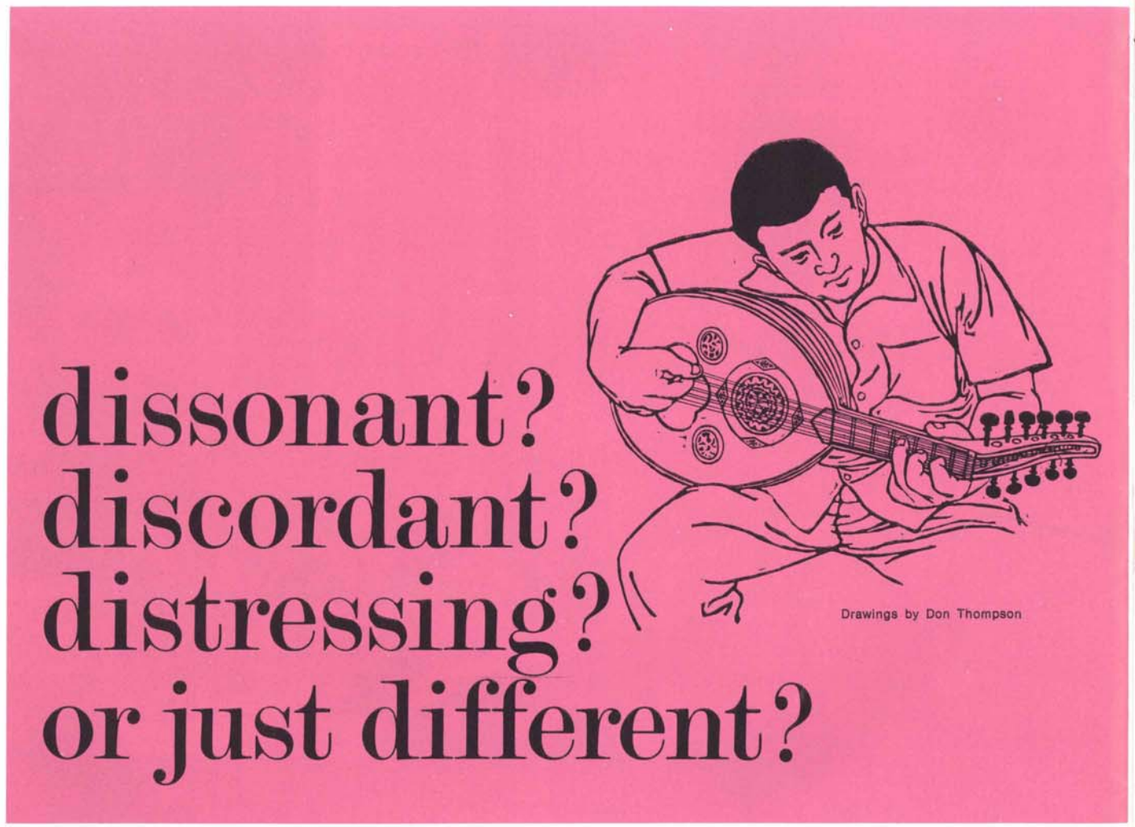


In camp during the evening the records of the day's seismic shooting, including the number, size, depth and configuration of shot holes and the elevations of geophones, are carefully combined.



BY AFIF ALVAREZ BOULOS

MUSIC IN THE MIDDLE EAST



Hearing presumably "exotic" music for the first time in the Middle East, the average listener from the Western world is inclined to confuse it with the keening of banshees, the howling of cats or the off-pitch gropings of a child's first piano lesson. Indeed, the contrasts between Western and Arab music are so pronounced that if both didn't produce patterns of sound, Westerners might well consider them separate art forms.

Arab music is definitely different. To ears attuned to the melodic blandness of ballads or waltzes it probably does sound harsh, discordant and monotonous and there is no denying that it has a certain high, wailing quality that is often unbearable. Songs, furthermore, seem to be unvaryingly mournful, tremulous, loud and endless.

If such reactions are understandable, however, they are also slightly unfair, and more than slightly uninformed. They fail to consider that musical idioms are as different as languages and that if they can't be understood they can't be appreciated. The differences in Arab music, the feeling, for example, that somehow it is a bit "off," are not accidental. They don't occur because Arab composers are unaware of harmony or because, say, the flutist can't read music. They occur because the Arab octave is divided into quarter tones rather than half tones, which is the way that seems logical and natural to the Westerner; because melody—still structured like 18th-century European melodies—is usually stressed at the expense of all but the most

primitive harmony, thus lending that peculiarly flat, atonal quality that is so distressing to Western ears. There are equally good explanations for the content and the length of songs too and even for the way they are presented, reasons that go back to an era when Eastern music, not Western, reigned supreme in the world.

Arab musicologists can trace their own folk forms back to the Bedouins of ancient times, whose simple caravan song—the *huda*—cheered their desert treks. Its *rajaz* meter—said to correspond to the rhythm of the camel's lurching stride—consists of six metrical feet each of which comprises two longs, a short, and an accentuated long and is regarded as the prototype of all Arabic meters. The first written record of Arab music, however, is a 7th-century B.C. Assyrian inscription which tells of Arab prisoners' songs of toil which caught their masters' fancy, and made them ask for more.

Probably the traditional emphasis of Arab music on the solo voice stems from the nomadic character of Arab life, the loneliness and tribal mobility which made any ensemble music, requiring a fixed urban abode, an impossibility. So, too, did the itinerant life lead to the development of light, portable musical instruments instead of pianos, sousaphones or pipe organs. The kettledrum and *shawm*—a double-reeded oboe-like instrument capable of a deafening blast—were distributed throughout the Mediterranean littoral in the wake of the Muslim conquest, as was the lute, an Arab forerunner of fretted instruments such as the guitar and violin which were introduced by the Arabs into Europe in the 13th century. Other Middle Eastern borrowings include the three-stringed rebec (Arabic: *rebab*), the flute (which goes back to predynastic Egypt) and the bagpipe, which first appeared in Syria and Alexandria shortly after the beginning of the Christian era.

The exact form of Arab music prior to the 13th century, when the first indigenous musical notation appears, has been a subject of speculation and reconstruction by experts. But since that time the structure and rhythmic patterns of Arab music have been codified and, to a great extent, solidified by custom. During this period, systems of melodic and rhythmic modes came into use. The melody type, called by its present name *maqam*, was of a prescribed and distinctive scale, a certain register and compass, one or more principal notes, and typical melodic phrases. By the 13th century there were 12 such primary modes. While the *maqam* dictated melodic development, the *iqa'* controlled the rhythmic organization of the music. In the 19th century there were eight such measures, based on alternations of a hollow percussive sound usually of low pitch and a dry staccato sound of higher pitch. These were beaten out on the drum, tambourine, and the tiny kettledrums called the *naggarat*.

The importance of rhythm in Arab music has always been accentuated by the fact that music among the Arabs is more of a collective than an individual experience, with the rhythms brought to life by the movements of the singer. It is possible for Arabs to enjoy their music in solitude on records or from the radio, of course, but infinitely more desirable is the public performance in which the atmosphere of the place can soak in, so to speak, along with the music. In the 10th century, according to historical accounts, this custom had already taken hold, although in a rather restrained manner. At concerts given in the home of a singer named Azza al-Maila in Damascus, for example, the behavior of the audience was most decorous, demonstrations of appreciation during the performance being severely frowned upon. If anyone so far lost himself as to lean over and whisper a comment to his neighbor, an attendant with a long stick would summarily rap the offender's knuckles.

Not so in modern times. In the open gardens under the stars where much of the Middle East's music is heard on balmy summer nights, the audience is not only permitted but expected to give vent to its feelings. Nor does the audience wait for the end of a selection, but bursts forth with applause and shouts of appreciation whenever the finesse of execution of any musical figure demands it.

Modern times have also brought less fortunate changes to the fore. With the expansion of Western influences, Arab music, like Arab architecture, has begun to change. An analysis of modern Arab music would show an unattractive accumulation of inappropriate snippets from both classical and popular European compositions and clumsy efforts to employ harmony—without even a sure knowledge of harmony. It is a far cry from the judicious, artistic borrowings of Arab composers who, in the eighth, ninth and tenth centuries, were able to find in other cultures elements that blended with, rather than clashed with, the national melodic idiom, and who, consequently, were able to develop a strain which was pure and uncorrupted and which still provides the basis for the best of Arab music today: the songs of the late Sayyid Darwish, the older songs of such greats as Um-Kulthum and Abdul Wahab, the earlier songs of Fairouz, almost everything sung by Sabah and the folk songs still heard everywhere in the Arab world.

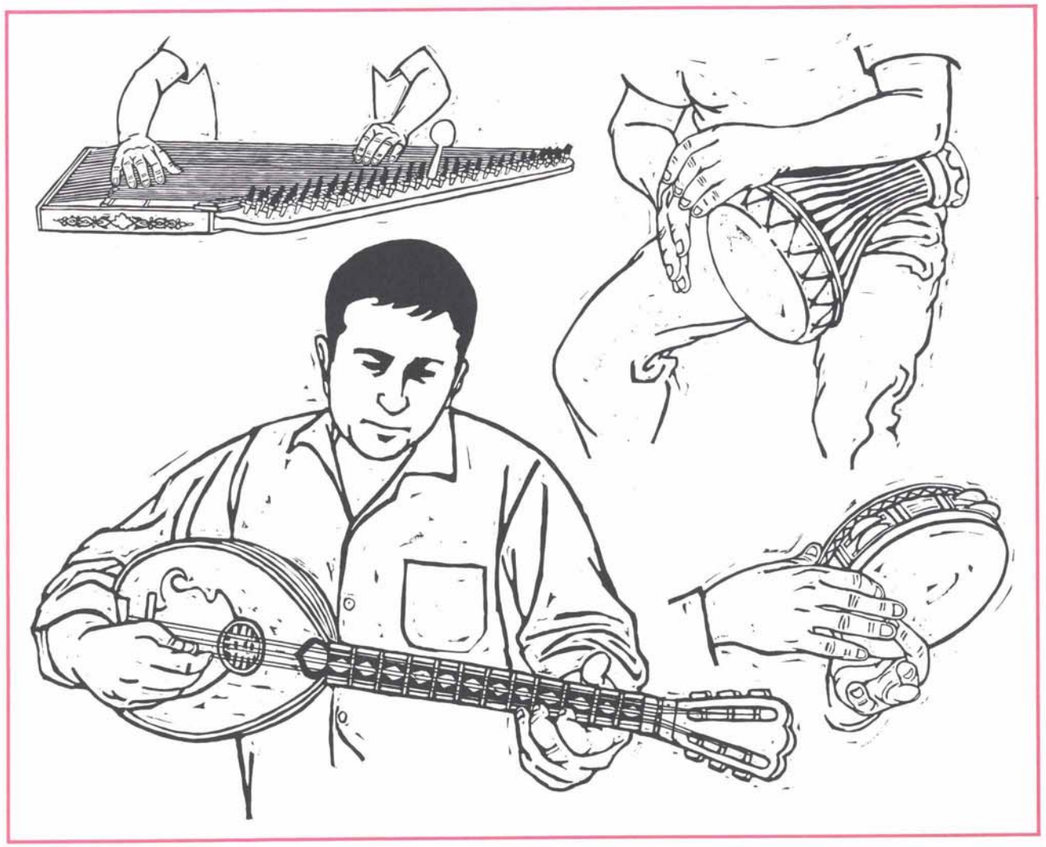
Curiously, it is precisely these songs—and most Arab music is vocal—that are the hardest for the uninitiated to appreciate, and for good reasons. For one thing, they are sung in a foreign language that is incomprehensible to most visitors, a language, moreover, with an abundance of laryngeal and pharyngeal sounds that constrict the throat and tighten the vocal cords with possibly haunting yet almost inevitably jarring results. For another thing few Westerners ever really know just what is going on, or realize that typical performances follow a prescribed, almost ritualistic form that is as essential as the quality of the singer.

A typical song will begin with *taqasim* (improvisations) on the *'ud* (the forerunner of the lute, from which that instrument's name also derives) in the scale or *maqam* in which the song is written. Western listeners usually enjoy this passage, which is similar to a guitar solo. This will be followed by an orchestral prelude in which every instrument on the stage will join. Since there won't be a trace of harmony among the instruments this may evoke a somewhat less favorable impression on Western ears. Thus introduced, the singer improvises on the *ya layl* (O! Night!) theme, in which the only words heard are *ya layl*. From the artistry shown in executing this "cadenza" the experienced listener can gauge the skill and the beauty of the voice. Finally the singer embarks on the central theme of the song, which may have the form of a long ode (or *qasida*), a *muwashah* (lyric poetry developed in Andalusia) or a simple strophic lyric called the *daur*, with the full orchestra playing in accompaniment.

The orchestra, called *takht* (seat) in Arabic, that accompanies the singer, can range from three to thirty instruments, and generally gives the singer a breather by playing a refrain after each long vocal recitative. Besides the *'ud* the instruments include the *qanun*, a zither-like fretted instrument trapezoidal in shape, with 24 strings; the *santur*, a species of dulcimer; the *nay*, a vertical flute; percussion instruments such as the *daff* (tambourine), *tabl* (drum) and the *riq*; and such Western innovations as the piano, violin, and accordion, introduced to the orchestra in recent times along with the inevitable microphone and loudspeaker system which amplify the sound to the satisfyingly bravura level favored by most Arab audiences.

Arab music is definitely an acquired taste for Western music lovers, who, in trying to decide how to react to it, might do well to recall a story about al-Farabi. On one occasion, so the story goes, al-Farabi in playing the *'ud* by his first mode made his listeners laugh, then by changing his mode brought tears to their eyes, and by yet a third mode sent them all into a deep sleep, whereupon he left them. There indeed is a broad range of possible reactions. One of them should fit.

Afif Alvarez Boulos, founder of the Beirut Orpheus Choir, studied music in Lebanon and Italy, is an associate of the Royal College of Music in London and holds a Ph.D. in music from Harvard University. A lifelong student of both Arab and Western music, he has lectured throughout the Middle East, England and the United States.



CITY OF THE PALMS

Photography by Thomas F. Walters

The triumphal arch, right, the colonnade, left, and, above, a huge Arab castle.

Part of Palmyra's main boulevard and its towering columns, 150 of which are still standing today.

The temple of Baal-Shamin—a small, handsome and well-preserved monument.

General view of Palmyra from the northeast, with the great Temple of Baal in the background.

BY JAN VAN OS

After 16 centuries the caravans are coming again to Palmyra.

They are not the caravans of old—composed of heavily-laden camels stalking ponderously over the Syrian desert with the silks and spices of the East. They are made up of automobiles and buses speeding swiftly across the sands from Homs, Aleppo and Damascus. Instead of the treasures of the East they carry visitors from the West—visitors anxious to see and explore the ruins of what, for a short time 1,600 years ago, was the central city of one of the most powerful states in the Middle East and the greatest of the "caravan cities" that rose along the ancient trade routes.

Palmyra—the "City of the Palms"—was the name given by the Romans to a small oasis village called Tadmor. The village had been founded about 2000 B.C. and for a thousand years had existed in peaceful obscurity. Sometime between 972 and 932 B.C. the famous King Solomon recognized its strategic and economic potential—it lay on the shortest possible route between Mesopotamia and the Mediterranean—and began to pour money into fortifications and expansion. With the rise of Rome and Parthia, Palmyra, conveniently located between them, began a swift climb to prominence as the point where the two hostile powers could peacefully exchange goods. Later Palmyra was taken under the Roman wing as a tributary state, became, under the Emperor Hadrian, a "free city" and, in 212, achieved the preferred status of "colony," which meant that Palmyra was regarded as a trusted friend and, perhaps more importantly, could profit substantially from its flourishing trade with China and the Indies. It became a commercial and financial center of great importance and a city of 30,000 inhabitants known throughout the region for fine temples, roads and villas.

In the latter half of the third century, however, things changed. Zenobia, the famous Arab queen, an intelligent, beautiful and, above all, ambitious, woman, came to power and unwisely challenged Rome by sending her armies to conquer Mesopotamia, Syria and, with Zenobia herself leading them, even Egypt. Emboldened by success, she proclaimed her son an emperor, a step that soon brought Roman legions to Palmyra's gates to capture her, crush her armies and reduce Palmyra to the status of a Roman garrison.

Zenobia's rule marked the apex of Palmyran glory. With her defeat and exile—to a pleasant pensioned life in Rome—Palmyra began to decline. As the years went by the city was shaken by the collapse of its caravan trade and then by the subsequent fall of the Roman Empire itself. The city knew moderate prosperity under the Muslims but after the 15th century, when savage Mongols under Tamerlane sacked it, and after several earthquakes, it slipped into obscurity and vanished under the sands, its only inhabitants a few farmers and some Bedouins who made their camp in what once had been the great court of the temple of Baal.

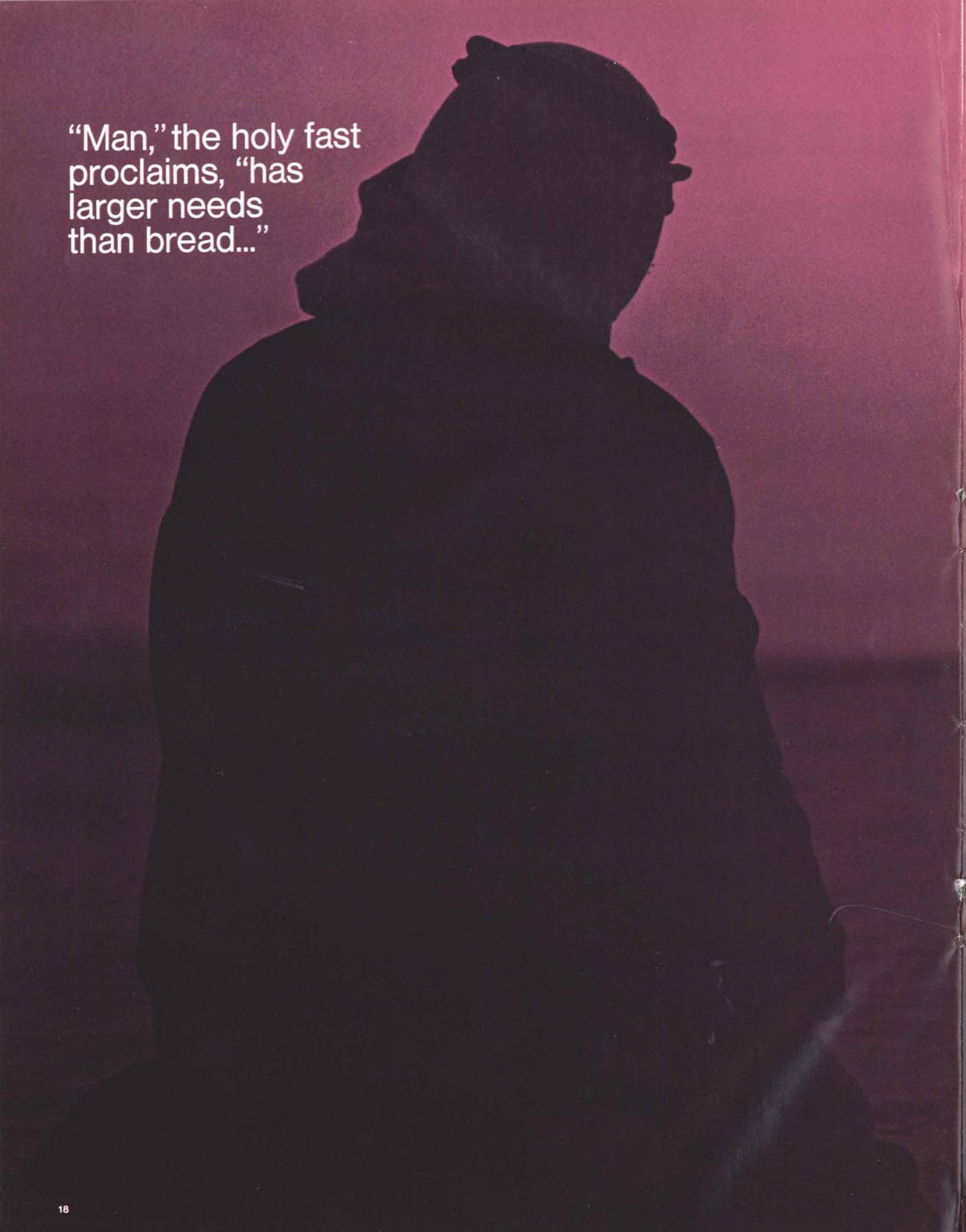
Today's visitors are usually surprised by Palmyra. Lulled by the monotonous miles of desert—it is more than 200 miles from both Damascus and Aleppo—they are seldom ready when, without warning, a line of 150 funerary towers 70 feet high breaks into the horizon. These towers, located in Palmyra's Valley of the Tombs, are one of three kinds of structures built by the Palmyrans for their dead. The other two are underground mausoleums and temple tombs, one-story structures above the ground.

The funerary towers mark the location of the city, but visitors soon realize that there is much more to see. Spread out on an arid plateau that tilts toward a range of low hills nearby, Palmyra's ruins comprise a vast area of broken stone and heaps of fragments in which, clearly, there once stood a city of remarkable beauty. In a large square court, 200 by 210 yards square, stands the great temple to the Babylonian God, Baal, that was built in the first century and has, at various times, served both as a Christian church and a mosque. Not far from the Hotel Zenobia, where visitors to Palmyra can stay, is a smaller but much more beautiful and better preserved temple that was dedicated to Baal-Shamin, a god of Phoenician origin. The beginning of what was once Palmyra's main boulevard is marked by a huge triumphal arch halfway between the two temples. The boulevard itself, 1,200 yards long by 12 yards wide, is lined with 150 splendid Corinthian columns, each 28½ feet high, the remnants of the original 375 columns which marked the boulevard and one of the most striking of the antiquities of the Middle East. It was on to those same columns that desert chieftains, in 1813, attached brackets to hold hundreds of lovely Arab dancing girls as a spectacular welcome to the famous Lady Hester Stanhope.

Off the boulevard are the ruins of other public places and buildings: the public square, once decorated with busts and statues of Very Important Palmyrans; a theater—unusual in that it was built in the heart of the city rather than on the outskirts, as was the practice—and the sites of houses and villas. There are also the remains of a military camp built by Diocletian in the 3rd century and an aqueduct built by Justinian in the 6th century.

Palmyra has been ranked by many experts as one of the two most exciting sights in the Middle East, the other being Petra. It may well be. With its location in the midst of the empty desert, beneath the ruins of a castle built by a 17th-century Lebanese amir, it is a sight to recall many times after the towering columns have vanished over the horizon and the new caravans have returned to the cities from which they came.

Jan van Os is a staff writer for Aramco World.



Photography by Sa'id al-Ghamidi

TIME OF TRIAL

BY NABIH AMIN FARIS

"O BELIEVERS, prescribed for you is the Fast, even as it was prescribed for those that were before you...
The month of Ramadan, wherein the Koran was sent down to be a guidance to the people, and as clear signs of the Guidance and Salvation.
So let those of you, who are present at the month, fast it; and if any of you be sick, or if he be on a journey, then a number of other days...
And eat and drink, until the white thread shows clearly to you from the black thread at dawn; then complete the Fast until the night."

—Surah II: 183-187

So, in the Koran, God ordained the Fast of Ramadan, one of the most exacting acts of worship in Islam and the month each year when, as one writer put it, faithful Muslims assert that "man has larger needs than bread."

The practice of fasting as a spiritual discipline is both ancient and widespread. It antedates Islam, even among the Arabs, and from time immemorial has been observed in various ways by Judaism, Christianity and other religions. The Prophet himself, according to tradition, observed the fast of 'Ashura,' a custom derived from the Jewish Day of Atonement, and even prior to his Revelations, his own tribe, the Quraysh, had placed special religious significance on the ninth month of the year—i.e.

Throughout the Arab world during Ramadan the sound of a cannon signals that the day's fast has ended and that the Muslim faithful may begin their first meal.

Ramadan—and had even associated penance with it. Tribesmen who desired to do penance were accustomed to go to Mt. Hira near Mecca upon the beginning of Ramadan, where they performed their *tahannuth* (religious devotions and penance). The exercises lasted the entire month and at their conclusion the devout made their way to the Ka'ba in Mecca, circled it seven times and then returned home to resume normal life.

The Prophet himself observed the same custom and in fact it was during one of those vigils of devotion and penance in Ramadan that he received his first divine revelation from God—thus linking the month of Ramadan forever with the custom of fasting.

Ramadan usually begins with the sighting of the new moon by a trustworthy witness and the subsequent thunder of cannon, the calling of the *muezzins* and, in modern times, excited announcements over the radio. If atmospheric conditions make the actual sighting of the new moon impossible, then the length of the preceding month, Sha'ban, normally 29 days, is extended to 30 days, at the end of which the fast becomes obligatory. It began about December 23 and will end whenever the January full moon is sighted. Each year of course the date changes.

While fasting, believers must abstain from all food and drink and must observe strict continence from the break of dawn to sunset. Food is eaten only during the hours of darkness, or, as expressed by the Koran, "until the white thread can be clearly distinguished from the black thread at dawn." Any Muslim breaking the Fast, with or without an excuse, is expected to make amends (*qada'*) for the days of fasting omitted. Even pregnant or nursing women who do not fast because of the children are required to make amends and to give in expiation a bushel of wheat to the poor for the days on which they could not fast.

Each day, as the shadows lengthen and sun is about to set behind the horizon, *muezzins* in all Muslim countries climb minarets to call the fasting believers to the evening prayer and to the breaking of the Fast. The call is punctuated by the boom of cannon—an innovation of the Ottoman Empire—fired at the exact moment the sun sinks behind the horizon. In recent times the radio has been employed to announce the end of the daily fast too.

Hearing the signal, the devout quickly offer prayer and proceed to break their fast, first quenching their thirst with water or, in some areas, thick apricot syrup prepared from thin round wafers of dried apricots, or eating a few dates. This step is avoided by many, who begin their meals immediately. The strict among the faithful, however, partake sparingly and avoid indulgence.

Upon breaking the fast and partaking of food and drink, the believer repeats an appropriate prayer of thanksgiving, sometimes the prayer said by the Prophet himself after every breaking of the fast: "Lord. In Thy

Continued on page 22

Photography by Sa'id al-Ghamidi

THE LITTLE 'ID

BY FUAD RAYESS

Through a break in the clouds a ray of moonlight filtered through and flickered briefly in the sky. Below, one of a group of men scanning the skies over Mecca saw it and pointed excitedly. "There it is," he said. "It is at hand!"

The others looked with excitement and saw it too. A few minutes later, before the religious leaders of the city, they testified to what they had seen. "The new moon is at hand," they said. "We have seen it." The leaders accepted the testimony and soon, from a hillside overlooking Mecca, a cannon boomed, the thunder of its report and the flash of flame from its muzzle announcing to the Muslim faithful that Ramadan, the most sacred period of the Muslim year, was over and that 'Id al-Fitr, the second most important day in the Islamic year, could begin.

'Id al-Fitr, "the festival of breaking the fast," is also called "The Little 'Id,"—to distinguish it from "The Big 'Id," the al-Adha holiday, which starts at the end of the period of pilgrimage and during which Muslims unable to actually go on pilgrimage participate spiritually in the rituals. The description does not in any way signify inferiority. As the climax to the exacting, month-long fast, it is one of the most important days on the Islamic religious calendar. It is a time of triumph, a time for rejoicing that the long struggle of the spirit with the flesh is over and that now, with an easy conscience, the flesh may be appeased.

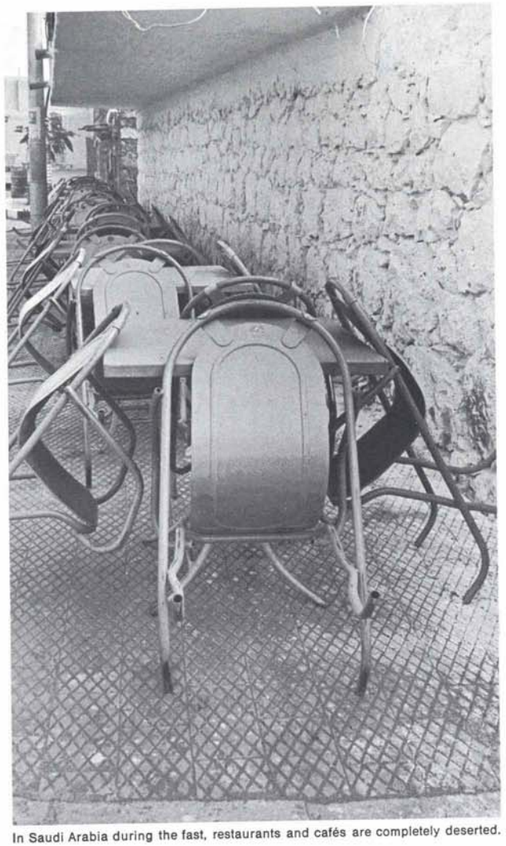
Because the 'Id is such an important day, preparations begin early and usually involve much shopping, for it is customary that each member of most families, especially children, will have new clothes for the occasion and new shoes. Indeed, for the merchants in the cloth suqs it is the busiest time of the year. They usually stock up on all the cloth they can reasonably expect to sell before the 'Id and most shops offer everything from Egyptian cotton to English wool in all patterns and colors. In recent years stores that sell ready-made clothing also have begun to thrive, and so, busily fitting and measuring customers, have tailors. Candy merchants are particularly busy too and most begin to stock assortments of colored candies and chocolate bars long before the holiday arrives.

Toward the end of Ramadan the pressures of the fast become intense and it is with more than passing interest that the faithful, during that final week, scan the sky for the sight of the new moon. Women keep a specially close watch on the sky as they hurry to finish the new garments, sweep and scrub their homes, beat the rugs and bring out white starched seat covers for chairs.

When, at last, the thunder of the cannon comes, the tension collapses and with cheers and congratulations the faithful fall upon their feasts, eating and drinking with gusto. On the following day most people, even though tired from the festivities, rise early in anticipation of a happy holiday. The children are particularly eager on this day because they expect their fathers to bestow on them that rarest of gifts, some pocket money of their own to spend as foolishly, as extravagantly as they please. As for the men—once they have dispensed this largesse—they proceed to the mosque to offer the 'Id prayer and, afterward, to exchange hearty greetings with acquaintances and friends. At noon they return home to have lunch, usually with relatives and friends, and to await the visits of friends. This first day is, in fact, reserved for those exchanges of visits and greetings. Many, however, go to parks or to small roadside carnivals for rides on smaller versions of the Western Ferris wheels or carousels, and similar amusements. The children also ignite firecrackers and the glitter of sparklers, the popping of salutes and the soaring glow of rockets gleam and echo through towns and cities from dawn until late into the night. With nightfall, tongues of flame from great bonfires flicker from hillsides and vacant lots and even the tops of buildings. In countries where the 'Id is a longer festival, the celebrations are most elaborate. In Saudi Arabia, for example, where the 'Id is a one-week holiday, bands of men armed with swords dance the national 'Ardah—once a war dance—in the streets and sing to the beat of drums as children cluster around with round admiring eyes.

But however it is observed the 'Id is a day of joy, one awaited each year with reverence and with pleasure by millions of devout Muslims throughout the world.

Fuad Rayess is General Supervisor of the Arabic Press and Publications Division in the Public Relations Department of the Arabian American Oil Company in Dhahran.



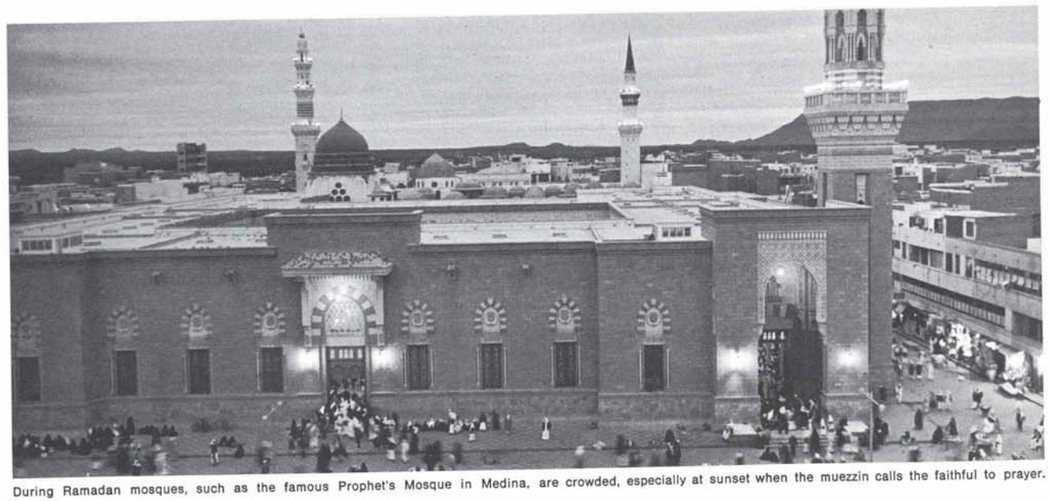
In Saudi Arabia during the fast, restaurants and cafés are completely deserted.

(name) we fasted; with Thy gifts we broke our fast; accept, therefore, (this our act of worship). Thou art the all-hearing, the all-knowing."

During Ramadan, night becomes day and day becomes night. Streets which are usually thronged in the daytime and empty at night are now deserted during most of the day and alive with activity at night. The activity usually begins in the afternoon as women file into the marketplace to buy food in time for the *iftar*, the first meal after sunset. Toward sunset the pace quickens as the faithful, hungry and thirsty after more than 13 hours of abstinence, head homeward or flock into restaurants and cafés to order their meals so that with the sound of the cannon they can begin to eat at once.

From that point on, each evening, cities and towns in Muslim countries take on a faintly festive air. Thousands of people pour into the mosques for the *isha*, the fifth prayer of the day, and the *al-tarawih*, a special prayer for Ramadan. People stroll the streets leisurely or visit friends or shop, often throughout the night or at least until 3 a.m. when the cannon fires again, this time to signal the *sahur*, a meal generally consisting of leftovers from the *iftar* feast. The *sahur* is eaten immediately before resumption of the fast at dawn and has given rise to the *musahhir*, a sort of town crier who roves the streets rapping on doors with a stick, beating a drum to rouse the sleepy faithful, and crying out in a loud voice, "Awake, sleepers! It is time for *sahur* and prayers!" For particularly heavy sleepers the *musahhir* often waits beneath the window until they acknowledge his call, usually with a sleepy, "Thank you, brother. May God compensate you with His grace and benevolence."

The disciplines of Ramadan are the first and the lowest of three grades of fasting: *sawm al-'umum*, the fasting of the general public, *sawm al-khusus*, the fasting of the select few and *sawm khusus al-khusus*, the fasting of the elite. The fasting of the general public involves refraining from food, beverages, smoking and sex and a deliberate, expressed intent (*niyya*), which must be renewed each night of Ramadan, to observe the fast.



During Ramadan mosques, such as the famous Prophet's Mosque in Medina, are crowded, especially at sunset when the muezzin calls the faithful to prayer.

The fasting of the select few requires that all the organs of sense—ears, nose, eyes, tongue, and hands—abstain from sin. And the fasting of the elite is "the fast of the heart"—an avoidance of mean thoughts and worldly worries and an exclusive concentration on God. This last fast, since it can be broken by a mere thought of anything other than God or by a hint of concern for the affairs of this world, demands tremendous concentration.

Following the example of the Prophet, many devout believers also go to the mosque after the late evening prayer—*salat al-'isha*—in order to spend the rest of the night in the highly meritorious intermittent prayer called *salat al-tarawih*, consisting usually of twenty prostrations with a short interval or pause (*tarwihah*) after every four. Those who observe the *salat al-tarawih* out of faith and fear will have their sins forgiven them.

Perhaps the most important observance during the sacred month of fasting is that of the *Laylat al-Qadr*, the "Night of Power," on which God granted the Prophet the first revelation. It is celebrated on the 27th of the month, but its original date has never been pinpointed with certainty. The Prophet himself, in fact, was vague as to the precise date and therefore admonished believers to observe the day during the last ten days of the month, more specifically on the fifth, seventh, or ninth night before the end of Ramadan. The Prophet often spent those last ten days at the mosque in vigil (*i'tikaf*) and prayer throughout the night, in expectation of partaking of the blessings of the holy night.

The end of Ramadan is determined by the appearance of the new moon of the month of Shawwal. As at the beginning, at least two reliable witnesses must testify that they have seen the moon and if atmospheric conditions make it impossible to see the new moon, Ramadan simply ends on the thirtieth day of fasting. Whichever way it ends, for the true believers it is a moment when the gates of heaven open and the favor of God descends upon them, because, as the Prophet said, of all the acts of worship in Islam, the sacrifice of Ramadan is the one which God alone sees and God alone rewards, and, as the Koran states, "Verily the patient shall be repaid: their reward shall not be by measure."

Nabih Amin Faris, chairman of the History Department and director of Arab studies at the American University of Beirut, holds a Ph.D. from Princeton University and is the author of 21 books and numerous articles. His work has appeared in the Encyclopaedia Britannica, Life, *and most of the major newspapers and periodicals in the Middle East.*

Although not expected to fast, Muslim children also observe Ramadan, sometimes by reading the Koran.

In an old land, a new playground...

SKI LEBANON!

BY WILLIAM TRACY

Photography by William Tracy

On a wind-swept ridge in the mountains, some 7,000 feet above the Mediterranean, a cross-country skier pauses briefly to take in a breath-taking view of orchards and Roman ruins near Faraya.

The headline on the tourist magazine was big and bold. "Skiing in Lebanon," it read, "is snowballing." And all afternoon the hundreds of skiers in tight bright ski pants who tramped in and out of the posh lobby of the new resort hotel and snatched up the magazine gave immediate, if unconscious, confirmation. Skiing *is* snowballing in Lebanon.

Visitors are often surprised to discover that this small hot country on the sunny shore of the Mediterranean is developing into a major center for winter sports. Actually Lebanon is only one of several Mediterranean and Middle Eastern countries—Morocco, Algeria, Greece, Cyprus, Turkey, Iraq and Iran—where, in spite of semitropical temperatures, skiing is catching on fast. And in Lebanon it is catching on faster.

It was a Lebanese engineer returning from studies in Switzerland who introduced skiing to Lebanon in 1913. But it was not until the 1930's that a group of dedicated French and Lebanese young people began to ski in earnest. "We used to spend three hours climbing a slope," recalls Dr. George Zabouni, president of the Club des Chalets, Lebanon's biggest ski club. "Then we'd make one descent and it would be over. Now we make 30 runs a day."

Dr. Emile Riache, president of the Lebanese Ski Federation, makes the same point. "For 20 years we had no mechanical tows. How could we really improve our technique with one run a day?" He mentioned, as an example, the effort involved in climbing 10,000-foot Mt. Hermon of Biblical fame. For one admittedly breath-taking, 20-minute descent, it took five hours of climbing.

In 1935, while France still governed Lebanon, the French army established a ski school in Bsharri, a village in the valley just below the famous Cedars. The army's aim was to train soldiers who could patrol the rugged and unruly mountain areas of Lebanon. The results were something else: a generation of trained skiers who, 17 years later, proudly carried the Cedar flag to the Olympic Games in Norway.

Since then the growth has been phenomenal. The Lebanese Ski Federation, once only a branch of the

Michèle Schehade's resemblance to Jill St. John startles escort Anis Barrage.

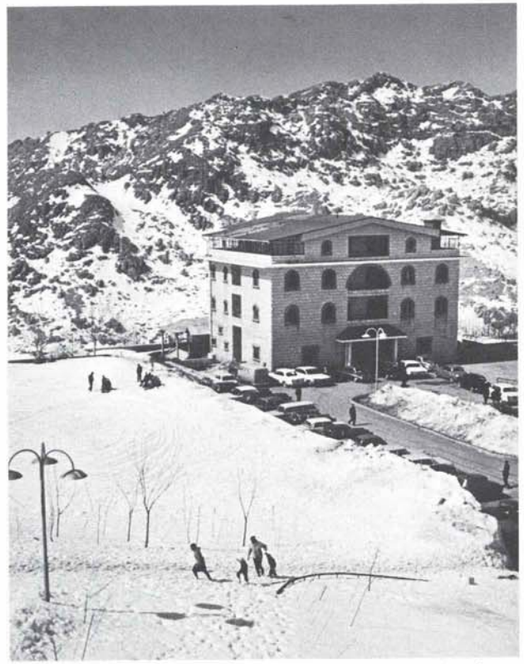
Federation of Swimming Clubs, now has 12 member clubs whose combined buying power last year enabled the federation to help bring in eight ski instructors from Europe and to organize a week of international competition that attracted top skiers from Switzerland, Germany, Austria, France and Britain. Michel Sem'an, proprietor of one of seven ski shops in Beirut, estimates that the number of skiers has been increasing at the rate of 10 to 20 per cent a year and says it shot up 30 per cent last year. Resort owners, working on a rough but apparently accurate count of automobiles, say some 3,000 persons swarm into the mountains every Sunday from late fall to early spring. Some head for open slopes like Baidar Pass on the Beirut-Damascus Highway. This slope, less than 5,000 feet high, and with inadequate snow cover, has won fame through its annual ski train—antiquated, open cars that crawl up the cog railway once or twice a year when the highway is blocked. Most skiers, however, head for one of the three major ski resorts that seem destined now to dominate the industry in years ahead: The Cedars, Laklouk and Faraya-Mzaar.

Of the three, The Cedars, today, offers most to the good skier. Perched on a natural platform 6,300 feet above the Mediterranean, in a great bowl scooped from the flanks

of peaks that reach up to 10,000 feet, the resort is blessed with breathtaking beauty, the fame of its six thousand-year-old cedar trees—survivors of the magnificent giants that once covered all of Lebanon's mountains—and the barracks built by the French army. Developers have added three T-bars, a two-stage chair lift, two hotels, five *pensions*, two stereo clubs, a snack bar, 50 private chalets and a 40-bed youth hostel, and have worked hard at improving and lengthening the steep trails that draw skiers from around the world.

Families, however, prefer Laklouk, a resort area begun about 15 years ago by a banker named Joseph Sa'ab at a time when the possibility of establishing a successful ski center amid barren mountains seemed laughable. Laklouk today boasts two handsome sandstone hotels—appropriately named "Shangri-La" and "Nirvana"—a spring-fed swimming pool, gorgeous flower gardens, fruit orchards, mineral springs and a safe, gentle slope that has been dynamited out of a nearby cliff and carefully scraped and hoed into skiable shape. There are dormitories for schoolchildren, a fleet of motor-driven ski-buggies, a stereo club, two restaurants, 14 villas—each with a fireplace—and swimming pools. Nearby there are two Roman temples, one of the deepest natural potholes in the world and an underground river emerging from mysterious sources deep with the mountains.

For Beirut, the newest and the most convenient ski area is Faraya-Mzaar. Only 39 miles away on good if hair-raising roads (and even closer next spring when a new highway will be finished), Faraya is actually within sight of Beirut. On clear days, skiers, moving up the mountainside on the silent chair lift, can look down nearly 8,000 feet and see the outline of the buildings in the city. They can also look down on a snowy plateau at the foot of the ski lift and see a 70-room hotel that would rank with the best in New England or Sun Valley, a youth hostel, a restaurant, a snack bar, a ski shop, a swimming pool with cabanas and 27 furnished chalets. Faraya is primarily the creation of Shaikh Selim al-Khazen, board chairman of the company that developed it and the man who saw the possibilities of skiing many years ago and kept the idea of development alive by sponsoring an annual skiing banquet in the village of Faraya. Skiers who wished to attend had only to climb the nearby summit and ski down once.



The resort at Laklouk offers families skiing, sliding and snow buggies.

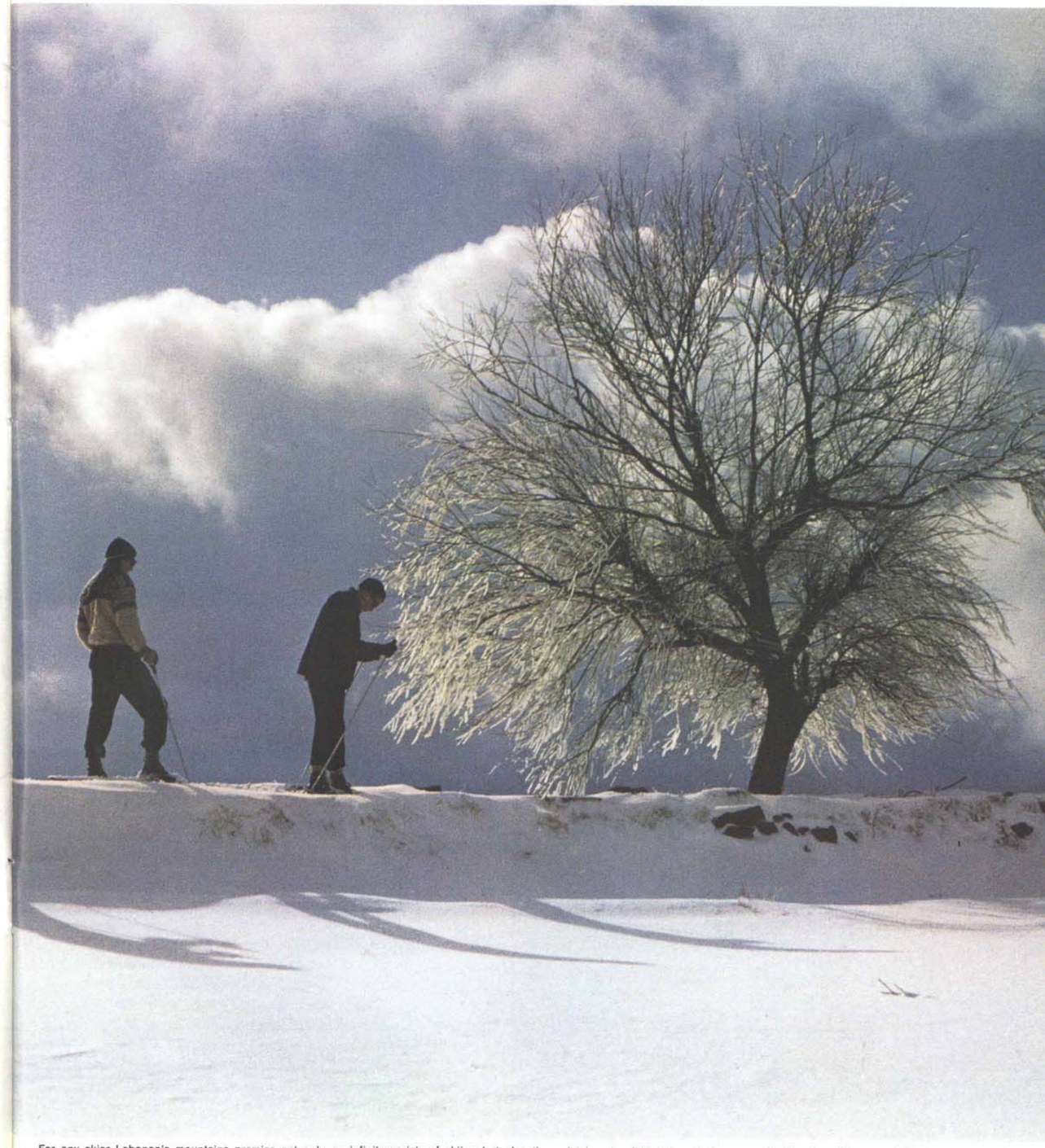
Charles Helou, President of Lebanon and a former director of the National Council of Tourism, has placed the tourist industry high on the list of priorities for his country's progress. He has formed a high-level committee made up of representatives from the ministries of public works, interior, and education; from the army and from the ski federation. Michel Khoury, Helou's successor as director of the tourist council, is committee chairman. The government, according to Joseph Kairouz, president of the Banque du Crédit Populaire and promoter of a new project at The Cedars, "has realized that tourism can be our number one industry, a key source of national revenue. And it has suddenly dawned on our businessmen that the jet age has brought us within reach of the middle class European vacationer."

The results of this new awareness are already visible. Roads in the high mountains originally planned for military purposes are being built to serve resort areas as well. Scores of special police are assigned regularly to help control weekend traffic. First aid and ambulance services have been established at the three major resorts. Emergency radio service has been put into operation—since storms often disrupt telephone connections—and army helicopters have been put at the disposal of architects and planners. Snow plows, formerly kept as far away as Beirut, and never called until after the last flake of snow had fallen, are now stationed in the mountains, ready, day or night, to crank up and go, methodically working from the resorts down to the villages. In 1964 some roads were blocked three weeks by frozen drifts; last year they were never closed longer than a full day.

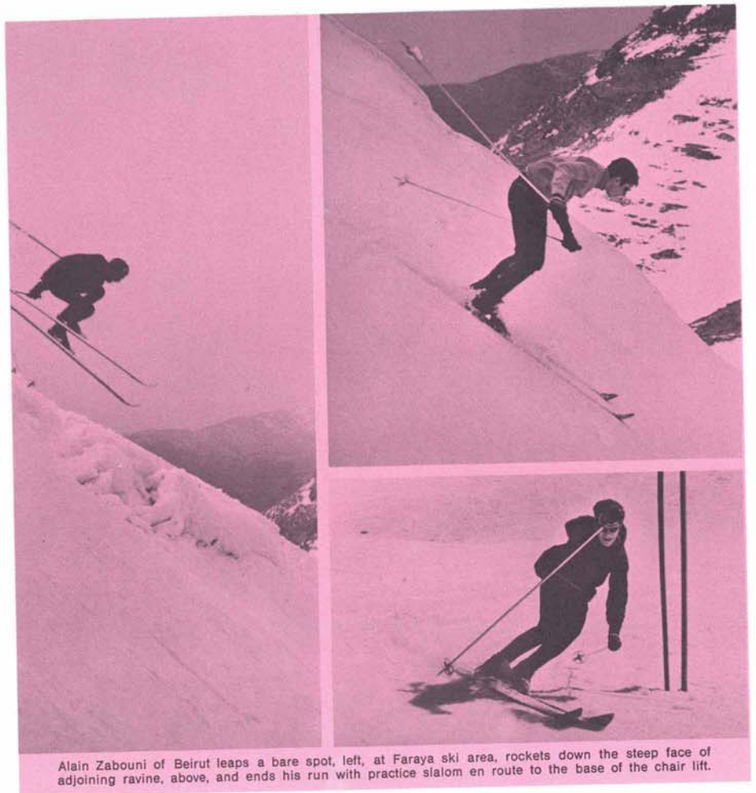
"I don't think the development was so rapid in Europe," Dr. Zabouni reflects. "Not so impatient! My father wore a high collar and wouldn't have dreamed of putting on a pair of skis. I became the president of a ski club, my oldest son Alain places in the men's championships. And his younger brother, well, who knows?"

Roger Saliby, who gave up dentistry to promote the first ski installation— a T-bar—at Faraya, says he and his partner, Sami Jamal, built the now-flourishing Faraya-Mzaar operation "in a moment of madness."

"But still I want the sport to succeed," he said. "I



For any skier Lebanon's mountains promise not only an infinite variety of skiing but also the quiet beauty of high broad slopes overlooking the villages and the terraced valleys below.



Alain Zabouni of Beirut leaps a bare spot, left, at Faraya ski area, rockets down the steep face of adjoining ravine, above, and ends his run with practice slalom en route to the base of the chair lift.

knew if Faraya was a success, others would try too. The more competition the better. I wanted a successful example to encourage them."

Last year Mr. Saliby's wish was granted. Faraya's operations racked up a profit for the first time—but mostly because Beirut-based airplane crews, staying over between flights, tried the new hotel and kept the facilities busy during weekdays. This made a significant difference because, as at most ski areas, skiing in Lebanon has been restricted to weekends.

"They were deserted during the week," said one investor, "but fortunately, nature, geography and now technology, have combined to give them what they need to draw foreign visitors in ever larger numbers throughout the week."

"I'd be a liar if I said our ski trails were like the European ones," Saliby admits candidly. "But it's only 30 minutes between swimming and skiing and we can throw in Roman temples and caves and Phoenician ruins as well. No other country can match the ensemble. In Lebanon, there are at least seven months of sun at the beach and, when new ski lifts are completed, there will be seven months of snow as well."

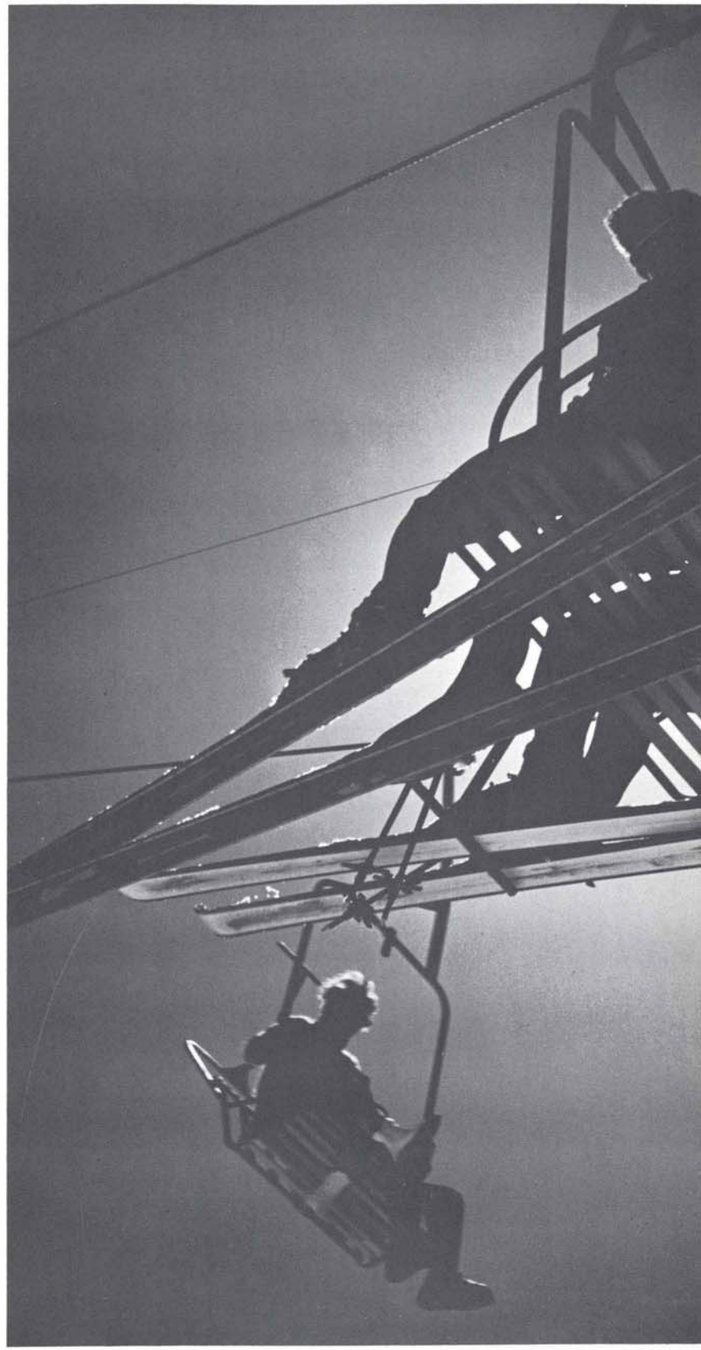
That adds up to a 14-month season for tourists during which swimming and skiing weather will overlap. The weather, furthermore, is stable. Investors in one proposed resort conducted three years of observation and later reported they could tell almost to the day how many days of powder, crust, boilerplate or corn snow could be expected. Planners have also studied 11 locations in Europe, compared conditions with those in Lebanon and have come away more than satisfied.

This has not been lost on the European tourist agencies, particularly those eager to open new territories. Last year, German, French and British companies organized two-week group charter flights to the Middle East that offered room, board and air fare for under $200. The idea was—and is—to let the visitors relax in the sun, either on the shore or on the slopes, during the week and then organize excursions to Baalbek, Damascus or Jerusalem over Saturday and Sunday so that resort facilities are free for the Lebanese on the weekends. "Europeans are very keen on sunburn, you know," smiles Laklouk's Joseph Sa'ab, also president of the Development Bank, "and Spain, Greece and the Riviera are getting overcrowded. Lebanon is new."

"Once international tourism begins, it booms," Mr. Saliby adds, "and our word-of-mouth publicity has been all favorable. Now that the Europeans have heard what we have to offer we're expecting big things."

On Lebanon's hard-packed slopes avalanches are rare, yet avalanche is the word to describe the burst of planned development ahead. At the Yamle Center at The Cedars a model village with strict zoning laws has been laid out. This season a 35-room hotel and 12 chalets were completed. Other features will be added step by step, including ice skating facilities, a motel and developments

Continued on page 32



Silhouetted against the sun, skiers on Faraya chair lift pass sight-seers on their way to the bottom.

TRAILS TO SAILS

BY WILLIAM TRACY

It has become a cliché that in Lebanon you can ski all morning and swim or sail all afternoon. And although few skiers would actually bother to interrupt a good day's skiing to go down to the sea and swim, a quartet of Lebanese young people recently decided to demonstrate that it is entirely feasible.

They left Beirut at 7 a.m., Alain Zabouni, 19; Michèle Schehade, 18; Anis Barrage, 18; and Anis's cousin, Randa, all friends, all skiers. In Alain's car, they headed north up the coastal highway, stopping once to buy oranges fresh from the orange trees by the road, then swinging onto a steep road that twists sharply upward toward the gleaming white flanks of Mt. Sannine, towering over the ski center called Faraya-Mzaar.

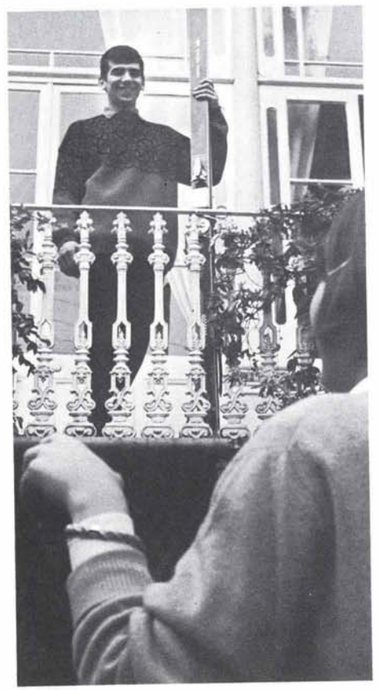
It's a pleasant drive to Faraya and in the springtime—which comes early to Lebanon—the mountains are unforgettably beautiful. There are small villages with red tile roofs in the midst of terraced olive groves and white-blossomed almonds. Higher, the slopes are splashed with the fresh white flowers on apple trees and dotted with tiny flowers hiding in grass just turning green. Every stream is a torrent of icy green water foaming over rocks and the high cliffs shine with gleaming waterfalls as thin as silver icicles.

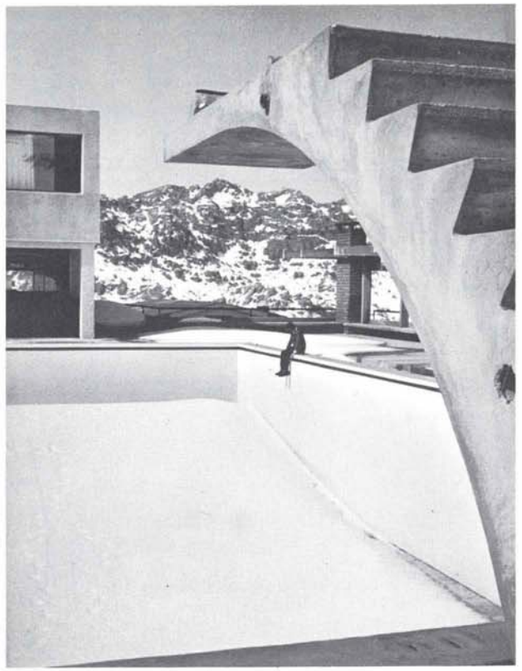
At exactly 8:30, Alain, Michèle, Anis and Randa strapped on their skis and began the slow glide upward to the summit. From there they slogged across the face to a windswept ledge above a deep valley and pushed off in a long, fast run down the valley side, knees locked, hips swaying, and pennants of powdered snow streaming out behind them. In the valley they dropped into a crouch that carried them up the opposite slope and then down to the base of the chair lift. There they settled comfortably into the wide seats, squinted through sun glasses at the blazing sun and moved slowly toward the crest.

For four hours they skied steadily. Unhampered by crowds, they flashed back and forth across the broad slopes, dipping into deep gullies, the boys tensing for short crouching leaps across bare rock, rocketing down the last sheer drop to the base for another quiet ride up. The sun climbed into the sky, the air was clean and fresh and the echo of their voices was loud in the stillness. Below lay Beirut, the shape of buildings vaguely outlined in a bluish haze, and beyond, the Mediterranean, calm and blue.

Suddenly it was noon. Unstrapping their skis, they spread soft yoghurt on paper-thin mountain bread and began to eat as they whirled down the winding road that took them back through the villages to the coast and, two hours later, to the dock of the Beirut Yacht Club. Exchanging ski clothes for bathing suits, they hustled into a trim sloop, expertly rigged the sails and pushed off into the bay. Michèle, relaxed in the cockpit, pointed upward. Nearly lost in haze, but still visible, was Mt. Sannine. "Think," she said. "Two hours ago we were up there. Now we're here." She swept an expressive hand around at the distant mountains and the bay gleaming in the hot sun. "Isn't it wonderful?"

There was no dissent.





At the Nirvana Hotel in Laklouk, also a summer resort, drifted snow fills pool.

on one of the high slopes with a northern exposure. Laklouk is meeting the competition with a new chair lift up the protected northern face of Mt. Blanc scheduled for this season, along with two T-bars near the top. An artificial-snow machine will fill the bare spots on the slope and around the hotel. For the summer there will be a new nine-hole golf course and a landing strip. Long-range plans include more hotels and hillside villas on large plots among the orchards. Foreign interests may join in a proposed seaside project at Byblos linked to the mountain resort by frequent bus service.

At Faraya, a second ski tow, to connect the present one with the chair lift, will be built next year along with a unique new V-shaped chair lift carrying skiers up slopes on both sides of a valley. Long-range hopes include a golf course and tennis court, a new village on the upper plateau with a web of eight ski tows, all to be connected with projected centers on the other side of the Mzaar peak (if the government can be persuaded to finance a $600,000 gondola lift). If plans go well, in fact, within 10 years Faraya-Mzaar's combined facilities could include nearly everything needed for the world ski championships.

Just north of Faraya, at Nab' al-'Assal, another company has detailed plans to build a 9,000-foot cabin lift by 1968. There will be a de luxe hotel, chalets, covered parking, a heated pool, and a ski school for both beginning and advanced levels. A short portable tow would be moved to the best children's slope depending on conditions. The planners hope to encourage the sport by getting the beginners off to an organized start, and will rent all the equipment needed right down to ski pants. "Skiing is 50 per cent boots, 30 per cent skis, and only 20 per cent courage," they say.

South of Faraya, at Anna Bakiche, a modest center is planned with two tows and a chair lift to exploit the very steep sea face of Mt. Mzaar above Beirut. There are vague plans too for a new chair lift on Mt. Sannine and even for a development on towering Mt. Hermon.

Like a beginner who has mastered the herringbone climb and the snow plow turn and has made his first run down a novice trail, Lebanon is moving toward big-time skiing. Ahead may be unexpected turns, sudden changes of pace and bone-jarring falls. But that, after all, is half the fun.

William Tracy is a Beirut free lance writer and photographer.