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A Peninsula in Profile

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Illustrations: A Peninsula in Profile — maps and aerial photographs by the Aramco Exploration Department; early exploration photographs from the Aramco archives; other photos by Abdul Latif Yousuf and Kay Brennan. "A Strange Little Book" — photographs by Khalil Abou El-Nasr; drawing of Al-mustafa by Kahlil Gibran, courtesy of Alfred A. Knopf Inc., New York. Learn, Remember and Know — photographs by Charles E. Wilkins and Aramco, New York. Diggings in the Deep — photographs by Frédéric Dumas and Georges Barnier. Land of the Two Seas — photographs by V. K. Antony and Keith Bradley.

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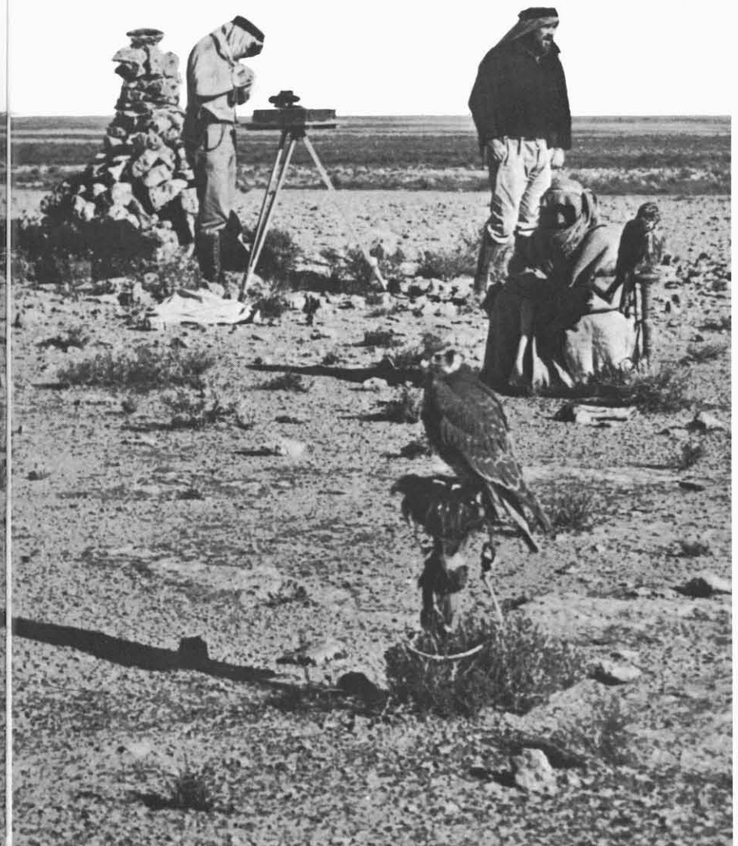
Cover: To depict approximately 170 geologic formations on some of the new maps of Saudi Arabia prepared by Aramco and the U.S. Geological Survey, cartographers had to use numerous hues, tints and shades of color — nearly 100 on the original and nearly 50 on this hand-colored reproduction — achieving an effect more akin to abstract art than traditional cartography. On the back cover are samples of the key colors used to depict the formations.

Back and forth across Saudi Arabia flew the plane — to map more than 1,000,000 miles of terrain...

While Arab guides and hunting falcons wait patiently, geologists working in Saudi Arabia during the mid-1930's for the California Arabian Standard Oil Company, predecessor to Aramco, plot survey lines on plane table.



A PENINSULA IN PROFILE

BY BRAINERD S. BATES

"The latter part of September, 1933 (K.S. Twitchell, R.P. Miller and S.B. Henry) began the first geological reconnaissance work on the mainland of Saudi Arabia. During the course of this work the region lying along the coast of the Persian Gulf and some 35 miles south of the town of El Katif (al-Qatif) was investigated ... The section was recognized to be of Eocene Age and structural relationships indicated a broad and gentle fold..."

— From the Introduction to Geology Report No. 1, July 1934.

Ten busy months had passed since the pioneering trio of explorers, wearing beards and Arab garb, had made its historic rendezvous at Jubail, on Saudi Arabia's east coast. Now "Krug" Henry and another geologist, J.W. "Soak" Hoover, who had joined the group in October, a month later, escaped to the relative cool of Dhour Choueir, Lebanon, to record their observations and impressions. The account, like others to follow, was written primarily to inform their employer in far-off San Francisco, Standard Oil Company of California, holder of an oil concession agreement with the Saudi Arab Government. Hoover and Henry composed it in the simple, straightforward prose demanded of all effective business and scientific communications. A careful reading by other geologists would have uncovered cautious hints of possible future oil finds. No one, however, could have foreseen in those days that the earliest geologic report would become basic source material for a 30-year exploration project utilized in turning the Arabian Peninsula, then a land whose interior features were almost completely unknown, into one of the best-mapped areas in the world.

Now the products of that long effort have been published: 1: 2,000,000-scale geographic maps of the Arabian Peninsula as a whole, in separate Arabic and English-language editions; an English-language geological map drawn to the same scale; 21 geographical and 21 geological, 1: 500,000-scale regional maps in both Arabic and English — a total of 45 individual sources of information about the vast subcontinent which runs southward from the borders of Jordan, Iraq and Kuwait to the tip of Aden and the Arabian Sea.

The mapping project called for the full, not to say unique, cooperation among governments, oil companies and private individuals. Even its conception was group-inspired. The idea came out of some discussions held back in 1951 by William E. Wrather, then director of the U.S. Geological Survey, the late George Wadsworth, who at that time was the American ambassador to Saudi Arabia, and James Terry Duce, a vice president of the Arabian American Oil Company, now retired. The Saudi Arabian Government and the U.S. Department of State agreed to be co-sponsors. Active participation in the project was divided between Aramco and the Geological

Aramco experts adjust camera during low-altitude reconnaissance flight.

Survey, with contributions by the Saudi Arabian Ministry of Petroleum and Mineral Resources.

For purposes of the undertaking the Kingdom of Saudi Arabia was marked off into 21 quadrangles, each three by four or more degrees square, the rough equivalent in area of the state of North Dakota. It was agreed that Aramco would be responsible for mapping 14½ of these quadrangles, located in the eastern half and the northern and northwestern parts of the country. Aramco geologists had already classified them as sedimentary rock areas, characterized by sandstone, shale and varieties of limestone, where oil is most likely to be found. The U.S.G.S. would map the remaining 6½ quadrangles, lying in the western third of Saudi Arabia and classified geologically as mainly crystalline ("hard rock") area.

Five years before the project formally got under way in 1954, sharp-eyed residents of Saudi Arabia's Eastern Province could see a tiny speck high in the sky cruising in a long straight line. The object of their interest was a converted B-17 which carried in her belly a six-inch focal length aerial camera with a metrogon lens. Intermittently from that time through early 1959 the plane was to crisscross in a well-defined pattern high over the gravelly plains of the northern Najd, the sandy wastes of the Rub' al-Khali, the 10,000 foot-high peaks of 'Asir Province deep in the southwestern corner of Saudi Arabia, and, under Saudi Arabian Government auspices, the Precambrian rock area of the Hijaz, in the western part of the Kingdom. When the plane's assignment was finished, 1,165,000 square miles had been covered and Saudi Arabia became one of the few countries anywhere to be completely photographed from the air.

The use of aerial photography as an aid in map-making has been described by one writer as the greatest advance in cartography since the invention of the compass. The basic idea is well over 100 years old. Beginning in 1849, a French army engineer named Aimé Laussedat made a series of photographs over Paris with ingenious combinations of balloons, kites and tiny sails. Early cameras secured to captive balloons were used to obtain topographic information in the U.S. during the Civil War. As techniques for making measurements in mapping became more refined, a new name was coined for the science: photogrammetry. Special applications of the principles of optics to steadily-improving aerial cameras moved photogrammetry ahead, but the biggest breakthrough came, of course, with the appearance of the airplane.

The focal length of the aerial camera, and the flight altitude from sea level, taking into account the average elevation above sea level of the terrain photographed, determine the scale of a vertical photograph taken from the air. Because of the large area requiring coverage for the Arabian Peninsula mapping project, as well as for other purposes, it was decided to work with aerials made on the relatively small scale of 1: 60,000. This required the photography plane to fly at a constant 30,000 feet above the terrain level, or elevation, it was shooting — an elevation commonly traveled by today's jets. But the aircraft doing the photography was of a non-pressured variety, which meant that flight and photography crews had to be sustained by oxygen. At more than 5.6 miles up, the air even over the baking Rub' al-Khali gets cold, with temperatures down to around minus 30° F. The men flying in that B-17 had to see to it that they were dressed for the occasion!

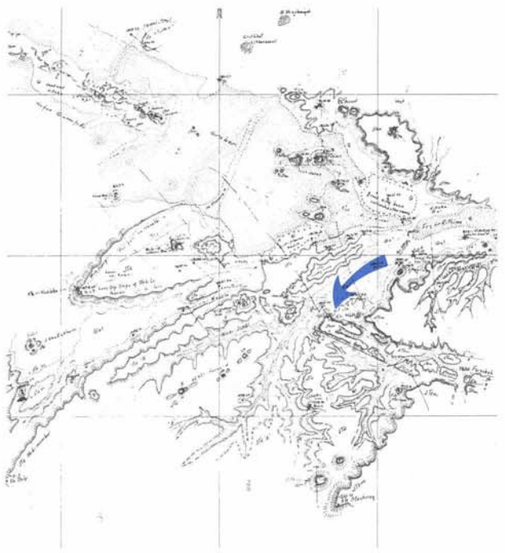
The photography plane was required to fly perfectly level, in order to avoid distortion and scale divergence in the pictures, and at exactly 30,000 feet above the terrain, to give each photograph proper scale for meeting strict photogrammetric specifications. The pilot had to fly in a consistently straight line, and to know precisely where he was at all times. The latter demands called for aerial navigation of a very high order.

Electronic navigation, employing a system known as Shoran, was brought into service over the Rub' al-Khali sand region of Saudi Arabia where the topography did not lend itself readily to visual navigation. Radar signals were transmitted between the aircraft and usually three widely-separated receiving stations located at geographically fixed known points on the ground. Thus the exact position of the plane at the instant of exposure of each photograph was recorded by measuring the time it took for the signals to make a round trip between the plane and the fixed ground stations. Through calculations using these data, the precise geographic coordinate of the physical center point of each aerial photograph was obtained.

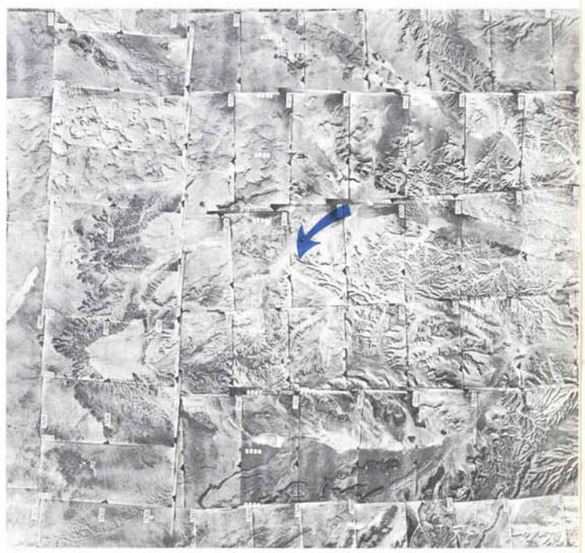
As the plane flew back and forth in parallel straight lines from one predetermined position to another, the aerial camera shutter, controlled by an automatic tripping device called an intervalometer, exposed film about every 55 seconds. The camera was set to take each successive picture with a minimum overlap of 60 per cent on top of the preceding photograph to enable the cartographers in the map-making process later to view these photographs stereoscopically.

At the end of each run the plane wheeled around and headed in the opposite direction. Every exposure photographed a piece of Saudi Arabia measuring about 70 square miles. Since the stereoscopic viewing equipment and photogrammetric solution by the slotted template assembly demanded, in addition to the substantial forward lap, a 30 per cent side lap on both edges (between flight lines) of every picture shot, it worked out that each pass the B-17 made in one direction was no farther than about six miles from the course just flown parallel to it going the other way. And there are a great many six-mile intervals, averaging about 11 flight lines for each degree of latitude, lying across a nation as large as Saudi Arabia. That is one reason why the aerial photography phase alone had to be measured in terms of years. Another had to do with local weather conditions. The aerial photography program was carried out on a strictly seasonal basis because exacting specifications demanded clear photographs which could be taken only with a minimum cloud cover and in an atmosphere that was essentially free of dust and haze.

As thousands of aerials came pouring in, Aramco and U.S. Government map-makers tackled the tedious but exacting job of translating them into 1:500,000 and 1:2,000,000-scale maps constructed on a Lambert confor-

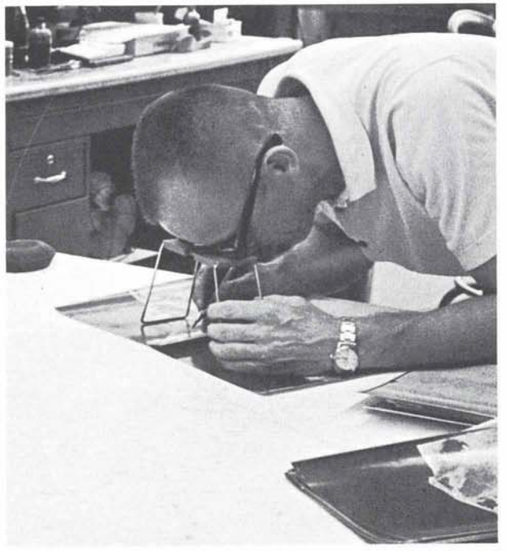


Using surface mapping instruments—barometers, compasses and automobile speedometers—Aramco geologists mapped this area, approximately 40 miles southwest of Riyadh, two years before aerial photography of the country started. Arrow points to a 3,300-feet-high "Khashm," which geologists working in Saudi Arabia define as a headland, or promontory, along a cliff or mountain front.



Out of the thousands of high-altitude aerials taken, map-makers could select photo coverage of any particular area of interest by referring to a "photo index," of which this is a small part, covering the same general area as shown in picture at left. Flight lines of the aerial photography, above, show up clearly, running east and west (right) and north and south (left).

A map projection, consisting of lines of latitude and longitude, is drawn and constructed on a large flat surface. On the map projection, map-makers lay down a slotted pattern consisting of hundreds of individual stiff cardboard templates, adjusting them to strategically-located fixed ground control stations plotted according to their geographic coordinates.



The templates are then disassembled in reverse order. The points established by the intersections of the slots of the overlapping templates are carefully marked on the projection. The map detail is next transferred from the aerial photos to the map projection. Peering through a stereoscope, which brings out photos in three dimension, cartographic draftsman Joe Colliver selects terrain and details to be transferred.

mal conic projection. With the aid of meter bar and mathematic tables, latitude and longitude graticules (intersections) were established on each new map projection copy. The differing scales of the individual photographs and the map bases proper had to be reconciled by use of the slotted template method, first utilizing a proportional radial line plotter. From the plotter, radiating slots — their direction determined by image points common to overlapping photographs — were punched into cardboard templates for use in the crucial slotted template assembly for establishing control points common in horizontal positioning to both the aerial photographs and the map projections.

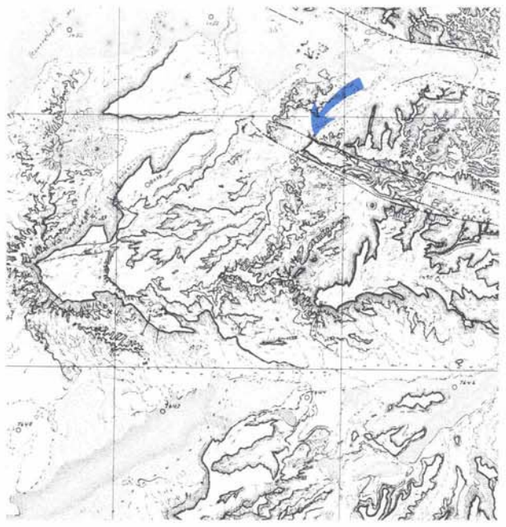
The most basic information cartographers work with is, of course, the measurements that have been made of horizontal distances and directions and the differences in elevations of the terrain they are mapping. A system of these measurements is called cartographic control, and any ground station in a horizontal and/or vertical control system that can be identified on a photograph and used for correlating the data shown on that photograph is a *control point*.

Certain control points set out on the Saudi Arabian landscape were easily identified on a pair of aerial photos viewed through a stereoscope, which brings out these points in third dimension. However, locating control points was difficult and time-consuming in certain regions of the Rub' al-Khali, where the sand terrain shows itself to be remarkably featureless and uniform, even on a long series of aerials strung together. In these types of terrain where problems with identification were anticipated and it was economically justifiable, key control points — triangulation, astronomical and level-line bench marks — were outlined prior to aerial photography with large asphalt circles which later could be picked out and identified on the aerials. Even this seemingly small refinement, though not widely used, had to be bought by much hard work. It required Aramco to truck asphalt great distances to remote areas separated from its refinery source in Ras Tanura by extremely difficult driving conditions.

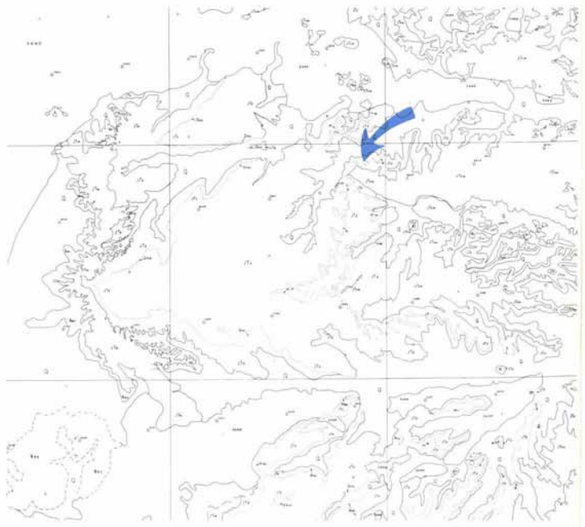
Major control points which tied the whole Arabian Pensinsula mapping project together horizontally were located largely by taking observations of stars, by establishing triangulation nets and by the Shoran method. But as cartographers began to fill in the empty spaces on their maps, they went to more detailed measurements, making use of many which had previously been made on the ground by geological field parties. It was at this juncture that the old field notebooks of "Krug" Henry, "Soak" Hoover and their numerous successors in the field were taken out of the Exploration Department vault and opened for ready — and welcome — reference.

If the results of their labors were invariably of a high standard, the means these pioneering geologists used to delineate the land were often elementary in the extreme. They measured distances in more remote areas by automobile speedometer and determined directions with a Brunton compass. Although the more accurate plane table method was used extensively in coastal areas, an aneroid barometer commonly determined elevations and dips elsewhere.

Exploration Department map-makers, many of whom were also experienced field geologists, were thus able to learn from the Henry-Hoover report on field work completed in June 1934 that "the Eocene sediments (formation) and those post-Eocene rocks immediately overlapping (it) ... resulted in the formation of a large structure involving an area of some 150 square kilometers."



Mappers indicate steppe-like terrain by shading steeper bluffs and escarpments and represent individual sand terrain features by detailed stippling. Because geological formation boundaries often follow topographical features, this and other detailed geographic maps, drawn on a scale of 1:100,000, are useful in making the next map in sequence and all the maps published in the 1:500,000-scale geographic and geologic map series. The area shown covers roughly the same region as that depicted at the bottom of page 4.



Interpretation of aerial photographs and geological data collected by surface mappers on the ground went into the making of this map, which clearly shows dividing lines between the various geological formations. Letter symbols scattered over the surface of map indicate individual geological formations. Visual comparison of similar configurations shown on previous picture and this one, covering the same area, shows that geological formation boundaries frequently follow escarpments and other terrain features.

The cartographers and geologists knew just how to make maximum use of a descriptive passage such as that taken from field geologists K.R. Parsons' and R.B. Carr's 1941 geological report on the En Nala-Wadi Faruq area, situated west of Hofuf:

"*The floor of the wadi* (*Wadi Faruq*) *averages about 10 kilometers in width south of the Jebel El Haya region. It is made up of drifting sands, dikaka, gravels and patches of marl. It is undulating in character, elevations in it varying considerably. Elevations in general rise gradually southward from an average of 215-225 meters in the north to 275-285 meters at the junction with Jau Kukhan. Topographic relief averages 50 to 60 meters between the wadi floor and the plateau areas on either side.*"

A somewhat sardonic note on plant life in north central Najd, written after a 1948 trip through upper Saudi Arabia, was almost as informative — in a negative sort of way. The description bears the stamp of geologist Don Holm, who before his retirement was Aramco's unofficial authority on local natural history:

"*As a natural result* (of recent showers) *the desert broke out in a green rash of vegetation. Some of the bare silt flats of last year became as green as a golf course fairway. Flowers, though usually rather small, were abundant and the fragrance often gave rise to the illusion of being in fairer fields.*"

When drafting the immensely detailed geologic maps such observations as the following, made by R.D. Gierhart and L.F. Ramirez on their 1949 investigation of Saudi Arabia's southwestern corner, were indispensable. Describing the general physiography of the region around the Wadi Dawasir-Najran area, the geologists wrote:

"*One of the most characteristic features of the area is the pediment, either sandstone or basement, which occurs around the edges of the Wadi sandstone hills. This pediment ranges from one to twenty kilometers wide and is best seen north of Bani Sanamma where the actual contact cannot be seen but can be inferred by the presence of a quartz gravel train which is the remains of a basal conglomerate seen in place south of Umm Rugaybah* (*19° 38′ 10.7″ N., 43° 57′ 22.4″ E.*)"

In a U.S.G.S. professional paper, which describes the geology depicted on the new 1:2,000,000-scale map of the Peninsula, Aramco's Exploration Department listed in alphabetical sequence the names of 77 geologists who over three decades were on field parties which collected such data. Among those mentioned in the normal order were Max Steineke and Dick Bramkamp. Between them they occupied the post of chief geologist for 22 consecutive years — from 1936 through 1958 — and either carried out personally or directed most of the gathering of the information. Another name on the list, appearing in the "B's", is Thomas C. Barger, who began his career with the company in 1938 as a young geologist and is now president and chief executive officer of Aramco.

The contributions each of these men made to knowledge about the physical and geological side of Saudi Arabia were important in themselves. Many aided the map project further by jotting down whatever Arabic place names they ran across in their field explorations. Their diligence, and years of patient sifting by Aramco's Arabian Affairs Division personnel put countless hills, valleys, plains

Final published map combines both geology and geography of the area covered. Maps in the 1:500,000-scale published series are the outcome of all the steps shown in the preceding sequence, plus other geologic and photogrammetric phases. Their accuracy results largely from thorough coverage over many years by Aramco's geologic surface mapping parties and utilization of horizontal control established by astronomical and Shoran control methods throughout the company's concession area.

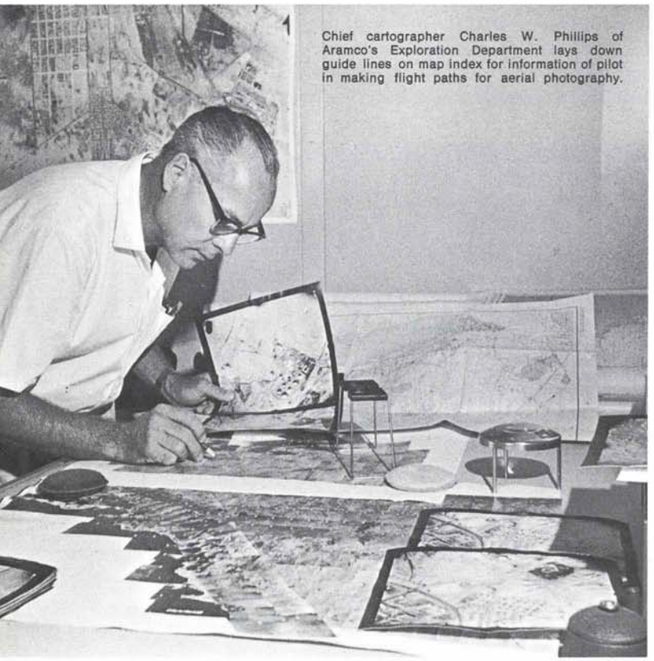
Staff geologist Lee Ramirez, shown with multi-colored, 1:2,000,000-scale geologic map of the Arabian Peninsula, participated in the map-making project from its very beginning. That was in 1951 when the director of the U.S. Geological survey, the American Ambassador to Saudi Arabia and an Aramco vice president began the discussions which led, finally, to the launching of the project under the joint sponsorship of Aramco and the Saudi Arabian government.

and especially villages and towns on the map for the first time.

It worked this way: an oil explorer on a field trip would see, for example, a jabal (hill) in the distance and ask his Arab guide and local inhabitants what it was called. Some geologists who were proficient in Arabic were able to write in their notebooks the name of the jabal in that language. Others not so well equipped linguistically would put it down in writing the way it sounded to them. By whatever method, the explorer recorded the name, with its precise location, on his field map and in his report. Back in Dhahran, a geographical analyst gathered a number of Bedouin "relators" familiar with the area around a map of the particular quadrangle concerned and by careful cross-questioning determined the exact Arabic name by which the feature is known locally. The final name chosen usually represented the consensus of from three to ten informants.

After determining the meaning of a dialect place name, researchers worked toward establishing its exact equivalent in the alphabet of classical Arabic. They then combed through company library sources to see whether the landmark in question had ever been mentioned in print, especially by geographers writing in classical Arabic, as an added check against their own findings.

Important geographic and geologic information on the peripheral areas of the Arabian Peninsula outside Saudi Arabia was contributed by cooperating oil companies, governments and private individuals. This cooperation made it possible to depict, on a mutually beneficial basis, geologic and geographic map detail for the entire peninsula.



Chief cartographer Charles W. Phillips of Aramco's Exploration Department lays down guide lines on map index for information of pilot in making flight paths for aerial photography.

Even though taken from an altitude of 30,000 feet, the aerial photographs used to help map Saudi Arabia itself were often sharp enough in contrast to show up black-colored Bedouin tents staked out on the terrain. On most aerials studied, features of significance were right out in the open where they could be clearly seen. The map-makers found them easy to interpret because, in arid Arabia, trees, bushes and what scientists call "residual soil mantle" seldom, except for sand cover, obscured the essential surface expression of the land.

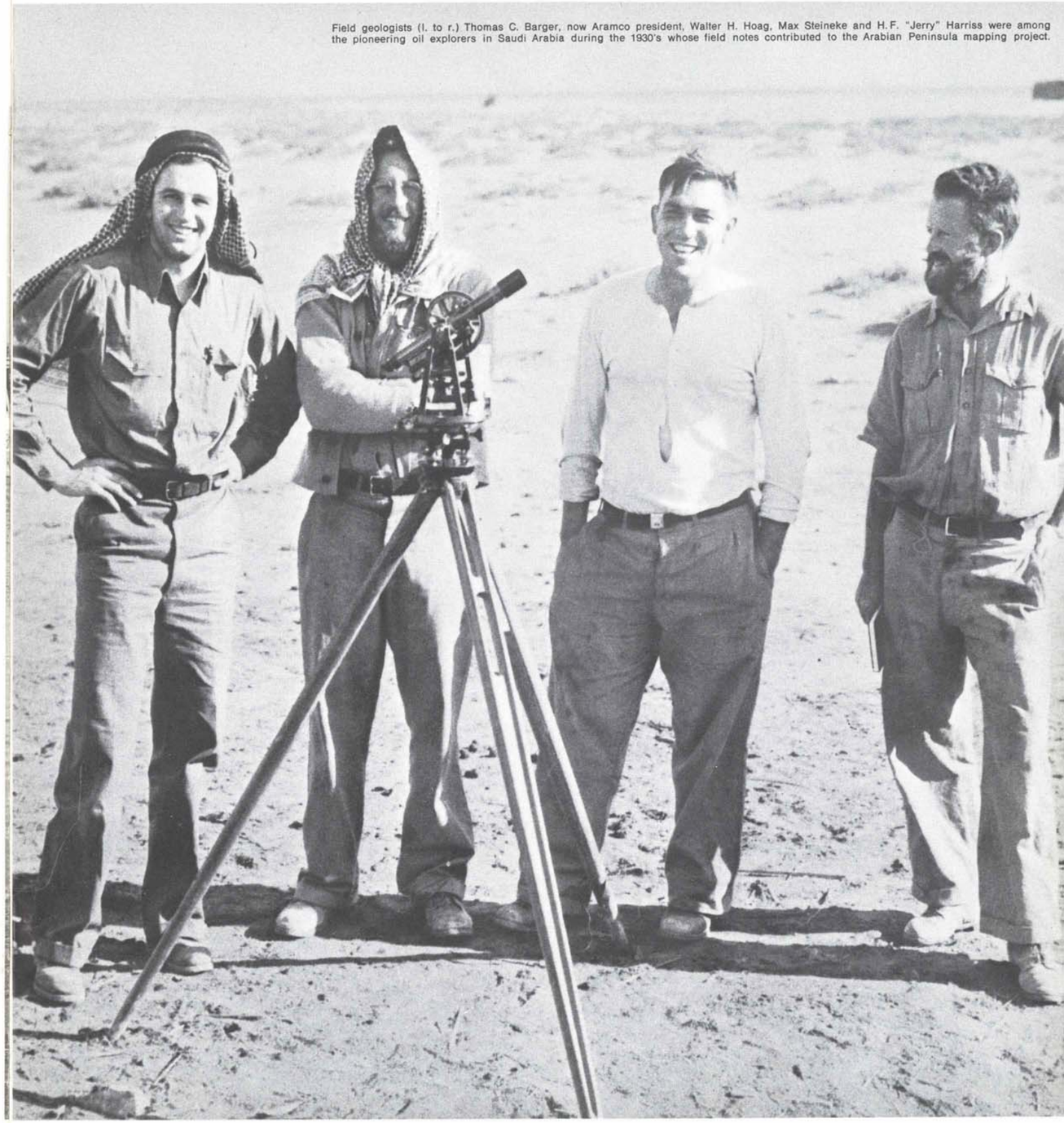
If the openness of the landscape simplified photographic interpretation, Saudi Arabia's current and active economic expansion, on the other hand, created a few problems for the map-makers. As one instance, the country has been undergoing a very ambitious road-building program. Cartographers indicated all the hard-surface and natural surface highways existing right up until their cut-off time, knowing very well that their highway information would become out of date even in the short interval between completion of the maps and their publication.

As they stand now, however, the maps are already being used for one of the main purposes for which they were intended: providing the Saudi Arabian Government with firm data for an orderly scientific and economic development of the Kingdom. Their accuracy and detail are such that they can be indispensable in the planning of roads, towns, agricultural programs and mineral exploration. As educational tools, 2,000 relief maps in Arabic, based on the 1:2,000,000-scale geographic edition, are to be presented by Aramco to schools throughout Saudi Arabia.

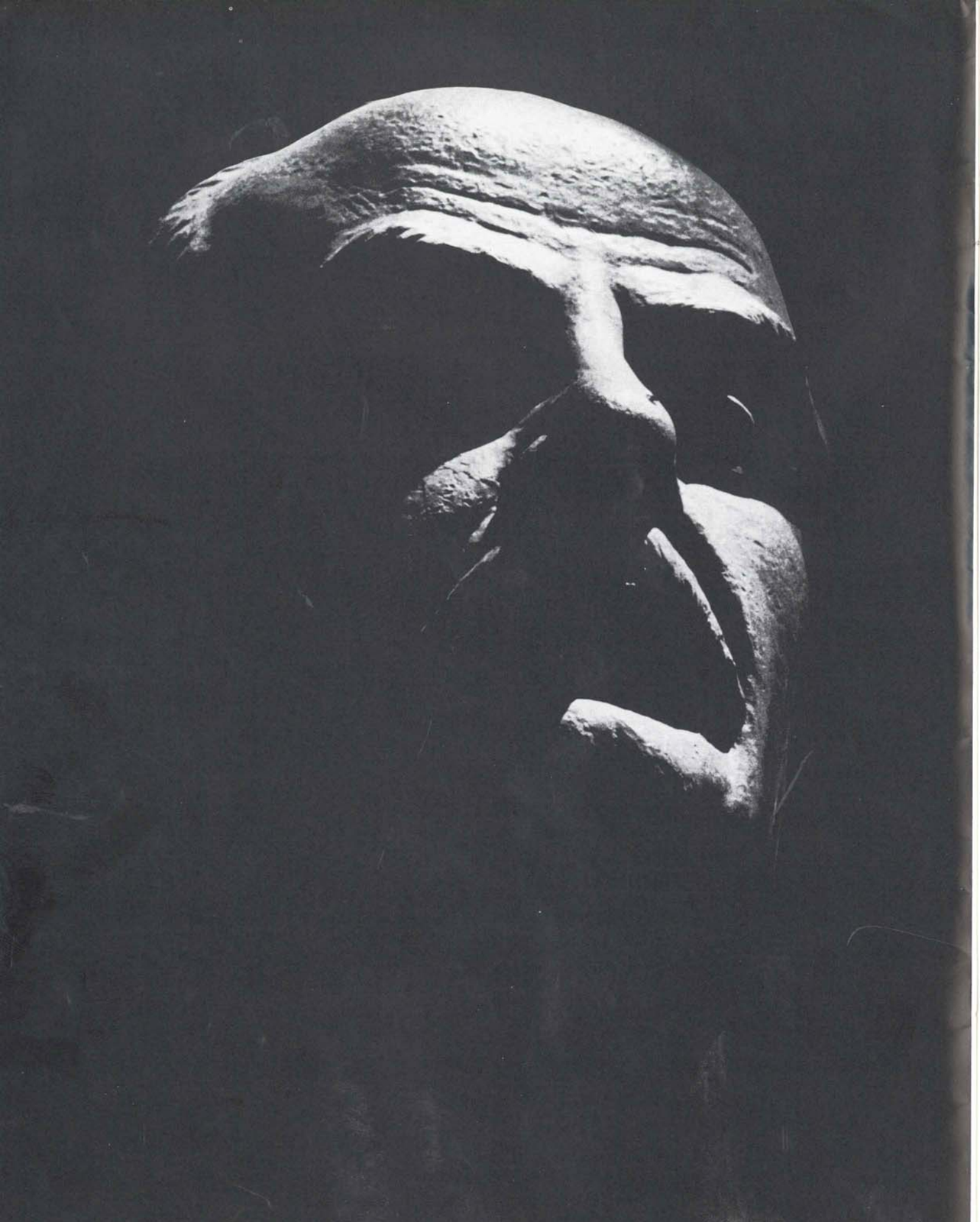
In addition to their obvious use as guides to further oil exploration and development programs the new maps have handed Aramco one minor, pleasant benefit as well. Several of the finished products carry graphic evidence of how correct were the predictions of its early oil explorers. In their geologic report of 30 years ago the team of Henry and Hoover said: "From a consideration of structural and stratigraphic conditions which prevail in the Dammam area .... the writers feel justified in recommending that a test well be drilled on the Dammam Dome."

On Geographic Map 1-208-B, which takes in the region they covered in their earliest reconnaissances, is a dot right on top of Dammam Dome. It is the cartographic symbol for an oil well — Dammam No. 7 — the first in Saudi Arabia to produce oil in commercial quantities — and still going strong. ■

Brainerd S. Bates, a writer with Aramco Public Relations in Dhahran, Saudi Arabia, spent three years in Majorca, Spain, as a free lance writer before joining Aramco in 1957. A graduate of Brown University in Providence, R.I., he is a former editor of Aramco World and contributes regularly to numerous oil publications.



Field geologists (l. to r.) Thomas C. Barger, now Aramco president, Walter H. Hoag, Max Steineke and H.F. "Jerry" Harriss were among the pioneering oil explorers in Saudi Arabia during the 1930's whose field notes contributed to the Arabian Peninsula mapping project.



Although his first books had failed, Kahlil Gibran somehow knew that "The Prophet" would be different...

"A STRANGE LITTLE BOOK"

BY MIKHAIL NAIMY

"It's a strange little book, Mischa."

Those words, though uttered 40 years ago, still ring fresh and clear in my mind. They were spoken by Kahlil Gibran—a still unknown Kahlil Gibran—one night not long after the publication of his third book in the English language, a short, curiously mystical work called *The Prophet*.

We were alone that night, Gibran and I, relaxing in what he and I and our small circle of other expatriate Arab writers and artists called "the hermitage," Gibran's modest studio on the third floor of a drab building on West Tenth Street in Manhattan, one of many such buildings packed tightly along the upper side of the street between Fifth and Sixth Avenues. Although severely furnished, as a hermitage ought to be, it spoke not so much of prayer as it did of work. It contained a cot that served Gibran as a bed at night and a lounge in the daytime, three upholstered chairs and a small bed-table on which stood a telephone. The whole studio was cluttered with folios of drawings, books, and papers and the tools of creative effort—brushes, paint tubes, pencils, pens and inkwells.

I had scarcely arrived when Gibran handed me a letter and said, with a twinkle of deep satisfaction in his eyes, "Read this, Mischa." The letter was from the president of Colorado College and asked permission to engrave a verse from *The Prophet* on the master bell of the chimes of the college memorial chapel. The verse was, "Yesterday Is But Today's Memory, and Tomorrow Is Today's Dream."

As I handed it back with warm, congratulatory words, Gibran looked at me with eyes half moist and said in a grave voice, "It's a strange little book, Mischa."

Today, nearly a half century later, it is clear that Gibran's view of his book was singularly appropriate. Barely 20,000 words long, philosophical in nature, mystical in tone, *The Prophet* was hardly a book one would expect to capture the attention of the reading public. Yet, eventually, it did. At first, to be sure, it attracted only scattered attention and even that was of an odd nature. In New York, for instance, a minister in a small church in one of the city's poorer sections somehow heard of *The Prophet* and requested permission to give readings from it at the church. Gibran assented and young men and women of the parish began to dramatize it on quiet evenings during the week. So favorable were the reactions that the word went out that the church had an unusually interesting program based on an unusually interesting book. Attendance increased and many of those who went to the readings eventually purchased a copy of the book and, in turn, added their endorsement to its spreading reputation. How far that reputation spread we did not know until the day Gibran received a letter from a friend relaying to him the unbounded admiration of the Queen of Rumania to whom someone had given a copy.

In this way, by such curious impulses, its fame slowly increased. Puzzled publishers occasionally issued new editions which continued, slowly, to sell. Then came World War II, and suddenly, inexplicably, the demand sharpened—as if, perhaps, the message of this book, conceived from such personal pain, leaped into sharper focus amid the sufferings of war. In any case it happened, and today the sales of *The Prophet* total more than 1,000,000 copies, and it has been translated into more than 20 languages.

Gibran, of course, did not know that any of this was to happen. He knew only that a verse he had written was

The glorious view Gibran loved and always remembered: the majestic mountains of northern Lebanon and Bsharri, his native village.

to be engraved on a bell in a college in Colorado. He knew only that after years of struggle in his lonely "hermitage," he had struck a responsive chord and that at last he could say, "Behold, I have caught the ear of the world and its fancy. I am no longer a voice in a void and a candle lit for the blind."

As we talked of the book that night I could not help but marvel at the mysterious hand that weaves human destinies. Here, in a tiny corner of that metropolis called New York, were two men born in faraway Lebanon of Biblical fame, Gibran at the foot of Cedar Mountain in the northern end of the lovely Lebanese range; myself at the foot of majestic Mount Sanneen in the center of that range, the distance between the two being no more than 50 miles. Yet Gibran and I met, not in Lebanon, but in the huge city on the Hudson. That was in 1916.

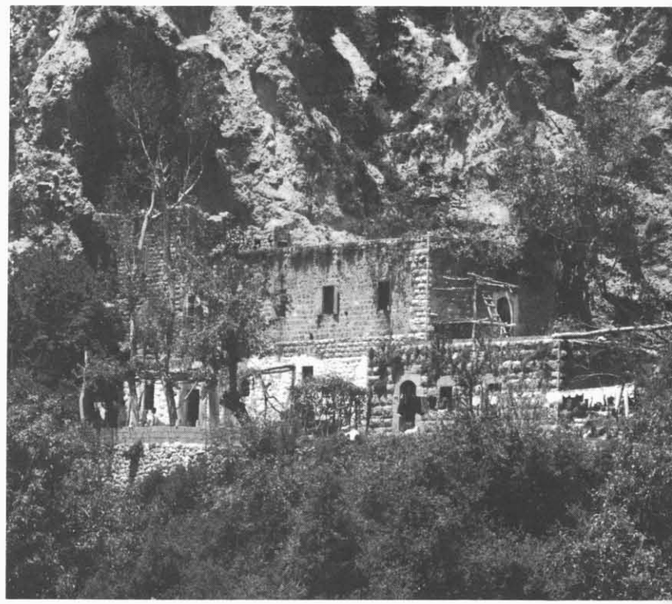
Gibran was born of a poor family in a small village called Bsharri and spent his boyhood close to nature amid the deep gorges, lofty peaks and crystal springs of northern Lebanon, a region rich in the sounds of nature and the constant shifts of light and shadow. In 1895, when he was only 12 years of age, his mother, a half-brother—his mother's son—and two sisters younger than Gibran decided to emigrate to America in search of a better life. They settled in Boston's Chinatown where a sympathetic teacher discovered Gibran's talent for drawing and painting and guided him into the study of art. Two years later, however, an intense urge to master his mother tongue—Arabic—drew him back to Lebanon for four years of study. From there he gravitated to Paris for a year's study of art, then back to Boston and finally, upon the tragic deaths of a younger sister, his mother and his half-brother from tuberculosis, to New York. Boston, however, was an important stop in Gibran's life, for it was there that he met Miss Mary Elizabeth Haskell during the exhibition of his first artistic efforts. Miss Haskell, principal of the Cambridge School for Girls, became Gibran's greatest benefactress. It was she who helped him to go back to Paris for study, who continued to help and encourage him through the later years of hardship, even to the end of his life. How important she was in his life can be seen in his dedication to her of his *Broken Wings* and other Arabic writings, and in his willing to her upon his death all the contents of his studio.

In New York Gibran was not entirely unknown. His fame as an original and very promising writer had preceded him to the large Lebanese and Syrian community living in Brooklyn and Manhattan. Many of his stories and other writings had already appeared in some of the Arabic journals published in New York, journals which carried his name back to the Arab countries in the old world where the younger generation hailed him as a rising and brilliant star in the firmament of new Arab literature.

Gibran, however, was not content with conquests in the small and little known cultural world of the Arab, and began to think seriously of invading the much larger and much more influential Anglo-Saxon world. His first timid step in that direction was a small book called *The Madman*, published in 1918. It was followed two years later by another small book called *The Forerunner*, a title chosen deliberately by Gibran who intended it only as a precursor of *The Prophet*. Neither caused any significant stir in America. And then, in 1923, came the "strange little book."

In structure, *The Prophet* hangs upon a very simple, yet very artificial skeleton: Almustafa—an Arabic name meaning "the chosen"—is a name borrowed by Gibran to designate a certain stranger who has lived 12 years in a certain city called Orphalese and who is awaiting a ship "to bear him back to the isle of his birth." From the top of a mountain he espies the ship and descends to the city to meet it and there faces the inhabitants of the city in a square before the temple. The inhabitants have come to bid him farewell and a woman called Almitra, "who had first sought and believed in him when he had been but a day in their city," entreats this "prophet of God" to speak to them, before he departs, of all that has been shown him "of that which is between birth and death." Speak, says Almitra, of love. Speak, says another, of marriage. And so Almustafa speaks—of love, of marriage, of work, of death, of children, of all those topics, in short, so important to the human heart.

It is not the skeleton, however, that sets *The Prophet* apart; it is the spirit and vision that animates it, that makes it breathe with the reactions of an impassioned, high-strung and over-sensitive soul that had known the full range of human experiences, from extreme dejection to the highest exaltation. It is too the music that cascades in words; the colors that make dead letters dance in rhythmic abandon; the shafts of light that pierce the dark-



The old monastery of Mar-Sarkees where Gibran wished to spend his last years on earth and where his body is now laid to rest in the old chapel.

Entrance, at right, to the chapel of Mar-Sarkees, hewn out of limestone, which is now the resting place of Kahlil Gibran's body.

ness as lightning pierces the clouds. It is, finally, the gates of a heart flung open to the world that it may see what miracles the magic hand of suffering had wrought in it. It is all that and more that makes *The Prophet* Gibran's masterpiece.

Yet to fully understand *The Prophet* it is important to consider the philosophical elements that went into its conception, the sharply differing influences on Gibran's slowly maturing thought.

At the beginning of his literary life, Gibran's main intent was to make of his pen a scourge of those who, he believed, restricted the material and spiritual freedom of his people. Bsharri, his village, lay in a region that was largely dominated by wealthier families and religious leaders. Gibran, who remembered this from his boyhood and from his youth, during the period when he returned to Lebanon, rebelled against this domination, delighted in calling himself a rebel and wished his people to rebel too against traditions which he saw as inimical to the free unfolding of their rich talents. Then, years later, he fell under the spell of "Thus Spake Zarathustra," a book by the German philosopher Nietzsche in which Nietzsche, as ever, passionately renounced Christian civilization. Gibran's early style and content reflected Nietzsche's bitter pessimism so much that he once called his people "rotten teeth." He even went so far in his Arabic work *The Grave Digger* to compare all men to worms and to corpses waiting for someone to inter them. To that period also, when bitterness consumed him, belong his first two books in English, *The Madman* and *The Forerunner*, both of which breathe denunciations of man's stupidity and blindness. But that phase passed too, and he turned to the more peaceful and humane philosophy of the Vedas (Hindu sacred writings) and to the Christian Gospels. In the Gospels, and particularly in the Sermon on the Mount, Gibran found the deeper meaning of life expressed not in logic as the philosophers would express it, but in terms of pure poetry. And it is this last, final phase, one dominated by the spirit of the Sermon on the Mount, that he breathed into *The Prophet*.

There are other influences to be found in the book too. One is the Hindu doctrine of reincarnation, reflected in at least four passages, especially that which says: "But should my voice fade in your ears and my love vanish in your memory, then I will come again." There is also the reference to the "vast man" within all men. "It is in the vast man that you are vast," says Almustafa to the people of Orphalese and one wonders if Gibran's "vast man" is not another version of Nietzsche's "superman." If that be true Gibran accomplished a great feat; he made of the German iconoclast one of the fishermen of Galilee who became fishers of men.

Out of such influences was born the message of *The Prophet:* that man's end is nothing short of omniscience, omnipotence, omnipresence and immortality and that in that light love, charity, compassion, forgiveness, gentleness and kindred virtues become necessities for right living in the same sense that bread, water, light and air are necessities for the body. They become the law and to deviate from them is to invite pain to oneself. Pain, therefore should be looked upon as an eye-opener to make man see his transgressions against the law. To use Almustafa's words to the people of Orphalese: "It is the bitter potion by which the physician within you heals your sick self."

There is another side to *The Prophet* which escapes most people, an intensely personal side. It is Gibran opening up his heart and speaking of things entirely personal. That side is thinly veiled by artificial names such as Almustafa, Orphalese, Almitra, the isle of Almustafa's birth, the ship and the mariners, as well as by certain numbers and dates such as the 12 years in Orphalese. By lifting the veil one can easily identify Gibran as Almustafa; the city of New York as Orphalese; Mary Haskell as Almitra; Lebanon as Almustafa's isle of birth; the 12 years in Orphalese as the 12 years Gibran spent in New York prior to the publication of the book.

When read in this light the prologue and epilogue in *The Prophet* become much more than beautiful literature. They become pulsating fragments of Gibran's heart, a heart so sensitive that it responded with tears at the merest suggestion of human sorrow. Thus, it is Gibran baring his loneliness in New York in his early days there and expressing his consuming thirst for wider recognition when Almustafa, about to leave, says:

> "*How shall I go in peace and without sorrow? Nay, not without a wound in the spirit shall I leave this city. Long were the days of pain I have spent within its walls, and long were the nights of aloneness...*"

Thus, too, it is Gibran expressing a farewell to New York and gratitude for the recognition it finally accorded him when Almustafa says:

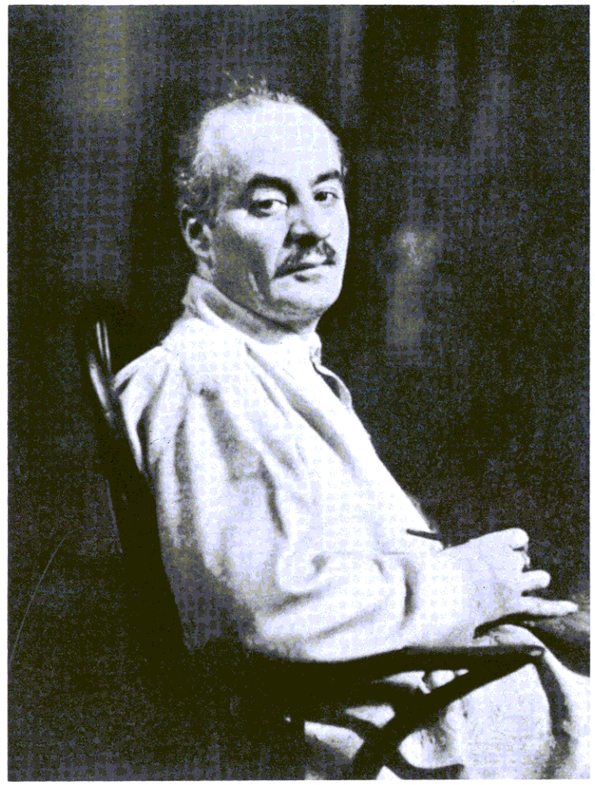
> "*You have given me my deeper thirsting after life. Surely there is no greater gift to man than that which turns all his aims into parching lips and all life into a fountain.*"

In the longing to go and the reluctance to depart, expressed so touchingly in the prologue and epilogue by Almustafa, there is an even deeper poignancy if one realizes that Gibran, prior to the publication of *The Prophet*, had taken steps which were to lead to a permanent return to Lebanon. About a year before the book came out Gibran had begun to talk to me of a real hermitage, not just his small studio on West Tenth Street. It was a small deserted monastery called Mar-Sarkees just outside his beloved village of Bsharri. He had begun negotiations to buy the monastery because he craved intensely the peace and solitude of that charming corner in northern Lebanon, not only for his weary soul, but for his overworked and ailing body as well. For some time he had been complaining seriously of physical disturbances whose precise nature he did not know. They terminated in his death at the age of 48 the night of April 10, 1931, in a New York hospital not far from his studio. Mar-Sarkees, where he planned to spend the rest of his days in fruitful work and peaceful meditation, became the final resting place for his lifeless body only.

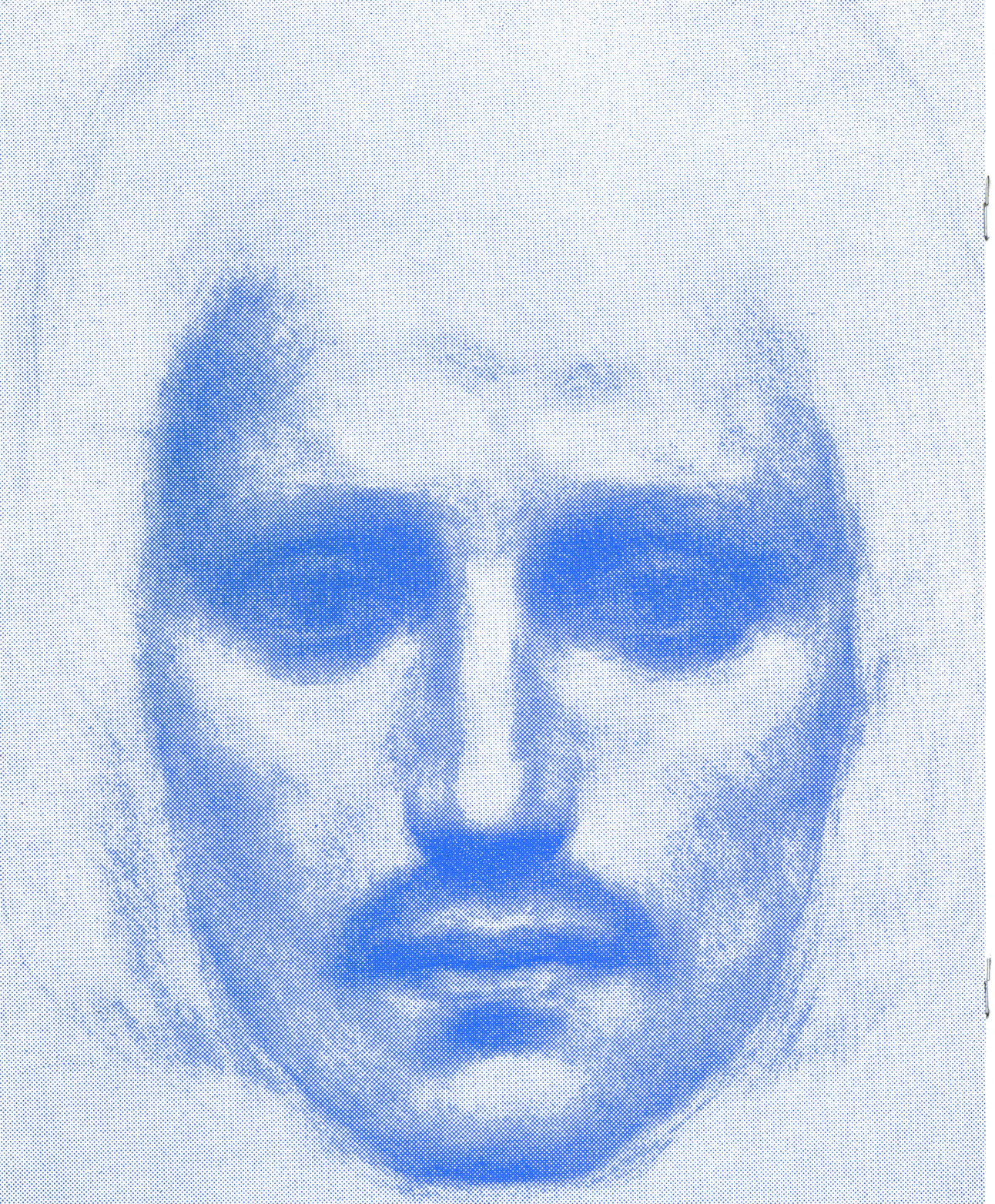
In this light it is easy to understand how very true and apt was Gibran's answer to one who had asked him how he happened to conceive and write *The Prophet:* "Did *I* write *it*? *It* wrote *me*."

It is indeed a strange little book. ■

Mikhail Naimy, a Lebanese writer, poet and philosopher, was an intimate friend of Kahlil Gibran for nearly 15 years and is the author of a biography of Gibran. He studied in Russia and France and lived in America for almost 18 years, before returning to the village of Biskinta in Lebanon where he was born in 1889.



One of the last pictures made of Kahlil Gibran before his death.



So spoke Almustafa...

...of love..

"When love beckons to you, follow him,
Though his ways are hard and steep.
And when his wings enfold you yield to him,
Though the sword hidden among his pinions may wound you.
And when he speaks to you believe in him,
Though his voice may shatter your dreams as the north wind lays waste the garden.

...of marriage..

"Love one another, but make not a bond of love:
Let it rather be a moving sea between the shores of your souls.
Fill each other's cup but drink not from one cup.
Give one another of your bread but eat not from the same loaf.
Sing and dance together and be joyous, but let each one of you be alone,
Even as the strings of a lute are alone though they quiver with the same music.

...of children..

"You may give them your love but not your thoughts,
For they have their own thoughts.
You may house their bodies but not their souls,
For their souls dwell in the house of to-morrow, which you cannot visit, not even in your dreams.
You may strive to be like them, but seek not to make them like you.
For life goes not backward nor tarries with yesterday.
You are the bows from which your children as living arrows are sent forth.

...of giving..

"You often say, I would give, but only to the deserving.
The trees in your orchard say not so, nor the flocks in your pasture.
They give that they may live, for to withhold is to perish.
Surely he who is worthy to receive his days and his nights is worthy of all else from you.
And he who has deserved to drink from the ocean of life deserves to fill his cup from your little stream.

...of work..

"And what is it to work with love?
It is to weave the cloth with threads drawn from your heart, even as if your beloved were to wear that cloth.
It is to build a house with affection, even as if your beloved were to dwell in that house.
It is to sow seeds with tenderness and reap the harvest with joy, even as if your beloved were to eat the fruit.

...of joy and sorrow..

"Your joy is your sorrow unmasked.
And the selfsame well from which your laughter rises was oftentimes filled with your tears.
And how else can it be?
The deeper that sorrow carves into your being, the more joy you can contain.
Is not the cup that holds your wine the very cup that was burned in the potter's oven?
And is not the lute that soothes your spirit the very wood that was hollowed with knives?
When you are joyous, look deep into your heart and you shall find it is only that which has given you sorrow that is giving you joy.
When you are sorrowful, look again in your heart, and you shall see that in truth you are weeping for that which has been your delight.

...of buying and selling..

"To you the earth yields her fruit, and you shall not want if you but know how to fill your hands.
It is in exchanging the gifts of the earth that you shall find abundance and be satisfied.

...of reason and passion..

"Your reason and your passion are the rudder and the sails of your seafaring soul.
If either your sails or your rudder be broken, you can but toss and drift, or else be held at a standstill in mid-seas.
For reason, ruling alone, is a force confining; and passion, unattended, is a flame that burns to its own destruction.

...of pain..

"Your pain is the breaking of the shell that encloses your under-standing.
Even as the stone of the fruit must break, that its heart may stand in the sun, so must you know pain.

...of teaching..

"No man can reveal to you aught but that which already lies half asleep in the dawning of your knowledge.
The teacher who walks in the shadow of the temple, among his followers, gives not of his wisdom but rather of his faith and his lovingness.
If he is indeed wise he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind.

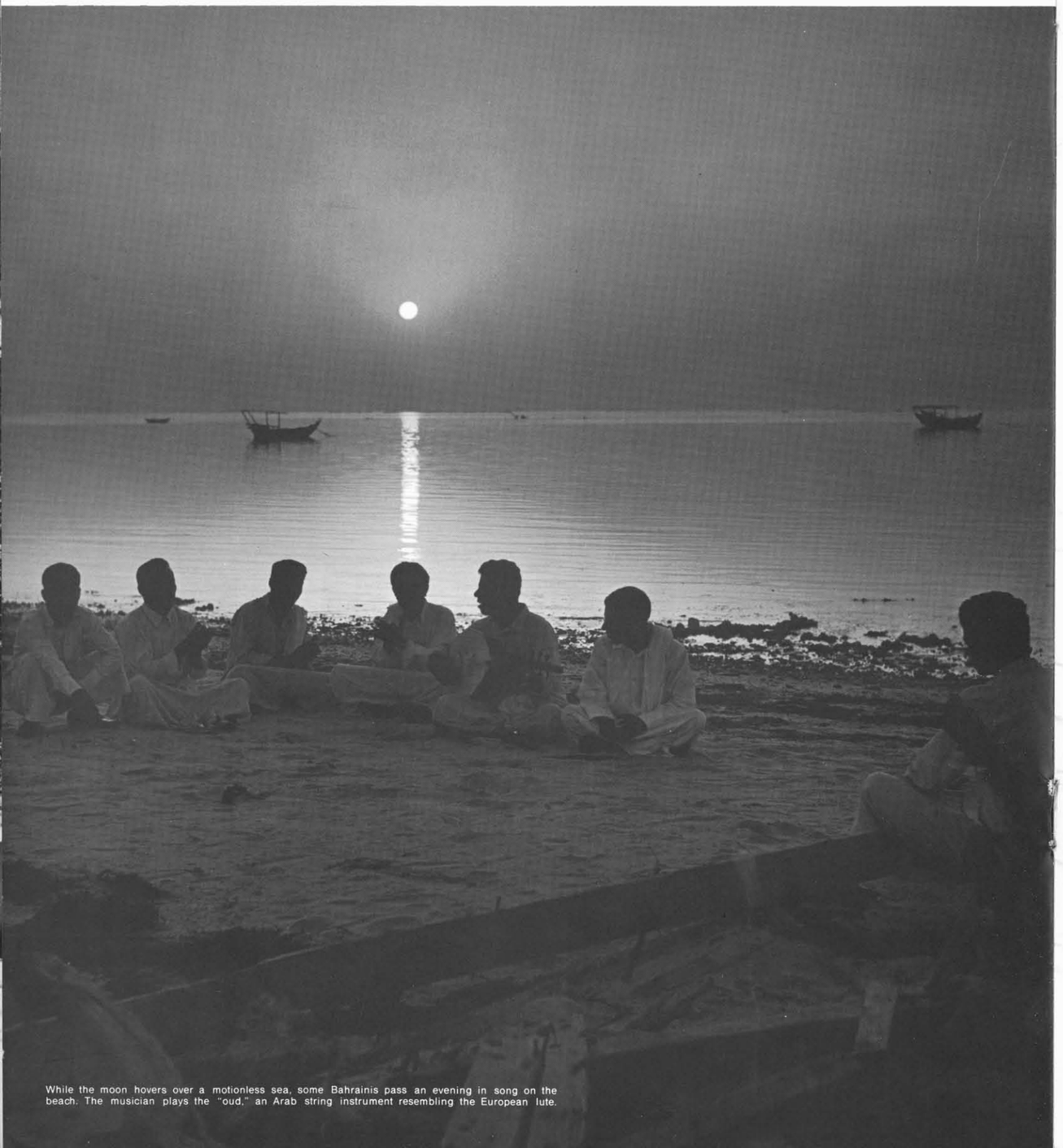
...of friendship..

"And let your best be for your friend.
If he must know the ebb of your tide, let him know its flood also.
For what is your friend that you should seek him with hours to kill?
Seek him always with hours to live.

...and of other things..

"You have been told that, even like a chain, you are as weak as your weakest link.
This is but half the truth. You are also as strong as your strongest link.
To measure you by your smallest deed is to reckon the power of ocean by the frailty of its foam.
To judge you by your failures is to cast blame upon the seasons for their inconstancy."

Bahrain's ancient inhabitants chose an appropriate name for this curious cluster of small islands...



While the moon hovers over a motionless sea, some Bahrainis pass an evening in song on the beach. The musician plays the "oud," an Arab string instrument resembling the European lute.

LAND OF THE TWO SEAS

BY KEITH BRADLEY

The lithe brown figure took a deep breath, clutched the deflated goatskin bag to his chest, and leaped from the prow of the *jalibut* into the sea. Down he sank to the bottom, some three fathoms below the calm surface, and for a full half-minute remained submerged among the undulating flora of the deep. Then suddenly he broke surface, heaving the now-swollen goatskin bag into the eager hands of his shipmates.

The goatskin passed from one sailor to the next, each in turn slaking his thirst—not with salty sea water, to be sure, but with cool fresh water issuing from one of the many submarine springs which ring the Arabian Gulf island of Bahrain. Indeed, the presence of sweet water beneath the briny sea is thought by philologists to account for the name Bahrain itself—an Arabic word meaning "two seas," and referring to the ancient assumption that there was another sea beneath the sea bed.

Whatever the origin of the name, it is certainly appropriate, for Bahrain has owed its traditional prosperity to twin bounties of the sea—maritime commerce and the pearl industry. The rich pearling grounds around Bahrain gave the island its first eminence as long ago as 2000 B.C., when an Assyrian scribe incised in stone a reference to the fabulous "fish eyes" taken from the waters of Bahrain. They continued to provide the people of Bahrain with one of the highest per capita incomes in history uninterruptedly down to modern times. When the inroads of the cultured pearl industry in Japan threatened the Bahraini pearl trade toward the end of the 1920's, the islanders bounced back with the discovery that they were sitting atop a sizeable deposit of crude oil, currently estimated at 245,000,000 barrels.

The beneficiary of this national good fortune is an Arab nation of about 150,000 people, living on a group of six main and a handful of lesser islands in the Arabian Gulf, just halfway between the Qatar peninsula and the even richer mainland of Saudi Arabia. Bahrain, some 30 miles long by up to 10 miles wide and shaped like the flint arrow heads which abound in its soil from the neolithic past, is by far the largest of the group, although the total island area of 231 square miles is only half the size of Los Angeles.

Bahrain and its Dependencies, to give the state its full title, is an autonomous Arab shaikhdom with a hereditary ruler. He is Shaikh 'Isa ibn Salman al-Khalifah, who succeeded his late father in November 1961. A member of the al-Khalifah family has ruled Bahrain for almost 200 years, and today nearly every major government department has an al-Khalifah at its head.

Such stability is a comparatively recent development. Bahrain's earlier history is mysterious and obscure, even the conjecture that the original inhabitants, the Baharna, were refugees from King Nebuchadnezzar's Babylon being open to question. Compounding the mystery of Bahrain's beginnings is the presence of some 100,000 burial mounds, or *tumuli*, scattered over half the island's area. Built of stone and lined with cement-like gypsum, the mounds reach 80 feet in height and 100 feet in diameter. Though most of them were plundered in ancient times, the 100-odd tombs so far investigated have contained pottery, copper spearheads, ostrich-shell drinking cups, ivory figurines and gold rings—and never more than a single human skeleton in each—evidence too meager to reconstruct with accuracy the civilization that built this, the world's largest necropolis.

A team of Danish archeologists which has excavated many tombs has identified the mound-makers as the inhabitants of Dilmun, a thriving merchant community reported in Sumerian writings. Mentioned frequently in Sumerian literature as the "land of immortality" and meeting place of the gods, Dilmun was fortified, independent, and probably the trade link between the Sumerians of what is now Iraq and the Indus Valley states in present-day West Pakistan. Apparently Dilmun, or Bahrain, flourished as a trading center for a thousand years until the descent of the Aryans on India, around 1800 B.C., choked off the trade, after which its importance declined.

At the time of Muhammad, Bahrain was governed for Persia by a Christian Arab, and a Nestorian bishop had his see on the island. From that time until the 18th century, control of the island see-sawed among the Arabs, Persians, Portuguese and Omanis. In 1522 the Portuguese seized Bahrain; the crumbling remains of a fort and a few rusty cannon and cannon balls are the only reminder of nearly a century of occupation. Persia captured Bahrain from the Portuguese in 1602, only to lose it to Omani pirates, from whom the shah had to ransom it in 1720 for "a large sum of money." Late in the 18th century the al-Khalifah family from the Nejd in Arabia invaded Bahrain. After a brief, bloody struggle with the Persians in which "sword play and spear play commenced, heads flew away from bodies and warriors attacked each other with cries which melt cowardly hearts," the al-Khalifah clan was in firm possession of the island, which it retains today.

Out of these mixed ancestors have come today's Bahrainis, short, slight, muscular and possessed of the same sense of humor attributed to all Arabs. Most of the population are Muslims, divided about equally between Sunni and Shi'a, and most cling to traditional dress, the *ghutra*, a white headcloth held in pace with an *agal*, a woolen cord, a *thaub*, the ankle-length shirt or gown, with a *bisht*, a cloak of dark wool sometimes trimmed with gold. Among those who have been drawn into the growing industrial world of the islands, the traditional dress is giving way slowly to western dress, primarily because of the hazards of wearing loose clothing near modern machinery.

For the past 4,000 years the magnetic lure of Bahrain has been its pearls. At its pre-1930 peak, the industry was said to employ half the population of the islands on some 3,000 boats ranging from one to 50 tons.

The methods used to recover the pearls are practically unchanged since the Arab historian Masudi described them in detail 11 centuries ago.

The pearl diver wears ear stoppers of beeswax, a bone clip to close his nostrils, and very little else. Grasping a weighted line to get him to the bottom quickly, he leaps into the water with a net bag for the oysters attached to another line, and sinks to the floor of the sea. The average dive of around 50 feet permits the diver to remain below a minute and a half (although some divers can stay for three minutes) and collect up to a dozen oysters before a sharp jerk on the line signals his handler above to pull him to the surface. A good diver can make 60 such descents a day, braving sharks and barracuda and the poisonous jelly fish, not to mention the possibility of cumulative damage to his body from the repeated immersions at high pressure: deafness, heart trouble, bronchitis and rheumatism.

Despite such hazards, the introduction of diving suits in recent times was violently opposed by the divers themselves, for though they eliminated the worst dangers of diving, they discriminated against the divers too poor to afford them; the Ruler of Bahrain sided with the divers and outlawed diving suits. In any case, the world-wide depression of the 1930's and the Japanese cultured pearl industry combined to make pearl diving less attractive than formerly. The peak island income from pearls of $10,000,000 annually has long since become a memory, and pearls such as the beauty an American lady paid $75,000 to possess, are an increasing rarity.

The decline of the pearl trade had put Bahrain in the economic doldrums by the time Standard Oil Company of California struck oil on the island in June, 1932. It was the first major oil strike in the Arabian Gulf, and it could not have come at a more propitious time. Soon the field was developed sufficiently for shipment of crude oil to the United States for refining.

Rapid expansion of the petroleum industry in Bahrain followed and the discovery of oil there set off a scramble for concessions in neighboring Qatar and on the east coast of Saudi Arabia. The new fields dwarfed Bahrain's production, but the Bahrain Petroleum Co., Ltd. (jointly owned by Socal and Texaco in 1935) established a major refinery, an installation which today ranks among the largest in the world. It is so large in fact that its own crude production of 46,000 barrels per day must be supplemented by crude oil piped from Saudi Arabia. Parallel pipelines run from Aramco's fields in Dammam 34 miles to Bahrain's refinery, half the way submerged in the Gulf of Bahrain (making it the longest private pipeline of its kind in the world.) The supplemental crude permits a throughput at the Bahrain refinery of 200,000 barrels per day.

Revenue from the oil produced by the Bahrain Petroleum Company (Bapco) and from refinery operations provides the Government with an income which has financed considerable development in the shaikhdom. Though small by Arabian Gulf standards—Bahrain's oil royalties for 20 years equaled those of Kuwait for four months—the money has been wisely used. One-half of oil revenues has traditionally been invested in a reserve fund, while the other half has been used for capital improvements in schools, hospitals, and other public works. Other state income has been derived from the pearl trade, customs duties, etc.

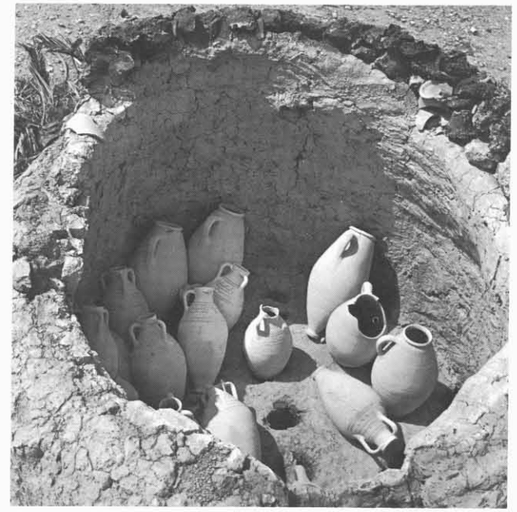
Employing 5,000 Bahrainis and 2,000 British, Americans and other nationals, the petroleum industry has had an enormous impact on the islands' social and economic structure. One significant result of the oil royalties is that Bahrain has become, in effect, a welfare state. The Bahrain citizen receives free education. For every Bahraini there is an excellent health service which includes top-flight doctors, hospitals and child welfare clinics, at no cost whatever to the patients. There is full employment and a sound labor law protects workers from possible abuses by employers.

During the past decade the pace of Bahrain's development has accelerated. In 1961, after six years of work, a deep-water port was completed from which ocean-going ships can load and discharge cargoes directly at shore facilities. Situated in sheltered water near the capital city of Manama, the port has a dredged channel leading to the open sea. Until this port complex was completed, vessels discharged cargoes into open lighters some three miles at sea in an exposed anchorage, resulting in delays due to bad weather and in cargo being lost over the side. The port has proved a boon for Bahrain's entrepôt trade, now second only to oil as a source of income, and because of the archipelago's strategic position in the Arabian Gulf a main feature of its livelihood for the past five millennia.

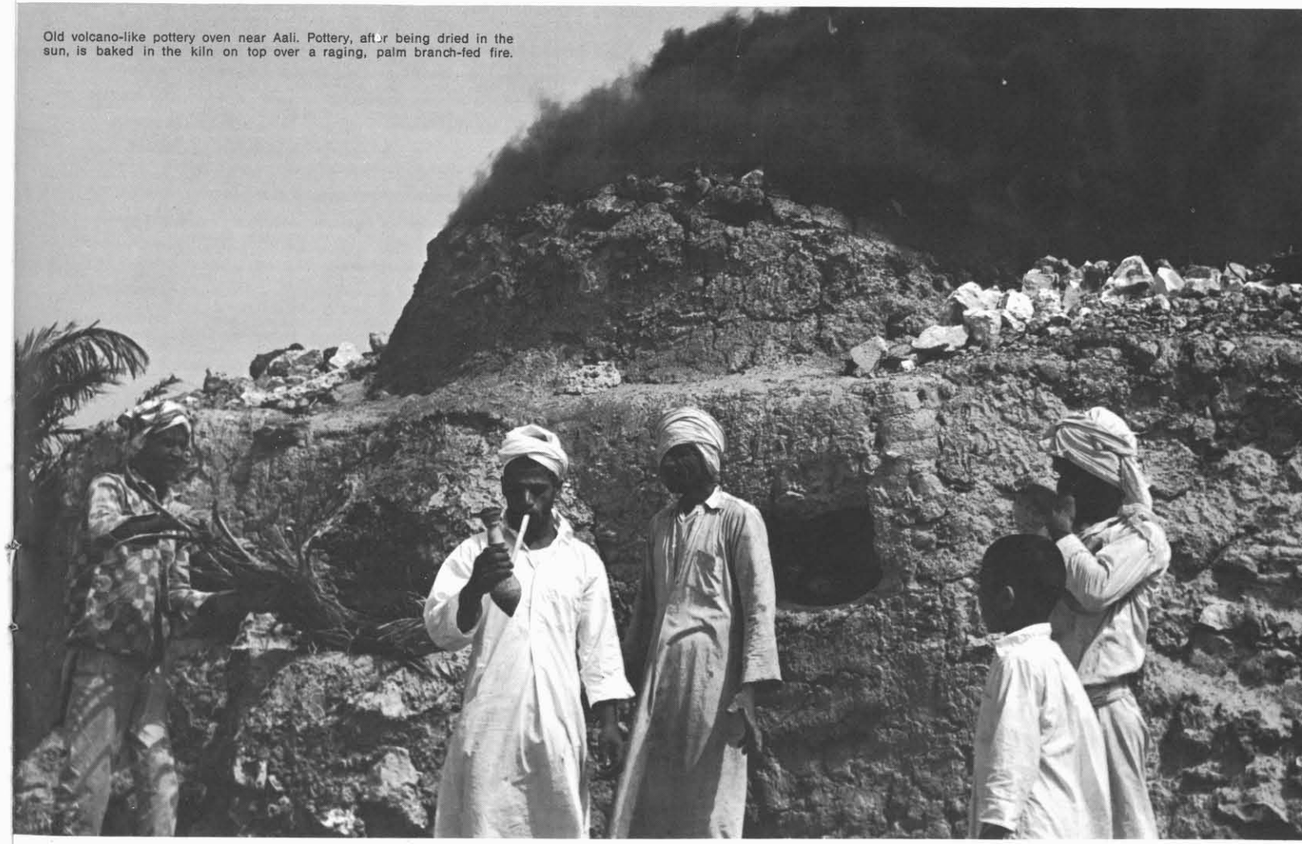
The oil industry has encouraged many ancillary industries, each contributing its share to the islands' prosperity. A large ship-repair depot was established on Bahrain last year, consisting of two slipways capable of accommodating two 1,000-ton vessels. Financed by private capital and wholly owned by Bahrainis, the depot's auxiliary facilities include workshops which can handle repairs on most types and sizes of vessels.

The new interest in shipyards continues an old Bahraini tradition, which languished temporarily when the pearl industry declined. Most of the pearling ships were locally made *jalibuts* or *sambuqs*, fully decked, square-sterned ships with clipper bows and two masts, or single-sailed *mahaila*. Eminently seaworthy, these ships were stitched together with a giant needle and cord in the days before iron nails appeared in the Gulf, and yet they could withstand the strongest Indian Ocean gales. The memory of Portuguese occupation is preserved in the *baghala*, a large craft resembling the Portuguese man-of-war down to the square port holes in the counter, though nowadays these are usually merely painted representations. Even more unusual is the *huwairiyah*, a tiny craft constructed of date stems lashed together and made watertight by being soaked in fish oil.

With such a diversity of sailing craft, it was only natural for Bahrain to develop a first-class fishing fleet,



Amphorae in the kiln after baking.



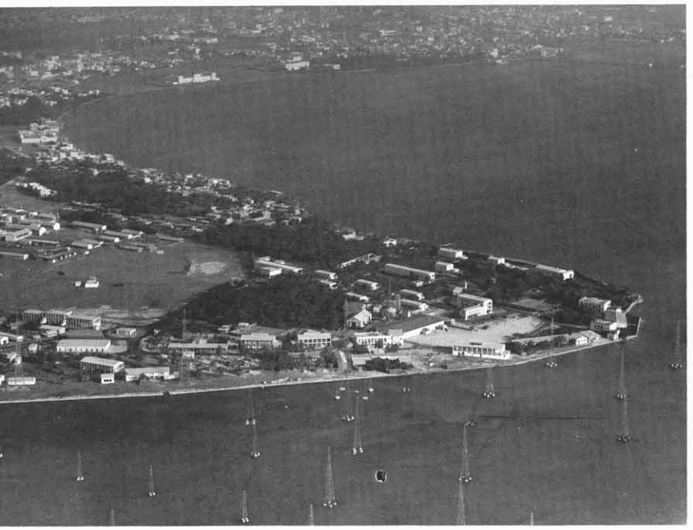
Old volcano-like pottery oven near Aali. Pottery, after being dried in the sun, is baked in the kiln on top over a raging, palm branch-fed fire.

particularly as there are more than 400 species of fish in the archipelago. Today the most important are octopus, considered a delicacy by the Arabs, the porpoise, from which oil is rendered commercially, rock cod, sardines, horse mackerel and shark, the fins and tails of which are exported to China for soup. Fish are also used to feed cattle on Bahrain when fodder is unavailable; surprisingly, perhaps, the milk tastes the same either way.

During the February-June and August-November seasons, Bahrain's fishermen ply their trade with huge circular nets or with the *hadhra*, a fish trap made of palm branches, which ensnares fish in its branches near shore on the outgoing tide. The Bahrainis have also evolved a mild narcotic made from the ground seed of the Persian lilac tree mixed with a paste of crab meat and small fish, which they spread on the calm Gulf waters. Fish which rise to eat the bait are drugged, and can then be caught by agile fishermen who slip over the side of their boats to land them by hand. Those eating the fish are unaffected by the poison.

Fishing remains a major means of livelihood for Bahrainis, but not nearly to the extent it was in former times, when a 16th-century Dutch traveler found some 40,000 of them (or so he said) engaged in this occupation.

The advent of the air age made Bahrain an important link in East-West communications. In 1961 an international airport with a runway capable of handling large passenger jets was inaugurated on the island of Muharraq, which is connected to Manama by a 1.5-mile causeway. Bahrain's Gulf Aviation Company serves as the leader in regional transportation, including in its passenger and freight schedules regular service to Saudi Arabia, Qatar, Kuwait, the Trucial States and Muscat.



Manama, capital and major city. In the foreground are radio transmission towers.

Pearl divers resting near bow of pearling ship from which they dive.

The central position of the Bahrain archipelago, coupled with its excellent air and sea facilities, has led an increasing number of foreign firms to establish regional offices in Manama, from which Middle Eastern markets and those of the Indian subcontinent are equally accessible. The capital, with a cosmopolitan population of some 62,000, is rapidly being modernized, and multi-story office and apartment buildings are beginning to dominate the skyline.

Last December one of the most significant social developments in recent Bahraini history took place when the Ruler, Shaikh 'Isa ibn Salman al-Khalifah, laid the foundation stone for an all-new city, the first phase of which will cost some $22,000,000 to build. Designed to provide up-to-date accommodations for middle-income groups, the city will have mosques, schools, modern street lighting and other municipal services frequently lacking in the older cities of the Middle East.

The government is encouraging agriculture, too, in a land not noted in recent times for its fecundity, although in the 2nd century B.C. the fleet of Alexander the Great found Bahrain "well-wooded and productive." It is the government's intention to restore that happy condition through a newly-established Agricultural Department and an experimental farm, on which methods and equipment will be tested for suitability to Bahrain's saline and sandy soil. Farmers are being assisted with advice and the loan of equipment, while better fertilizers and pesticides are being introduced by a staff of experts.

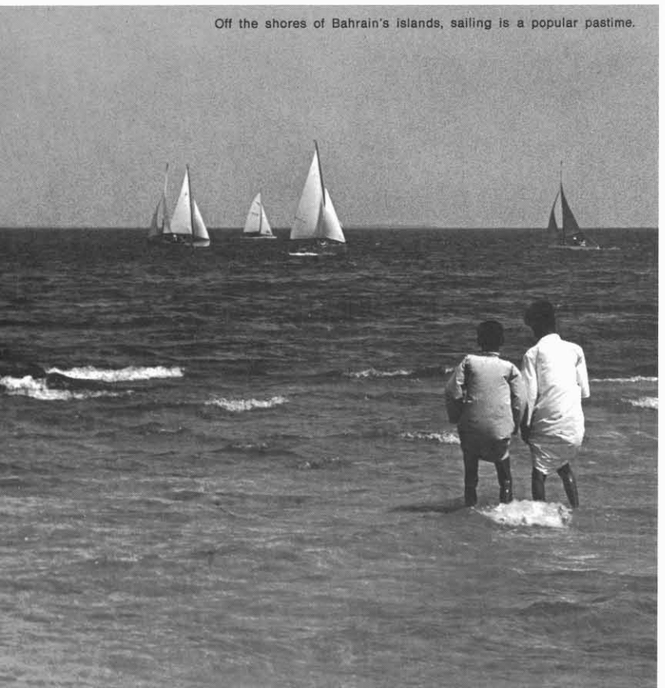
In the past 20 years many thousands of acres have been reclaimed from the harsh terrain of sand, rock and gravel, and today dense plantations of date palms bind the northern coastlines of Bahrain Island with a ribbon of green. Under the shade of the palms thrive alfalfa and, from October to April, a large variety of vegetables. Such cultivation is not only economically valuable but relieves the monotony of a desert landscape.

One of the most unusual features of Bahrain is its central depression, where the land has eroded away leaving a rim of inward-facing cliffs, known locally as the Rim-Rock. At the center of the depression stands the Jabal ad-Dukhan ("Mountain of Smoke"), a rocky eminence 450 feet above sea level, which gets its name from the shroud of dust which surrounds it in summer and lends a misty look to the summit.

On the northwest part of Bahrain can be found subterranean water channels called *qanats*, thought to have been built between the 4th and 7th centuries. They are almost certainly Persian in origin and are similar to those found today in Persia, Syria and Eastern Arabia. So well constructed that many are in good working order today, the *qanats* were built to minimize evaporation of irrigation water. Then, as now, a channel at ground level was dug, the sides were lined with stone, then roofed over with slabs of stone, with chimney-like shafts giving access to the *qanat* at 20-yard intervals for removing accumulated silt. At least once, in the 8th century, a besieged Bahraini

Graceful but lonely in a world where the old rapidly makes way for the new are the minarets of an ancient mosque, the island's oldest Islamic structure.

Sole remnant of Portugal's conquest of Bahrain is a crumbling fort about 400 years old.



Off the shores of Bahrain's islands, sailing is a popular pastime.

garrison crawled through a *qanat* and under an invading army, taking it by surprise from the rear and routing the enemy.

In common with that of most Arab countries and the Arabian Gulf states in particular, the Bahrain summer is as savage as anywhere in the world. A relentless heat, magnified by the bare rock and sand, can produce air shade temperatures of up to 120° F. Mercifully, in June a cool *shamal* blowing from the north cuts temperatures by as much as ten degrees. Although the months from November to May are delightful, the humidity in summer steadily increases until the island steams like a Turkish bath. World weather statistics, in fact, award Bahrain an unenviable "high"—the world's highest mean dew point (the temperature at which the atmosphere, being cooled, becomes saturated with water vapor): 82° F. Despite the humidity, however, the rainfall averages a negligible three inches a year, one-third that of New Mexico.

The fierce summer has affected the way of life of everyone on the islands and many methods have been adopted to combat it. Air conditioning has become as much a necessity as heating is to the Scandinavian countries. The designers of the oil company community of Awali made it one of the first centrally air conditioned cities ever built, to the everlasting gratitude of the people who work there.

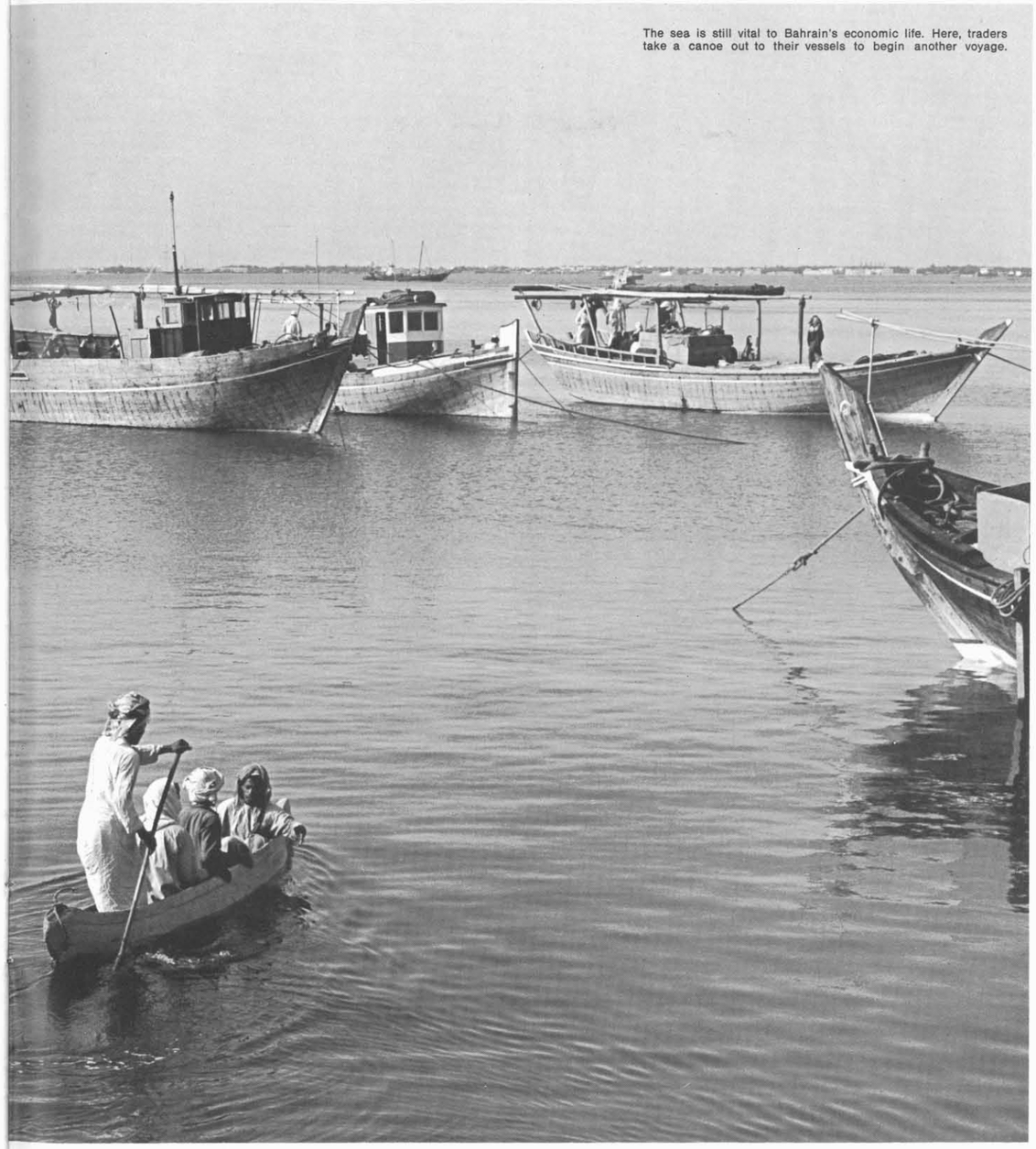
The weather has, it seems, even conspired to keep the animal population on Bahrain at a minimum. Camels are kept and bred by the Ruler, more out of sentiment for a departed way of life than necessity, for camels have seldom been used for transport on the archipelago. A few hare, a species of lizard, the mongoose and the kangaroo rat very nearly comprise the whole of Bahrain's larger wild animal life, now that the black buck and gazelle have been all but exterminated by over-zealous hunters. One denizen of Bahrain, the white ass, in the minds of some makes up for the lack of the rest, for it was once prized throughout the Arab world as a beast of burden both useful and decorative, and in Bahrain it is still bred with the care given race horses elsewhere.

Although small, the islands of the Bahrain archipelago exhibit a diversity which gives them a charm found nowhere else in the Arabian Gulf. Their magic has the same appeal today it must have had to the Sumerian settlers who plied its pearl-strewn waters at the dawn of history.

■

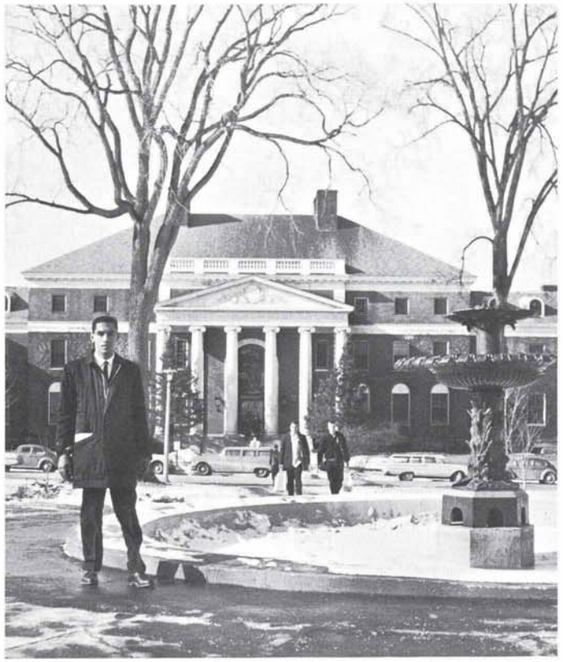
Keith Bradley, an English newspaperman for ten years and now a public relations man for the Bahrain Petroleum Company Limited, edits the company's English language newspaper, The Islander, *and is the Arabian Gulf correspondent for two major London dailies,* The Daily Telegraph *and the* Daily Express.

The sea is still vital to Bahrain's economic life. Here, traders take a canoe out to their vessels to begin another voyage.



Learn, remember and know

BY CHARLES E. WILKINS



'Abd Allah Ali Zayir's real home is in Qatif, Saudi Arabia. His temporary one is an off-campus, three-room apartment in Burlington, Vermont, U.S.A.

Exchanging news from home, Muhammad Nasir al-Duwayan, left, and Muhammad Saif, both students from Saudi Arabia, pause between classes on Mitchell College campus in New London, Connecticut.

In his apartment in Greenwich Village, Salih Ghanim, of Qatif, contemplates the future.

Like all students in Washington, Khalid Ali Turki of Dammam, Saudi Arabia, finds the Library of Congress an invaluable source of information.

To promising young men Aramco offers opportunity—to help themselves and their country ...

On the East Coast of the United States recently, four young men, hundreds of miles apart, shared a common experience. One, Salih Ghanim, emerged from a neat brick building in lower Manhattan, shivered in the sharp, damp cold of late afternoon and strode through the vibrant bustle of the city toward his apartment. Another, 'Abd Allah Ali Zayir, left a handsome Colonial structure in Burlington, Vermont, and set out across the icy, snow-dusted campus, his shoes squeaking in the snow. A third, Khalid Ali Turki, strolled too that day—along the broad avenues of Washington, D.C. from which occasionally he could glimpse the stone tip of the Washington Monument towering above the city in the distance. And the fourth, Muhammad Nasir al-Duwayan, walked quietly through New London, Connecticut, not far from the sloping banks of the Thames River.

The experience they shared, however, had nothing to do with walking; it was an experience common to all men far from home—a momentary and involuntary longing for home, a longing perhaps for the feel of a blazing sun on sweat-dampened shoulders, for the sight of a cool date palm curving sharply against empty sands beyond the edge of an oasis, or perhaps for the taste of familiar food or the sound of the *muezzin* calling his people to prayer. Because those four young men are Saudi Arabs and home, on that cold winter's day, was 7,000 miles away.

Salih Ghanim, 'Abd Allah Ali Zayir, Khalid Ali Turki and Muhammad Nasir al-Duwayan are all students. They and nearly 80 other young Saudi Arabs scattered on campuses throughout the United States, are enrolled in colleges, universities, technical schools and other, varied institutions of learning recommended by the Arabian American Oil Company (Aramco) as a means of furthering their own careers and the welfare of their country under Aramco's "Out of Kingdom Training" for Saudi Arab employes.

Established in 1950, the Out of Kingdom program was intended to offer, to promising Saudi Arab employes of the company, an opportunity to add to their knowledge or to acquire the skills necessary to improve their performance or meet the requirements of higher positions with Aramco. Since then hundreds of selected students have left Saudi Arabia and have gone abroad to five countries, Lebanon, Syria, the United Arab Republic, Great Britain and the United States. During the 1963-64 academic year, for example, there were more than 100 such employes studying in all of these countries except Syria and of that number, nearly 80 were in the United States scattered from New England to the Texas Panhandle.

For most of the students the shift from their homeland to the United States is a difficult challenge. Some, married, must leave their families behind. Some have never traveled before. Some have a limited knowledge of English or of the unfamiliar and quite different customs and culture of the land in which they will live. There are changes in diet and in climate for most. And above all there is the challenge of study. Despite extensive schooling in Saudi Arabia many still come into the training schools, colleges and universities lacking the long valuable background possessed by their fellow students.

To ease this transition, Aramco sends most of its employe-students to Bucknell University in Lewisburg, Pennsylvania, for two months of intensive study of English, history and the mores of the United States before they scatter to campuses across the nation. At that point, however, Aramco gradually withdraws its helping hand. Students, to be sure, are free to telephone to the company's New York offices at any time for assistance and officials of the company make occasional visits to campuses. But generally the students, after Bucknell, are left alone—free to find their own quarters, their own friends, free to make their own way, to triumph or fail according to their own desires and abilities.

Few, however, do fail, for those selected to go abroad are not chosen haphazardly. By the time a committee of Aramco executives gives its final approval to a man, he has been under close scrutiny for a minimum of five years and has given clear evidence in several ways of his ability, his drive, his dedication.

The Out of Kingdom students—be they in Group A, those who will seek one or more academic degrees, or in Group B, those who will spend two years or more in job-oriented technical training—cannot qualify until they have worked for Aramco for at least five years and until they have achieved a minimum grade of 86 in such subjects as Arabic, English, geometry, general science or biology, chemistry and physics at Aramco's Industrial Training Center or an acceptable equivalent. A man who meets those requirements and applies for study abroad must, furthermore, survive a thorough evaluation of his background including assessments of his attitude, character, performance and potential.

Out of this selection process emerge, at last, those who are sent abroad entirely at company expense, with tuition at a university or a technical center paid, living expenses provided, plus other benefits such as travel, and medical care.

They are a select group, of course; young men who see in their advanced education not merely an opportunity to improve their own positions, but also to help their families and to share their own knowledge and skills with their country. And perhaps they see too the opportunity to heed and put into effect the simple precept on education written by an Arab poet many years ago:

If I study I'll learn

If I see I'll remember

If I do, I'll know.

■

Charles E. Wilkins, former writer and supervisor of editorial services for Aramco's Public Relations Department in Dhahran, earned a degree in journalism at Wayne University in Detroit, Michigan and did editorial work in the United States for three years before coming to the Middle East in 1956.

DIGGINGS IN THE DEEP

Down to the bottom of the Mediterranean go the divers in search of knowledge...

BY HONOR FROST

To the armchair devotee of marine archeology—that fascinating blend of deep-sea diving and rigorous scholarship—it must seem that the youthful science has belied its initial rich promise, for no new Pompeii, Troy or Jericho has been uncovered or even hinted at from the depths of the sea. Thrilling reports of submarine discoveries, on sober scientific examination, turn out to be but small pieces in the mosaic of submerged history which as yet reveals no definite pattern. Considering the avid curiosity surrounding each new attempt to wrest its secrets from the sea the results have, indeed, proved disappointingly meager. Yet it would be a mistake to assume that, because accounts of pioneer research are inconclusive, controlled techniques of underwater excavation are not being developed: though barely out of its teens, marine archeology looks confidently toward the day it will be possible to reconstruct ancient ships from keel to masthead from fragmentary sunken remains.

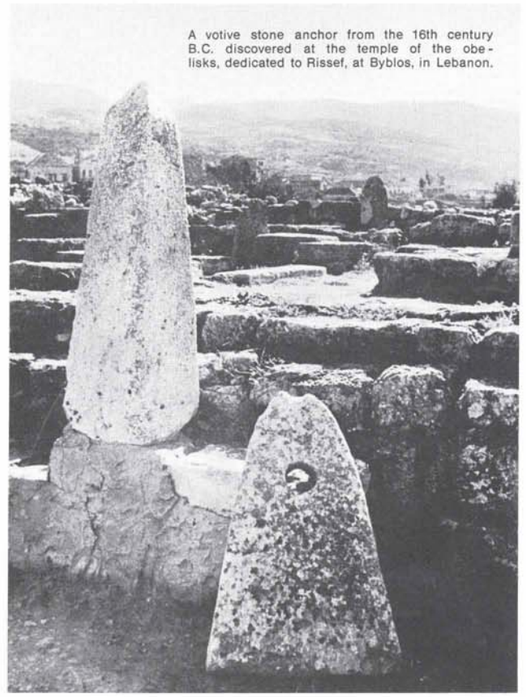
Free diving has come a long way since Jacques Yves Cousteau and Emil Gagnan in 1943 invented the aqualung, which in turn gave birth to marine archeology. In the early days, news of now-famous archeological discoveries was rushed into print, before their significance could be measured. In those days too, not only was comparative knowledge lacking, but also a professional approach to the problem of undersea excavation. Sometimes divers of undoubted skill and experience were forced, by lack of time and money, either to hurry their work or abandon it in its early stages. Others tried to excavate wrecks, buried under tons of sand and silt, with their bare hands, hopefully recording their discoveries with a camera in a leaky case. This is no longer the way it is, but even when funds permit the use of heavy-duty digging and lifting machinery, television cameras and adequate boats and crews, trouble dogs the divers because the proper utilization of the equipment requires training seldom found among divers interested in archeology and because marine archeologists simply haven't developed the techniques appropriate to their needs as have dry-land archeologists. No way, for example, has been found to entirely solve the problem of time.

On land, it is conceivable that an energetic archeologist could excavate a whole village in a year or two, if provided with an adequate number of trained workers to assist him. In contrast, it may take years merely to raise the cargo from the wreck of a single ancient sailing ship, leaving aside the all-important task of recording the positional relationships between the objects raised. For underwater, both the number of divers that can work on a single site, and the time they may remain submerged, is severely limited.

The excavation of a Roman ship that sank off Grand Congloué island near Marseilles, France, illustrates the frustrations of the underwater archeologist fighting the clock. This was the first ancient wreck to be salvaged by free divers only, i.e., divers breathing from compressed-air tanks strapped to their backs instead of receiving air from the surface through hoses. The campaign lasted eight years, yet at the end of that time a good deal of the cargo and hull remained fast on the bottom. Captain Cousteau's team of divers had worked constantly, but because the wreck lay at a depth of nearly 150 feet, no diver could spend more than a total of half an hour a day under the pressures found at the bottom. His first dive lasted about 20 minutes; then he had to wait at least six hours before making his second and final dive of the day, lasting a mere 10 minutes.

Depth curtails diving time because of the dangerous side effects that occur when air is breathed under pressure. The most serious is the "bends," severe (and sometimes fatal) body cramps caused by the sudden release of nitrogen bubbles, absorbed by the diver when receiving air under pressure, from his blood stream as he rapidly ascends to the surface. The maximum time a man can safely spend at any given depth has been computed and published in tabular form. If the stipulated period is exceeded, he must undergo stage decompression. That is, on the way to the surface, he must stop at certain levels for minutes, or even hours, while the nitrogen slowly and painlessly passes from the blood stream to the lungs and is expired. Diving day after day is more hazardous still, for it demands cumulative decompression, the neglect of which may cost the diver his life or lead to incurable paralysis. Ironically, divers can spend the least time at sites where they want to spend the most, for well-preserved wrecks are found only in deep water, where they are beyond the ravages of wind and current.

Dry-land archeology is a science with well-developed techniques more than a century in the making, but marine archeology is very much in the experimental stage. And while ordinary archeological expeditions are assuredly complicated ventures, underwater investigations are burdened by the necessity of having to be full-blown diving expeditions involving much more specialized and hazardous equipment, trained diver-archeologists, of whom there are few, and teamwork that assures safety as well as scientific efficiency. They also demand speed and continuity of effort, both dependent on not merely good but excellent weather conditions on the surface. That optimum conditions are rarely met is depressingly evident from the fact that so far no ancient ship, complete with cargo, has been fully excavated.



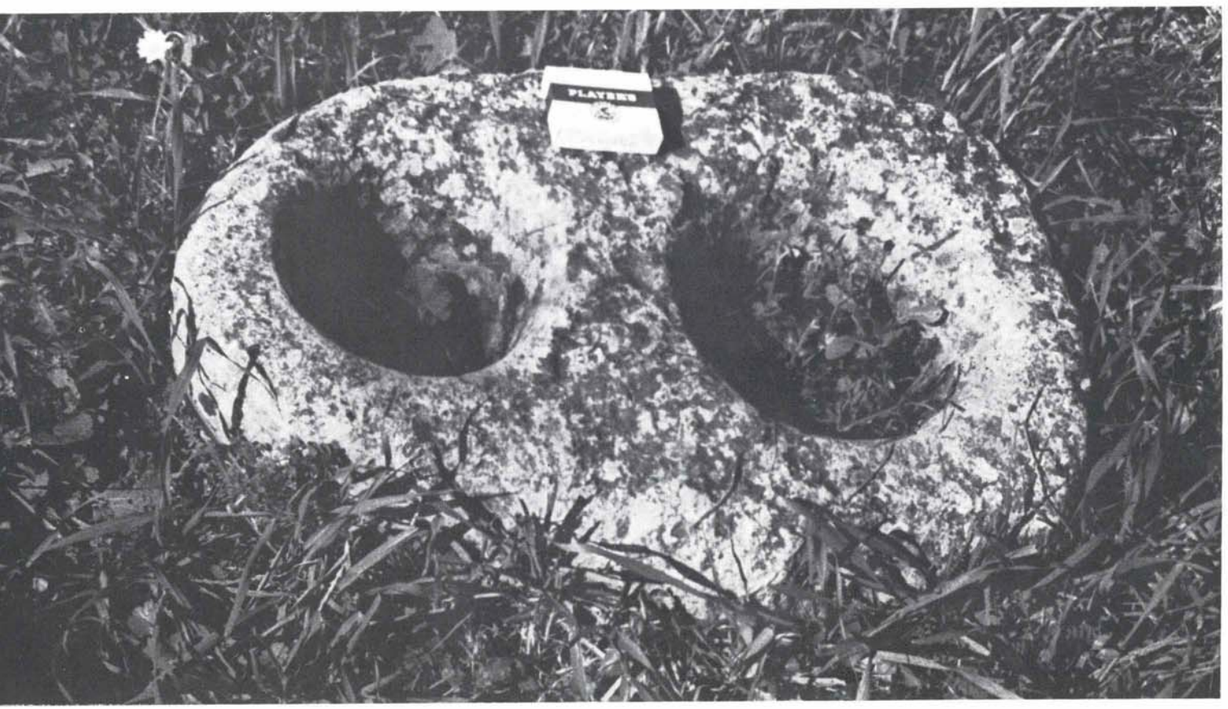
A votive stone anchor from the 16th century B.C. discovered at the temple of the obelisks, dedicated to Rissef, at Byblos, in Lebanon.

In underwater archeology there is another vital problem that has, until recently, gone unrecognized: the need for comparative knowledge of underwater sites. Without such knowledge, it is impossible to understand the significance of submerged remains. Many good divers do not even recognize an ancient wreck when they see one, for a few fragments of pottery may be the only indication that beneath a low mound of sand lies the remains of a ship. Harder yet to identify are off-shore moorings, which are marked only by groups of pierced stones or the lead components of ancient anchors.

These "cemeteries of lost anchors" provide an insight into the methods of the marine archeologist and the way in which he interprets his findings. Their presence near reefs or in off-shore shallows is explained by the inability of ancient sailing vessels to cruise into the wind. When the wind was adverse, they had to anchor and wait for the wind to shift. The rope lines often parted, leaving the anchor on the bottom. Since vessels of about 500 tons carried up to 20 anchors, Mediterranean reefs and shallows are littered with ancient anchors, which range in size from chunks of pierced stone which can be lifted with one hand, to lead-stocked six-footers which require five strong seamen to manhandle aboard.

It is possible to account for the presence of these anchor cemeteries with a fair degree of confidence. Julius Caesar, in *The Conquest of Gaul*, mentions with surprise

The size of one anchor found can be measured by comparing it to the cigarette pack on top.



the possession of strong anchor chains by an enemy French tribe called the Veneti, and thus confirms other evidence that rope anchor lines were standard equipment on Roman ships at the beginning of the Christian era. (It also indicates that Roman wrecks bearing anchors with chain belong to the period *after* Julius Caesar.) Rope not only breaks more easily than chain but, having a tangential traction under water, tends to work loose from the attached anchor. From the Biblical description (Acts 27: 28-29) of St. Paul's wreck off the island of Malta, we can calculate that that particular Roman ship carried at least eight anchors.

The places where ancient anchors were lost are eloquent pages of history for those who can learn to read them. Divers will notice that on steep submarine cliffs there will be only lead stocks (in ancient times, when anchors were made of wood, the cross bar or "stock" was often of lead to keep the fluke imbedded in the bottom) and primitive iron anchors. On certain off-shore shallows, stone anchors predominate. If we can discover where each type of anchor was made, and in what period, the analysis of each collection will thus delineate a trade route and even, perhaps, tell us something about the methods of navigation used by the various sea peoples in ancient times.

It is quite easy to date Roman anchors because hundreds of wrecks have been found and some of them have their anchors in place. The construction of Roman ships is well known from written records, so it is possible to pinpoint the dates of their anchors with reasonable accuracy. Stone anchors are as yet less familiar to archeologists, but their study promises even greater rewards. This is because they were considered sacred objects, and in the Bronze Age were placed in temples as votive offerings. The manufacture and function of these anchors, fortunately, is not so deep a mystery as the history of their development, for stone anchors of a very similar design have been used in the Eastern Mediterranean and the Arabian Gulf right up to the present day.

Another type of site familiar to divers, but one which has so far escaped the attentions of marine archeologists, is the bay used as shelter from storms. In antiquity, ships driven into such havens left debris behind them—pottery sherds, broken weapons and tools, and so on—in the same way that modern ships litter harbors today with beer bottles, tin cans and plastic bags, all of which eventually winds up in the silt on the bottom. Successive layers of this debris would, of course, give clues to the relative dates at which the objects were deposited, the more recent being in the uppermost strata. Analysis of stratified deposits has long been a standard method of date-interpretation in dry-land archeology, but, as yet, has not become a useful tool of underwater methodology.

As if to make amends for the violence of the storms which sent ancient wooden ships to the bottom, the submarine environment preserves what is left of them with remarkable fidelity. When a ship settles on a suitably

White mark on an amphora shows that it has been moved from its original site, thus destroying the relationship between wreck and cargo and hampering research.

sheltered sandy bottom, it will be metamorphosed through waterlogging, the growth of marine concretions, and sand burial. The latter phenomenon is due to the interruption of the natural flow of sediment, which in consequence piles up around the obstacle until it is buried and the natural equilibrium of the bottom is restored. Assimilation of a wreck may take 50 to 100 years but, once complete, the remains of the ship will be stabilized for millennia. In the process, metal fittings such as iron nails corrode into nothingness, but not before lime secretions of sea animals form around them, making a sturdy mold into which today's technicians can pour plaster to reproduce the original with exactitude.

The excavation of man-made harbor installations of great antiquity depends, in part, on divining the harbor designers' original intentions. Dredging was not invented until the Middle Ages, so the ancient harbors had to be flushed out, either by use of natural currents, or by the creation of artificial currents released through sluice gates, as at the Phoenician port of Sidon. Silt erosion and subsidence have now hidden the greater part of ancient harbor works, and what remains cannot be reconstructed unless archeologists can guess how the original designers intended them to function.

Since excavation entails destruction of a site, for after all a find is necessarily brought to the surface piecemeal, it is vital that meticulous records be kept of every discovery and every mechanical operation involved, so that mistakes can be caught and rectified on future jobs. It is possible, using graphite crayon on sheets of frosted plastic, to sketch underwater artifacts even at depths of 125 feet. Metal pipe-and-wire grids placed over the site give precise points of reference to chart and photograph the site, while underwater compass readings provide geographical orientation. Record-keeping is as unremitting as it is important, for each stage of an excavation must be mapped as the many tons of sand and silt are carefully brushed and blown away to reveal what is below.

For all the problems, however, marine archeology is steadily developing. Little by little, what was once the preserve of eager amateurs is becoming a fledgling science. The crippling limitation of brief periods of working time on the bottom is already being overcome by the use of submarine "houses," which enable divers to remain at the bottom for a week or more, while the worst effects of depth itself are being mitigated by the use of oxy-helium mixtures and other oxygen combinations instead of conventional compressed air. Excavation underwater is today, in a sense, a function of economics rather than technical progress, for while many excellent dry-land techniques can theoretically be applied to yield good results under the sea, their cost is as yet prohibitive.

While this remains true, amateur divers have an important role to perform in underwater research. Too often in the past their number has included souvenir hunters who ripped artifacts out of their context, obliterating scientific and historical data of immense value for the sake of a trinket or two, soon discarded. Anyone can wrench antiquities from the sea, but if they are not to destroy what they say they love, they must first set themselves to the less spectacular tasks of charting, of making a comparative study of marine sites, and of keeping abreast of technical progress by experts in underwater work. ■

Honor Frost, an Englishwoman, studied art as a vocation, archeology as a hobby and free diving for pleasure. She is the author of Under The Mediterranean, *a book derived from her ten years' experience as an underwater archeologist.*

Statues not buried by the sand were eroded badly by the seawater. This group was discovered in the wreck of a Greek ship near Anticythera.

Marble torso from a Greek wreck located off the southern tip of the Peloponnesus at Anticythera. Buried in the sand, it was protected from erosion.