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ARAMCO WORLD magazine

JULY-AUGUST 1969

A SLIGHT CASE OF SHELL SHOCK

Businessmen west, businessmen east, show your boarding cards please. Captain Nahar Nassar welcomes you aboard a Saudi Arabian Airlines DC-9 jet; departing immediately. Takeoff on page 28.

ARAMCO WORLD magazine

THE OBSTINATE MR. DOUGHTY

BY ANTHONY T. SULLIVAN

He was a man as stark and unyielding as the desert wastes he traveled. And although he was also a peerless explorer, when he returned to write one of the world's epics of survival he saw it not as a tale of adventure, but as a monument to uncorrupted English prose. 2

LONG WAY 'ROUND

BY BRAINERD S. BATES

From Abqaiq to Ras Tanura, both oil communities in Saudi Arabia's Eastern Province, it is usually no more than a 90-mile drive. For a very good reason, however, two Aramco "supertrucks" recently added 125 miles to the trip —most of them in empty desert. 6

A SLIGHT CASE OF SHELL SHOCK

BY CALVIN L. HAM

Romans, Saxons and Ecuadorean Indians collected sea shells as charms. Fiji Islanders wore them as jewelry. North American Indians used them for money, Phoenicians for making dye. And Aristotle, naturally, wrote a treatise on them. 8

CHILDREN OF THE MOUNTAIN

Through the lens of a photographer visiting in a remote Lebanese village, a photographer who could resist them no longer, comes the winsome charm, the shy beauty, the healthy vigor of these artless, lovely, children of the mountain. 14

DISCOVERY! THE STORY OF ARAMCO THEN

BY WALLACE STEGNER

Nobody could ever quite reconstruct what happened, but whatever it was, it was enough. Some tiny tick or scratch or jar, some bubble of gas as inconsequential as a hiccup, and all that enormous curbed energy erupted in destructive flame. 20

SILVER THREADS AMONG THE OLD

BY DANIEL DA CRUZ

For Saudi Arabia the great jets of the Kingdom's airline —now the biggest fleet in the Middle East—are silver needles that stitch together the farflung parts of the immense Arabian subcontinent and weave a tapestry of progress high in the desert sky. 28

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Cover: Emerging from the Red Sea, Shari Fielder, 20, photographed near Jiddah by Khalil Abou El-Nasr, holds a new acquisition for her collection of sea shells. Miss Fielder who comes from Texas, but lives in Saudi Arabia, is an avid skin diver who has already gone down as far as 185 feet, and has collected sea shells for three years. Story on page 8.

THE OBSTINATE MR. DOUGHTY

To his critics, he was arrogant, humorless, self-righteous and mulish. He was also the author of a masterpiece that outlives them all. BY ANTHONY T. SULLIVAN

Charles Montagu Doughty was the most obstinate of men. His bull-headedness led him to disregard the wise admonitions of men who knew better to stay away from then-unknown Arabia. He paid a terrible price for not listening: two years of suffering from intense heat, starvation, thirst, and the constant threat of death as an outsider without the tribal affiliations that were a man's only insurance policy. Once embarked, well-meaning companions warned Doughty to conceal his Christian faith beneath the pretence of being a Muslim. Doughty's Victorian principles were offended by the suggestion, and he lost few occasions to declare his adherence to what he believed was a superior religion. Again he paid dearly. He was maltreated, spat upon, beaten, and on several occasions narrowly escaped death for his profession of an alien faith.

When he finally—and miraculously—emerged alive from the desert, he determined against all advice to record his experiences in an artificial blend of Chaucerian and Spenserian English, to the disgust of his friends and the utter indifference of publishers. But then, to the astonishment of everyone, himself included, he produced a literary masterpiece that has outlived them all: *Travels in Arabia Deserta*.

Obstinacy has its uses.

It would be gratifying to report that all along Charles Montagu Doughty was as misunderstood as his book, when it first appeared—that he was merely a shy, polite, solitary scholar with a bent for science. Alas! He was all of that, but also an arrogant, humorless, self-righteous man and, ever and always, mulish in disposition. Were it not for his classic account of Arabia, for those two passionate years out of the four-score that he lived, Doughty would have died in well-deserved obscurity.

At least he was *born* into obscurity, of a line of conservative Suffolk churchmen whose narrow horizons the young Doughty strove to extend by a career in the Navy. A speech impediment crushed that ambition, and the young man instead entered Caius College, Cambridge, in 1861. He was unremarkable both in scholarship and appearance, with an ordinary pale Anglo-Saxon face, rather large and full lips, deepset eyes with hair parted slightly off-center and of a length that is today once again popular at Cambridge. One of his teachers remembered that "he had a very disheveled mind. If you asked him for a collar he upset his whole wardrobe at your feet."

He soon manifested a considerable interest in geology, and an essay describing his year's exploration of Norway's Jostedals-Brae glaciers received some professional recognition and marked the awakening of a life-long interest in research. But even that interest was eclipsed by the study, once he had been graduated from Cambridge, of early English literature at Oxford's Bodleian Library. "Nearly 60 years in all," he later confessed, "I have given to the tradition of noble Chaucer and beloved Spenser."

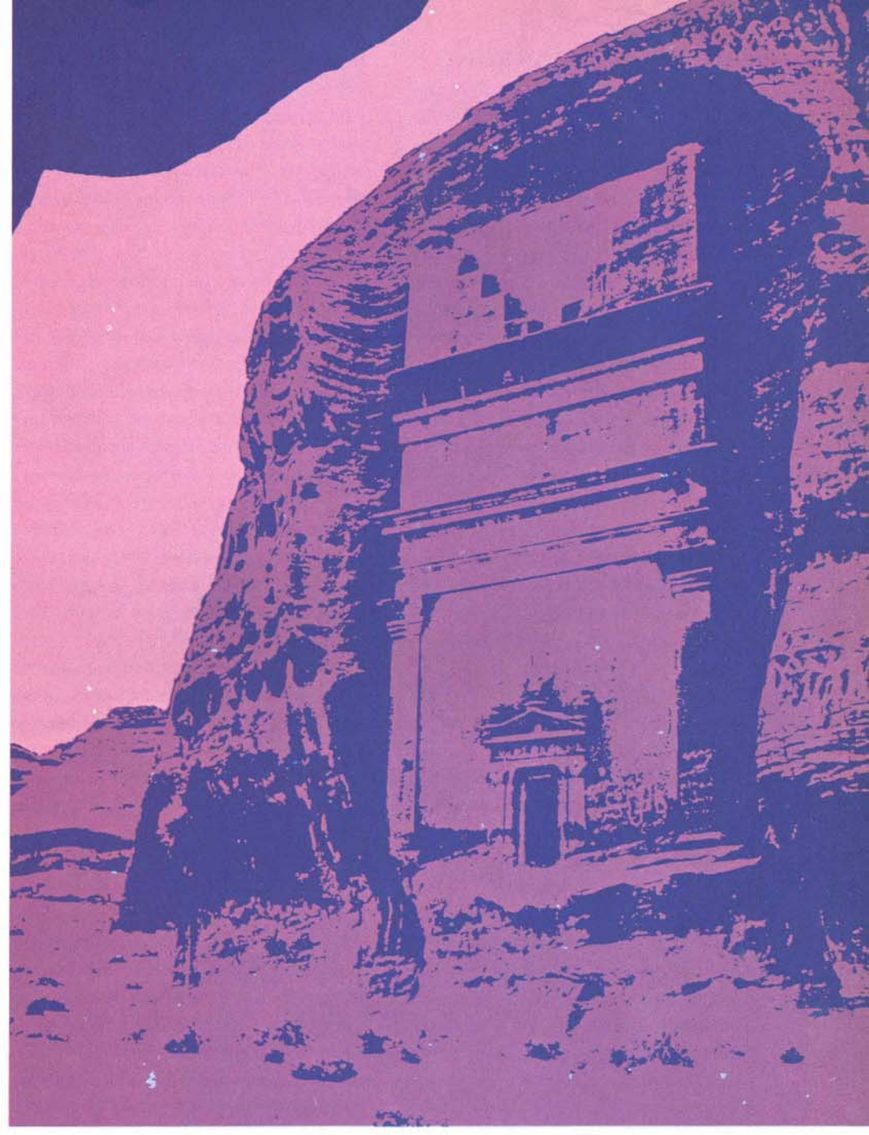
He forsook these loves temporarily in 1870 when he went to Holland to study Erasmus. An intellectual wanderlust there seized him, and for the next four years he roamed, hippie-like but with a sackful of books over his shoulder instead of a guitar, through Belgium, Italy, Sicily, Malta, Spain, Tunisia and Greece. In 1874, for no discernible reason, he took a boat to Palestine, walked through Lebanon, passed down to Egypt, then with a single companion and one camel between them, crossed the desiccated Sinai Peninsula to Aqaba.

Doughty still had no plan but a vague urge to travel. Until he reached Ma'an, he wrote later, "I had then no other intention than to see Petra. I could speak very little Arabic ... not having studied the history of those countries." And yet the cold-blooded Doughty had already been infected by the subtle fascination of the East that has felled so many of his countrymen. Of Sinai he wrote: "Nowhere, outside perhaps the moon, does the skeleton of the world bleach so naked and revealed," and recalling the bleak jagged eminences of Norway, noted the similarity in his

'...horror of bergs aloft
Inhuman silent solitude of sharp dust;
Wind-burnished stones and rocks.'

It was while en route from Ma'an in present-day Jordan to the ancient capital of Petra which the Nabataeans had carved from the red rock of their mountain fastness that Doughty first heard of Mada'in Salih—the City of Salih—in the desert wastes due south, halfway to Mecca. Great tombs, it was said, had been hewn into the sides of mountains. Huge portals, dim inscriptions in an unknown tongue carved on the mountainside, vast empty chambers—these were some of the oddities of the vacant city of which Doughty's fellow-travelers spoke, and suddenly he thirsted to be the first man to record the forgotten city's mysteries.

He wrote to the Royal Geographical Society for assistance—and hurried to Vienna to receive the reply all the sooner—but no reply ever came. He returned to Damascus, spent eight months there in intensive study of Arabic. Then, rejecting all attempts by



the English Consul at Damascus to restrain him from the venture, Doughty started south with a Mecca-bound caravan. Calling himself Khalil, undisguisedly a Christian among Muslim pilgrims, he hoped to remain under the protection of the caravan—6,000 men, more than 12,000 camels—as far as Mada'in Salih, before reaching the precincts of Medina and Mecca which were forbidden to non-Muslims at the pain of death. It was November, 1876.

If Doughty's purpose in entering Arabia was basically archeological, his lengthy sojourn was partly occasioned by the mystique of the desert itself, partly by grim necessity, for he had practically to beg his way from one point to the next relying on the uncertain hospitality of suspicious Muslims towards a penniless Christian. Doughty's ability to endure, and indeed to seek out all the harshness of a primeval land as a result of his unbending unwillingness to adapt himself to his environment, was a characteristic he shared with such travelers as Johann Burckhardt and Sir Richard Burton. Yet to him alone did the experience have philosophical significance. For good or ill, much of the West for years saw the Arab East through the sonorously Chaucerian pages of Doughty's greatest work.

From Amman the pilgrim's procession moved south through Kerak, Shaubak and Ma'an to the brow of the immense Arabian plateau. Below lay the land made unforgettable by *Travels in Arabia Deserta:*

"The summer's night at end, the sun stands up as a crown of hostile flames from that huge covert of inhospitable sandstone bergs; the desert day dawns not little and little, but it is noontide in an hour. The sun, entering as a tyrant upon the waste landscape, darts upon us a torment of fiery beams, not to be remitted till the far-off evening. Grave is the giddy heat upon the crown of the head; the ears tingle with a flickering shrillness, a subtle crepitation it seems, in the glassiness of this sun-stricken nature ... The lingering day draws down to the sun-setting; the herdsmen, weary of the sun, come again with the cattle to taste the first sweetness of mirth and repose. The day is done and there rises the nightly freshness of this purest mountain air. The moon rises ruddy from that solemn obscurity of *jabal* like a mighty beacon—and the morrow will be as this day; days deadly drowned in the sun of the summer wilderness."

Despite its occasional deceptive mildness, Doughty pointed out—quite correctly—that the habitual face of the desert is unrelentingly stern:

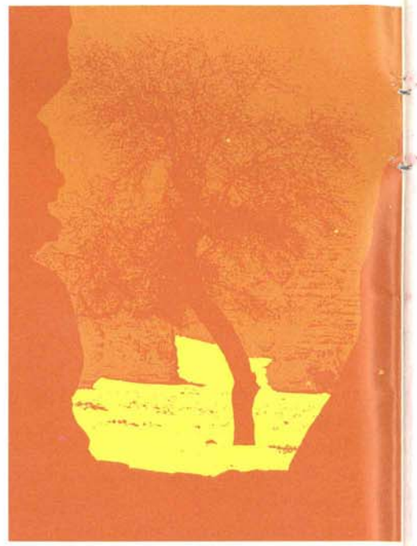
"We look out from every height, upon the Harra, over an iron desolation; what uncouth blackness and lifeless cumber of volcanic matter ... a wilderness of burning and rusty horror of unformed matter. What lonely life would not feel constraint of heart to trespass here in a dead land, whence, if he die not, he shall bring home nothing but a perpetual weariness in his bones."

Doughty never permits the reader to forget the numbing fatigue and searing heat which constantly afflict the desert traveler:

"The wilderness fainted before the sunny drought ... we seemed to breathe flames. All day I gasped and hardly remained alive, since I was breathless and could not eat."

And yet it was here in this earthly furnace, he argued, that history began, the land from which mankind spread to the corners of the world. It was in Arabia that monotheism took root, and in observing the customs of the Bedouin he felt himself carried back to the age of the patriarchs. The contrast between Arabia's physical sterility and the fruitfulness of her cultural and religious legacy is a constant theme in *Arabia Deserta.*

The later Arabian traveler Sir Richard Burton had ample grounds for his contempt of Doughty's continual carping at the Arabs' rough treatment of him. Burton notes that had Doughty respected the religion and customs of his hosts he would not have had to go in constant fear for his life. With more courage than good sense, indeed, did Doughty intervene to stop a group of pilgrims from beating one of their number who, he discovered later, had been guilty of one of the desert's most serious crimes: theft.



With similar lack of tact did he publicly upbraid a shaikh: "I have wandered in many lands, many years, and with a swine such as thou art, I have not met in any place." Certainly he should have known that only his status as guest saved him from instant death for voicing this worst of insults, and yet in the next breath he could boast of being one with a people whose best qualities—humor, tolerance, hospitality, dignity—he utterly lacked: "The sun made me an Arab," he says pretentiously. "But never warped me to orientalism," presumably meaning that he never understood the Arab mind.

Nor did he, or else he would been less vocal about his belief in the superiority of his High Church Christianity over Islam, which created most of his problems with his Muslim hosts. From his self-erected pedestal of righteousness he surveyed his companions as an elderly schoolmaster might survey a classroom full of unruly pupils. He never doubted that Arabia had long ago made its unique bequest to mankind and was in his time an historical anachronism. He never understood the East mainly because he never really *wanted* to understand.

The strain of keeping his guard up against any possible contamination by eastern ideas was probably the source of the spiritual prostration he complained of after his return to England in 1878. He regained his strength by purging himself of his experiences in *Arabia Deserta,* which he conceived to be a monument to uncorrupted English prose rather than an account of an epic of survival in the unknown Hijaz. "In writing *Arabia Deserta,*" he later said, "my main intention was not so much the setting forth of personal wandering among a people of Biblical interest, as the ideal endeavor to continue the older tradition of Chaucer and Spenser, resisting to my power the decadence of the English language; so that whilst my work should be the mere verity for orientalists, it should be my life's contribution so far to literature."

Doughty's style, consciously imitative, was considered too exotic by most publishers to whom he sent his manuscript. Well-meaning friends tried to persuade him that his book would be an instant success if only he would modernize its archaic syntax. Doughty doughtily insisted that not a syllable would be changed. "It is the prerogative of every lover of his country, to use the instrument of his thought, which is the Mother tongue, with propriety and distinction; to keep that reverently clean and bright, which lies at the root of his mental life, and so, by extension, of the life of the Community; putting away all impotent and disloyal vility of speech, which is no uncertain token of a people's decadence." Apparently fearful that the next sentence of protest might be even longer and even more medieval, Cambridge University Press crumpled and, in 1888, published *Arabia Deserta.*

Reaction to the book was, by British standards of enthusiasm, ecstatic. Orientalist Wilfrid S. Blunt said that Doughty wrote "certainly the best prose in the last two centuries," and added that he would rather have written *Arabia Deserta* than any other book of the 19th century. How heartwarming such comments as this must have been to a writer who made it clear that he valued his style far above the vehicle that carried it. *Arabia Deserta* soon found its place in the curriculum of the best British public schools. Doughty could not have asked for anything more.

Like all one-book men, Doughty would have been more dearly remembered by posterity had he stopped right there. But, like all one-book men, he didn't. Following his literary triumph, he turned back to his first love, poetry, and proved once again that the dead embers of old love cannot be revived by authoring a long procession of stupendously boring books of verse, culminating in 1906 with what he considered his chef d'oeuvre, *The Dawn in Britain,* six volumes of especially soporific epic poetry. The work purports to trace the seeds of civilization from its Arabian beginnings through Rome and finally to full flower in northern Europe and England. A sample passage reveals why it is among the world's unquoted epics:

Dear Muse, which from this world's beginning, was
Seated, above, in heavenly harmonies;
Reveal that Radiance to mine hungry ears,
Thine eyes behold; what sacred light, far off,
Like new wide dawn, (for which, men's eyes have watched
From age to age) now kindled on the earth!
Whilst night lies, as a cloak, whelmed on our Britain;
Tell me of Land, under East bent of heaven;
Wherein, is born, the Everlasting Prince
Of Peace, Sun of night—darkness of our hearts.

Adam Cast Forth, because it is shorter, and related to experiences Doughty himself suffered, is less a failure. It relates the story of the first man to struggle for survival against the sun and winds of Arabia:

All of horror, dark astonishment;
Inextricable, unending, hideous rocks!

Unending, and doubtless hideous too, were the years of penury consumed in such writing, for Doughty was as unsuccessful in providing for himself and his family as he had been in convincing his erstwhile Muslim friends of the doctrinal errors of their ways. Still, he stubbornly kept at the task of writing poetry which, considering the nearly 60 years he devoted to it, he may have considered divinely inspired. In the twilight of his life, leaders of the government, in recognition of his contribution to letters, granted him a government pension of £150 per annum, almost sufficient to keep him starving for another decade or two. Fortunately (for Doughty, anyway), a younger cousin died soon afterwards leaving him a pension of £2,000, and it can be imagined with what relish Doughty threw back in the governments' teeth their niggling award.

He lived only two years more to enjoy it, and in 1924, at the age of 82, he died still as obdurate and still as lonely as the stark desert he had celebrated.

Anthony T. Sullivan, is working toward his Ph.D. degree and is a graduate of Yale and Columbia.

LONG WAY 'ROUND

BY BRAINERD S. BATES / PHOTO BY S.M. AMIN

For the riggers and transport specialists of the Arabian American Oil Company (Aramco) there are few surprises left and not many challenges. Back in the winter of 1966, for example, they hauled from Ras Tanura to Abqaiq a brand new de-ethanizer column that weighed 275 tons, and barely put a scratch on it.

Even so, they had to think a bit a couple of months ago when Aramco decided to move a spheroid from the inland Abqaiq oil field to Ras Tanura, as part of the expansion of crude oil production at the Qatif field, which straddles the Gulf coast. Spheroids, which play an important role in the initial process of gas-oil separation, are not particularly heavy, but they are bulky. The one that had to be moved weighed only 75 tons but it was 52½ feet wide and 46 feet high—roughly the size of a four-story apartment building.

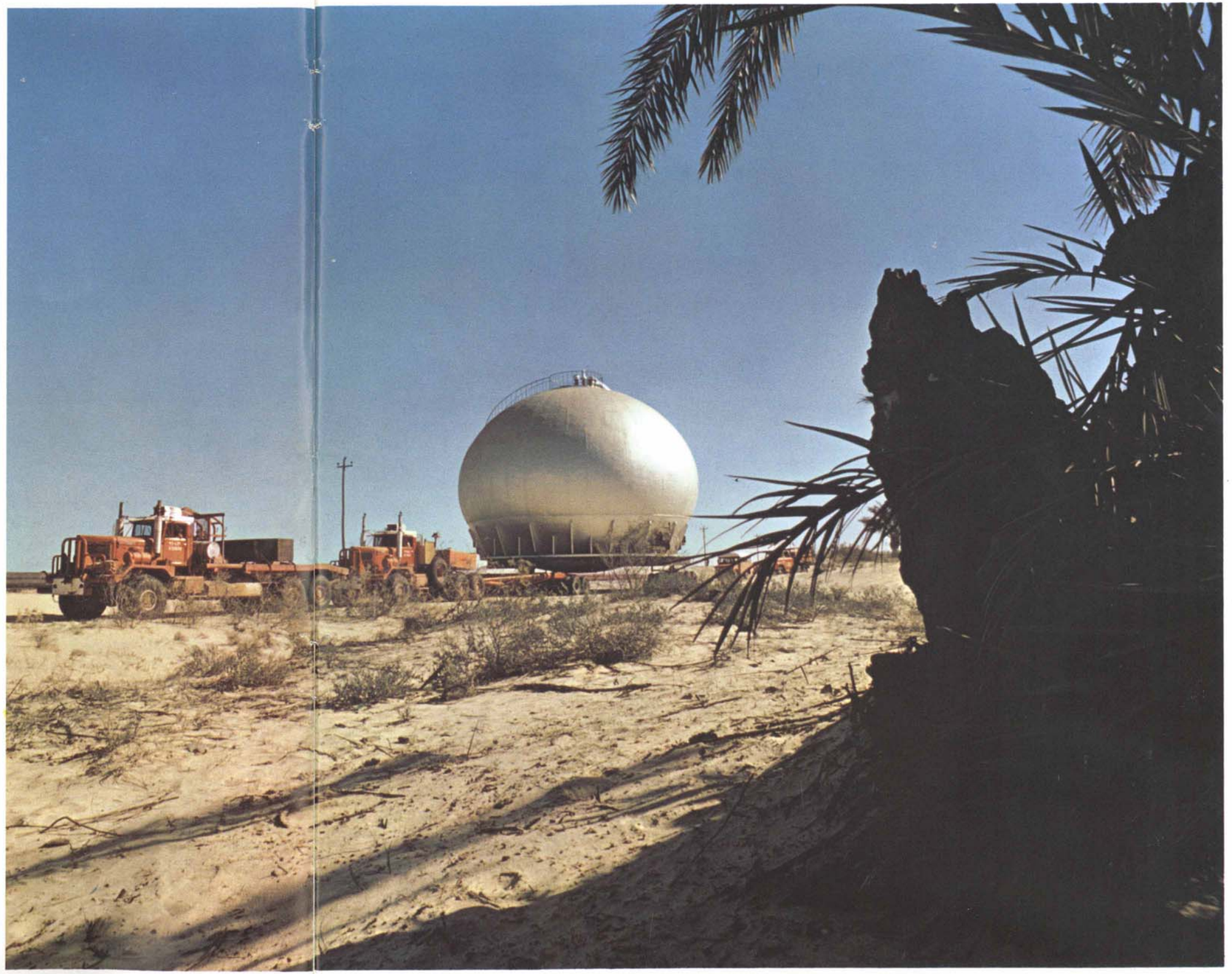
To the transportation experts this meant they could not use the 90-mile stretch of paved highways that link Abqaiq, Dhahran and Ras Tanura because power transmission lines crossed the highways at several points. These lines, interconnecting the Aramco power plants that serve the company's three main operating centers, supply electricity to the company's northern and offshore oil-producing installations. To get a spheroid through would have meant shutting off the power, and at a time of maximum oil production this simply could not be done.

Another problem was traffic. That stretch of 90 miles happens to include the main paved arteries that link eastern Saudi Arabia's busiest industrial and commercial centers. The 52½-foot-wide spheroid, grunting along at five miles an hour, would have created a traffic snarl of monumental proportions.

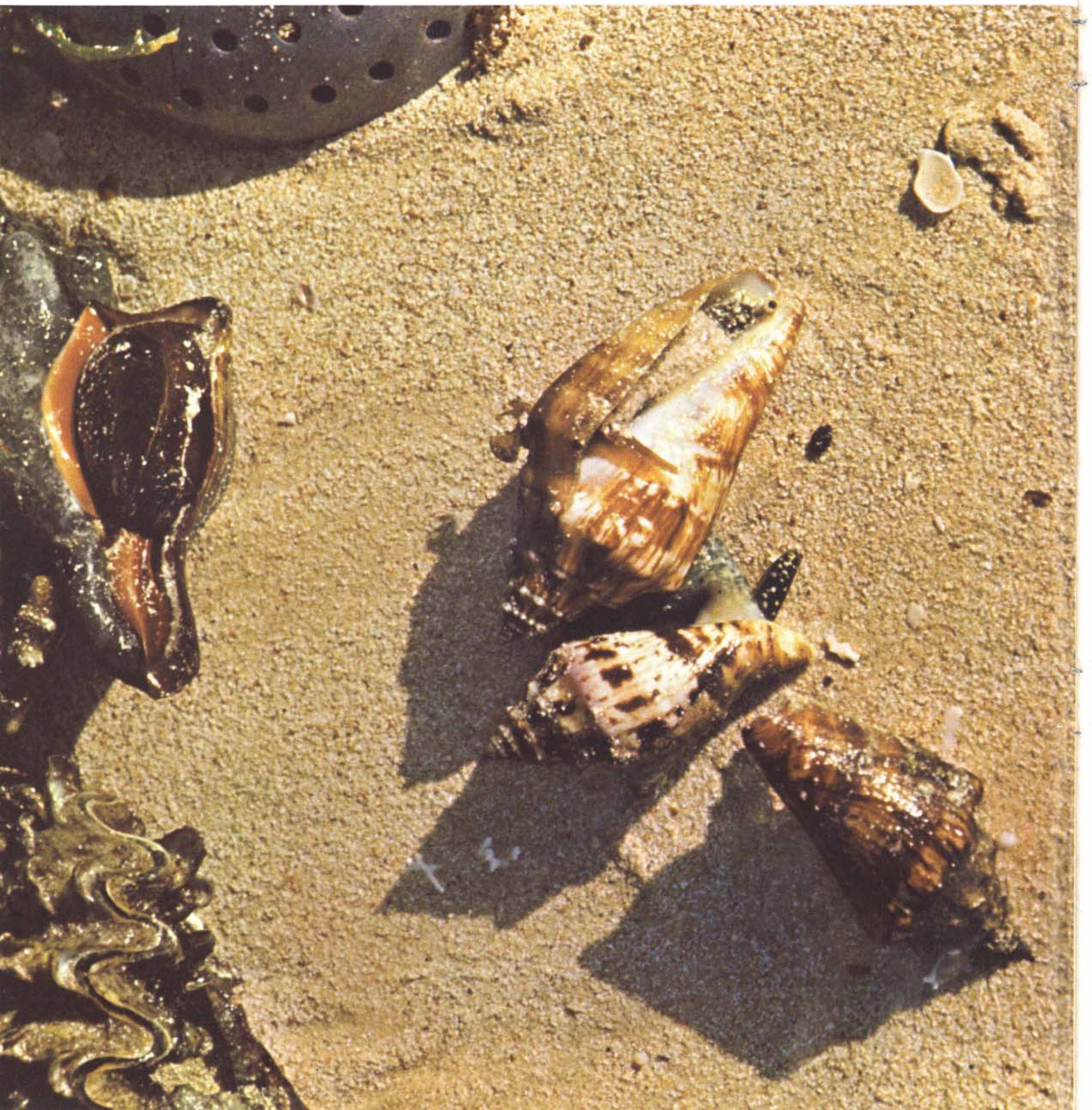
The men planning the spheroid move, therefore, decided to go the long way 'round: west toward the 'Ain Dar area of the Ghawar field, north by the Fazran field to Fadhili and the Northern Area Access Road, then southeasterly to Ras Tanura. The route they mapped had surfaces covered by everything from deep soft sand and brush to saline flats and asphalt, and it was 217 miles long, but it also avoided key overhead power transmission lines and high-density road traffic.

To get the project underway the spheroid was lifted from its foundation—about as high as a man's chest—on four jacks, two on each side. Raising it eight inches at a time on each side until it was three feet above its original resting place, the riggers then edged it onto steel-pipe rollers and rolled it onto a special dolly.

Locomotive power for the haul was provided by two 435-horsepower Kenworth trucks, each carrying a 12½-ton cement-block counterweight to give the cab's six immense tires more traction, and joined in tandem by a towbar. After nearly continuous driving from dawn to dusk for three days the trucks and their weighty cargo arrived at the Ras Tanura Refinery, and the laborious task of easing the spheroid off its dolly and onto a new foundation began.



Left: (red background) Venus Comb Murex. Center: (upper right, then clockwise) Partridge Tun, Bonnet Shell, Minor Harp, Pacific Grinning Tun. Right: (top) Subulate Augur, (bottom) Crenulate Augur.



A SLIGHT CASE OF SHELL SHOCK

BY CALVIN L. HAM / PHOTOGRAPHY BY KHALIL ABOU EL-NASR

Venus Clam **(Periglypta reticulata).**

"All I did was turn up a magnificent cowrie on a Red Sea reef and zap! I felt like Tiffany with his first diamond."

In an issue of *Holiday* not long ago, I was reading about life in the British colony in the Seychelles island group when a line jumped to attention. "Their wives," the author noted acidly, "collect 'live' cowries and cones compulsively."

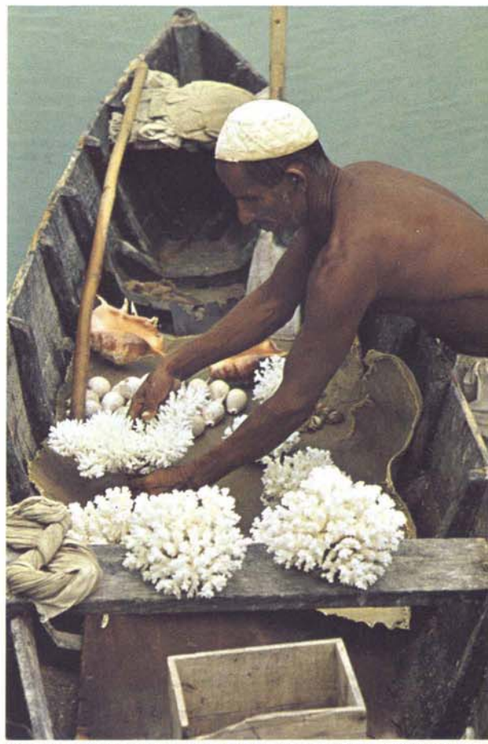
I did not agree with the writer's faintly malicious hint that people who collect sea shells are slightly dotty —unless you count a slight case of shell shock as evidence of instability—but he was quite right otherwise. Collecting shells *is* a compulsion. Cones and cowries *are* taken live and I'll tell you why in a minute.

I came down with my own case of shell shock two years ago. (All I did was turn up a magnificent cowrie on a Red Sea reef and zap! I felt like Tiffany with his first diamond.) And at first I thought I should keep it a secret. Fortunately, I have since learned that neither I nor the good ladies in the Seychelles are in the least uncommon. People all over the world are taking up shell collecting: harried city dwellers no less than lonely islanders, adventurous young men as well as timid old ladies, bright children and their parents, Americans as well as Japanese, Italians and Arabs. In the United States in 1956 there were 10,000 shell collectors. Today there are more than 100,000.

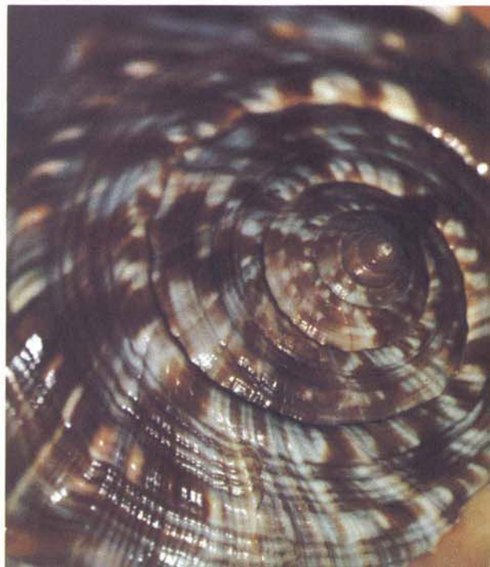
I have also learned that it is a condition as old and as widespread as man himself—and not merely for the joys inherent in oysters on the half shell, California abalones, New England clam chowder, or the unforgettable *escargots* of France. Romans, Saxons and Ecuadorean Indians collected cowries as charms to guarantee fertility and good hunting, North American Indians called shells wampum and used them as money, Phoenicians extracted dye from them and Aristotle, naturally, wrote a treatise on them. Today paleontologists study fossilized shells for clues to the location of oil deposits, Filippino artisans slice them thin and make translucent window glass, and a few American factories still use them to make buttons. No, my Seychelles brethren and I are not alone.

A collector usually starts by idly bringing home a few colorful specimens from the beach. At this stage, cowries, because of their symmetry and color, are favorites. Then, as interest quickens, he begins to wonder about the shells whose curious names crop up in conversations with other collectors, names like the Much-desired Volute, the Tapestry Turban, More Beautiful Abalone or Roman Shield Scutus. Why, he wonders, is the Armenian Cowrie so called when it is found only in Australia? Or the Little Arabian, which comes only from Central America? What did the Clandestine Cowrie do? What contaminated *Cypraea contaminata?* Do their names accurately describe the Snakeskin Nerite, the Bleeding Tooth, the Florida Fighting Conch, the Dragon's Head Cowrie, the Snipe's Bill and the Zigzag Cowrie?

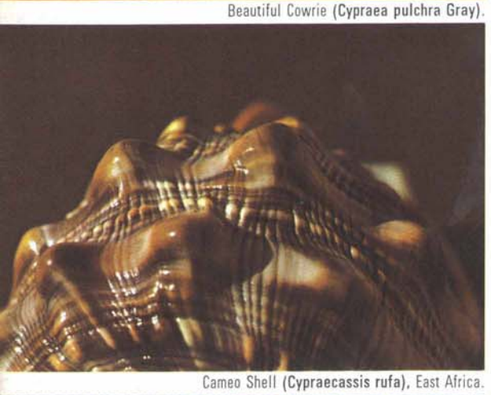
If he decides to continue, and he probably will, he quickly learns why those poor abused colonial ladies collect their cowries and cones "live". To get shells at their prime, with their rich color and smooth texture intact, they must be taken while the creature that creates the shell is still inhabiting it. The lustre of the shell of the live cowrie, for example, is like fine china—a result of the cowrie's ability to cover the exterior of the shell with an extension of a filmy organ within its own body. This prevents any of the tiny organisms inhabiting the sea from



A fisherman near Jiddah offers conches and coral for sale. Bottom: a Cameo Shell.



Beautiful Cowrie (**Cypraea pulchra Gray**).



Cameo Shell (**Cypraecassis rufa**), East Africa.

Six Money Cowries (**Cypraea moneta**), Central Pacific.

attaching themselves to it and protects it from the abrasion of waves and sand. If the cowrie dies, its shell loses the protection of this film and is exposed to chipping and scratching and, later, to fading.

The lady collectors, therefore, are quite rational in insisting that their cowries be taken live. And the same may be said for the cones, although cones have a quite different device to protect their shells: a sort of skin called periostracum which ranges from a very thin, transparent coating such as that worn by the Sand-dusted Cone *(Conus arenatus)*, to a thick, brown, velvet-like covering on the Virgin Cone *(Conus virgo)*. This skin not only preserves the beauty of the shell; it can completely hide it. Lying in the sand, the Virgin Cone gives no hint of the pure white beauty waiting for a discerning eye to strip away its periostracum. The contrast is so striking, in fact, that serious collectors like to have a specimen of each state—one with the periostracum and one without.

It is here that you can tell how bad a case the collector has. A bag of "live" shells is not a thing of beauty and a joy forever. Not, anyway, until it has been given the kind of patience and effort that goes into restoring antique furniture or old automobiles. So if a collector goes on to clean, soak, brush and polish the shells, his compulsion has become an obsession. He's hooked and he'll never be the same.

While it is the beauty of shells that first attracts the neophyte he might soon tire of the hobby, because not all shells are lovely. Fortunately, by the time he reaches the point of diminishing returns in his search for beauty, he has often become intrigued with the fantastic variety of shell forms.

This variety is really not surprising if you consider the molluscan position in the scientific order of things. Mollusks comprise one of the approximately 14 phyla into which the animal kingdom is divided. The vertebrates—mammals, fish, amphibians, reptiles, birds and several other classes –comprise another phylum. Knowing the great diversity of vertebrates, ranging from man to elephant, to hummingbird, to rattlesnake, to angel fish—it is not surprising to find mollusks as various in color as the Violet Snail *(Janthina janthina)* and certain turban shells, green as oxidized copper; varying in size from *Marginella aphanacme*, 2.5 millimeters long, to *Tridacna gigas* (the "man-eating" Giant Clam), which has reached 54 inches and 580 pounds; ranging in form from flat, eight-plated chitons to the globular Partridge Shell *(Tonna perdix)*; and existing in such opposing environments as the ocean floor 2½ miles down and a ledge 18,000 feet up in the Himalayas.

There are six classes of mollusks: the gastropods (univalves or snails); pelecypods (bivalves or clams); scaphopods (tusk shells); amphineura (chitons or coat-of-mail shells); cephalopods (nautilus and argonaut shells as well as, surprisingly, the octopus and squid—which conchologists do *not* collect) and the rare, deep-sea monoplacophora. The classes, moreover, are divided into more than 100 families and the number of living species is in the neighborhood of 100,000, of which cowries account for from 145 to 190 and cones 400 to 600. And if that still isn't enough, the collector can always look into the 100,000 species that have been identified as fossils, but are now extinct.

At home in Jiddah, the author works on his collection.

Fortunately for conchologists, the land masses that separate the oceans, as well as the differences in water temperatures, restrict the migration of salt water mollusks from one part of the world to another. The molluscan world is thus divided into provinces, each with its own unique species, each providing new worlds for the collector to explore—if not personally then by trading or purchasing.

On the west coast of North America, for example, you find species that do not live on the east coast. The cool-water Californian province spawns different species than the Panamic further south. One of the world's six pearl-producing species of oysters, *Meleagrina vulgaras* thrives on the east coast of the Arabian peninsula but not in the Red Sea. The Mediterranean has its own particular species, as does Japan and South Africa.

The largest province is the Indo-Pacific—stretching from Hawaii through Australia, the East Indies and the Philippines to the east coast of Africa—and one of the most interesting parts of it is the Red Sea, an isolated, almost landlocked pocket which harbors many unique species and interesting subspecies.

Within each province, of course, exists a wide range of physical environments, and each molluscan family has its own preference. The conches, for example, generally like shallow water and a sandy bottom, the volutes, deep water, the cowries, a rock to cling to, the bivalves, sand. Where the bivalves go, so do the murexes, which relish oysters and clams for supper.

Within these general preferences, each species has its own, very fussy specifications. In the Red Sea the brown-spotted Subulate Auger—long and thin and sharp as a pencil—is always found under sand at the ends of trails between the high and low water marks, in only a few inches of water while the Crenulate Auger *(Terebra crenulata)* usually chooses a less accessible 12 feet of water. Some of the cowries in the Red Sea—*pantherina, qrayana, carneola, gracilis, isabella* —prefer the landward side of the inner reef, where the water is quiet but fresh and comparatively cool. Others—*lynx, turdus* and the elusive *camelopardalis*—I have always found in the nearly stagnant, very warm water only a few feet from shore. The uncommon Stolid Cowrie hides in coral heads rather than under rocks. Of the cones, *arenatus, tessulatus, virgo* and *sumatrensis* (the Red Sea-Indian Ocean sub-species of *Conus vexillum*) are found lying on or in sand between shore and reef, while Textile Cones and Striate Cones hide under rocks on the reef. It is perhaps just as well that the latter two are well concealed since they have tiny harpoons in their noses with which they can inject poison that can paralyze a man.

Most shells are adept at concealing themselves; only a few give the hunter no sport. Many are elusive by virtue of the very inaccessibility of their habitat. Some are common in one part of their province, rare in others. Others—like the Glory-of-the-Seas *(Conus gloria-maris)* —are just rare. First described in 1777,

A glass-bottomed viewing box made from a plastic bucket cuts reflection and distortion and helps a young collector take her shells 'live'.

Immature (left) and mature Seba's Spider Conches (**Lambis truncata sebae**).

Hairy Triton **(Cymatium pileare).**

Blackened Murex **(Murex nigritus),** Gulf of California.

only 70 specimens have ever been found. Another, the Glory-of-India Cone, of the Indian Ocean, fetches up to $1,300. Only 17 specimens of *Cypraea guttata* (the Great Spotted Cowrie of the southwest Pacific) have been found, and can fetch $950.

These, collectors only dream of finding, but just closing in on a species in your area can be challenging too. I am still searching, for example, for the Venus Comb Murex, *Murex triremis*, a species prized by collectors for the delicate beauty of its spines. It is by no means rare but specimens with all spines perfect are elusive. From beach specimens with broken spines I know the species exists near Jiddah, but so far I have not been able to find any alive.

Another specimen I have been hunting is the Arabian Tibia *(Tibia insulaechorab)*, a large shell with lovely lines that rates up to $15 in Van Nostrand's *Standard Catalog of Shells*. I first saw it as a beat-up beach specimen in the fishermen's village at Mastabah, 60 miles south of Jiddah. The fishermen assured me they could find live ones, and promised, generously, to collect and preserve them until I came their way again. Two weeks later I quivered with excitement as they withdrew a burlap bag from the water and opened it. And then ... my smile faded. "Live" Tibias all right; alive with hermit crabs! So back to the search.

At last a colony was located by another collector and I drove 50 miles north along the road to Medina and then swung west toward the sea, my Land-Rover churning up powder sand like the sea before the prow of a ship. Arriving at the shore at dawn, before the wind had raised waves to stir up the silty bottom of the bay, I swam out, dove down 30 feet, being careful not to touch the mud and cloud the view. And there they—well, they were there last week.

In his search for shells the avid collector often graduates from conchology to malacology—the study of the whole mollusk, not just the empty shells. He more or less has to if he wants to know how shells are created.

Mollusks come from eggs that their mothers scatter around in great quantities on rocks, in sand or even in the open sea. In some species the eggs are retained within the mother's body and hatched there and some, like cowries, sit on their eggs like little hens, with their mantles folded around them until they hatch. In other species the eggs come in gelatinous ribbons, in cases like a honeycomb or even mixed with sand formed into an artistic arrangement resembling an open flower and held together with a sticky secretion. Whatever their shapes, the eggs eventually produce a tiny organism that swims around in larval state for a while and then settles down and begins manufacturing its shell.

The creation of a sea shell is really a form of alchemy—the medieval attempt to change common metals into gold. For what the mollusk does is take minerals from sea water and with the help of a minute, quite remarkable gland in the mantle (the filmy organ that protects the shell) converts them into an infinite variety of forms and colors, each species producing a shell like those of the others in its own species, but different from all other species. It is a marvelous process. Minute holes in the membrane squirt out the colors at specified intervals and places to produce the pattern built into its genes—rather like instructions programmed for a computer. In the univalves—snails—the process begins with the spire and continues round and round, usually, but not always, in a clockwise direction, until the shell is complete. The number of whorls varies from family to family and species to species. Slim, tapering auger shells, for example, have from 12 to 20, cones six to eight.

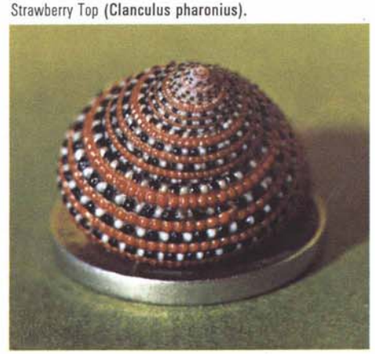
Most immature shells are miniature replicas of what they will become as adults. But a few young species are so different from the adult form they are difficult to identify. The immature cowrie is often mistaken for a Bubble Shell, very thin and fragile, with a large opening and no denticulation or tooth-like marks on either the inner or outer lip. The shell gradually thickens and the outer lip is extended until it almost meets the inner. Finally the denticulation is produced. By this time the final colors have been applied and then a colorless, transparent coat is laid on and the job is done.

All this takes time: up to a year for a cowrie, up to six for some trochus shells —almost as long as it takes collectors to learn about it. At the end it is worth it. The mollusk has a shell as lovely as a rainbow and the collectors have such specialized knowledge that they may one day make a serious contribution to science.

Not many do this, of course. But in conchology the professionals, busy teaching and writing, do lean heavily on the enthusiasm of private collectors in the field throughout the world—and always have. The private collection of Sir Hans Sloane (1660-1753), for example, became the nucleus of the British Museum's collection and in 1956 Mrs. Orville R. Davis, an amateur collector, accidentally turned up a conch that Mr. William Old of the American Museum of Natural History identified as a new species, now called "Bill Old's Conch."

For most collectors, however, this is the furthest thing from their minds. What they really like is much more elemental: the tang of salt air at dawn, the look of clear water, and the sharp excitement of seeking and finding an object of beauty. There are worse compulsions.

Strawberry Top **(Clanculus pharonius).**



Calvin L. Ham, Administrative Assistant to Aramco's Representative in Jiddah, has lived in Saudi Arabia for 17 years and in Jiddah, on the Red Sea, for the past five years.

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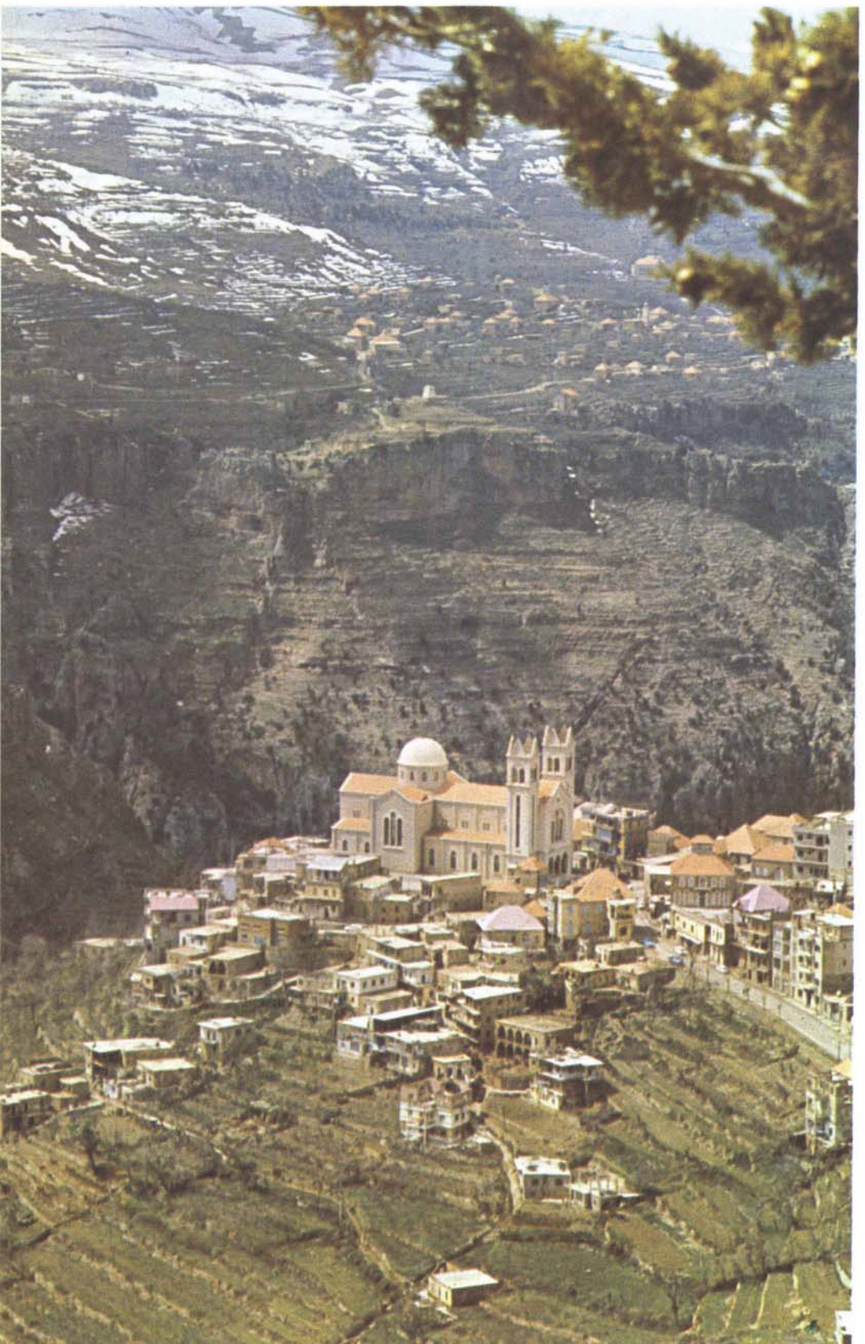
children of the mountain

PHOTOGRAPHY BY NICHOLAS KOURIDES



To a photographer, the temptation to digress is both bane and blessing. It lures him away from his subject but it may also provide a better story.

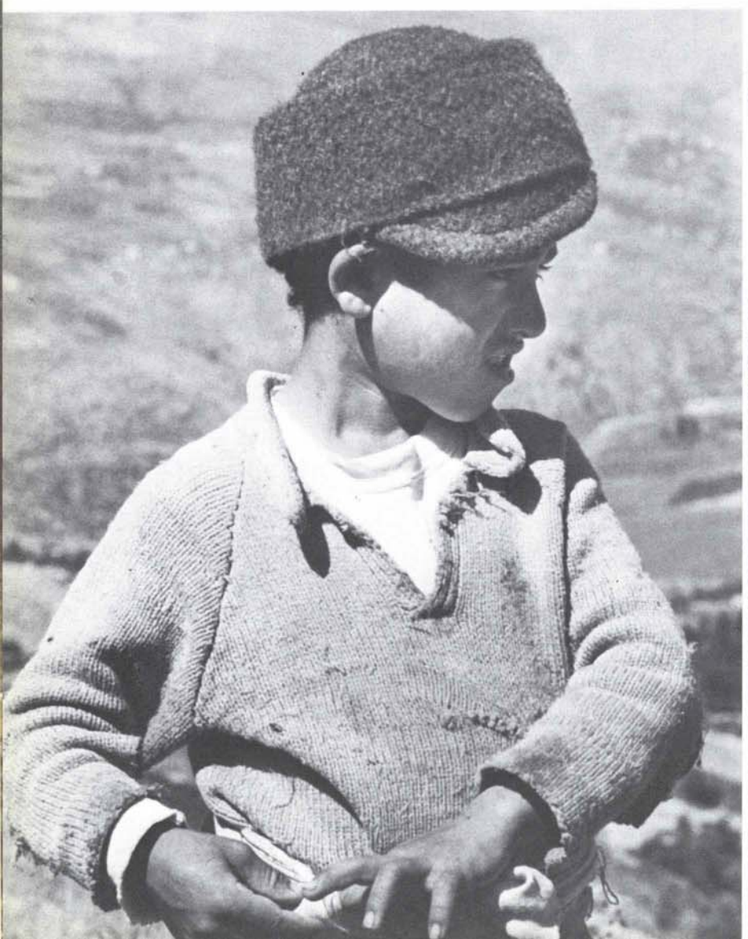
Last spring, for example, photographer Nicholas Kourides was on assignment in the mountains of Lebanon. He was attempting to capture with his camera the people who, years ago, moved Gibran Kahlil Gibran, the Lebanese poet-philosopher, to write some of his most penetrating observations on life and human nature.

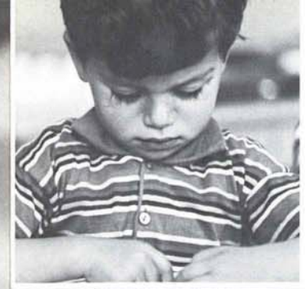
To carry out the assignment he began to travel back and forth from Beirut to the village of Becharri, where Gibran once lived. His idea was that in a mountain village as out of the way as Becharri, the people would not have changed greatly in a few decades. Among the narrow streets and houses clinging to a high ledge not far from Lebanon's historic grove of Cedars, he hoped he could find not merely the simple villagers who at once annoyed and inspired Gibran, but also the very mood of the mountains that nurtured the poet's often-brooding thoughts.

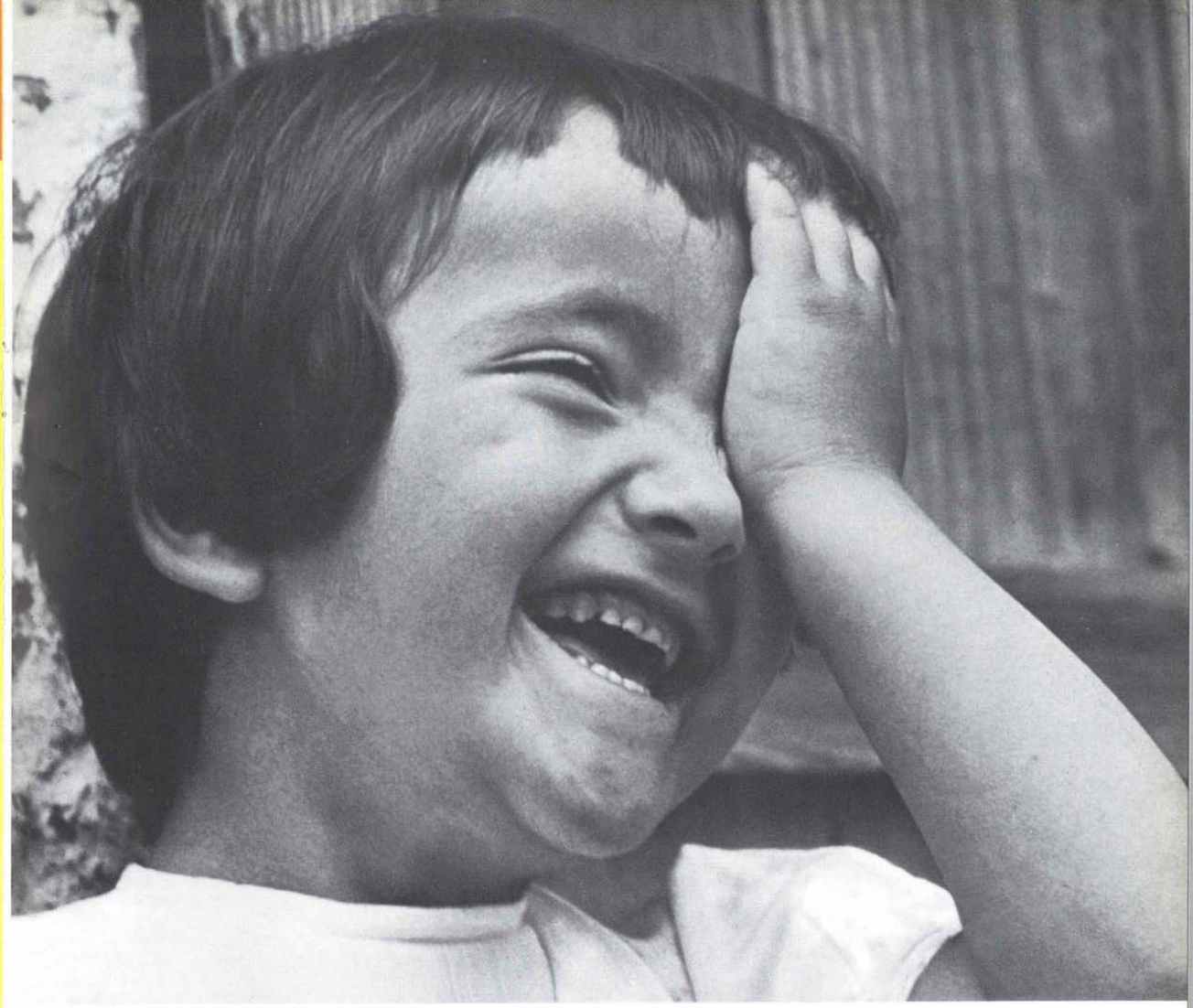
As he worked, however, he kept finding himself singling out the children of the village, the handsome, healthy, thoroughly-happy children. He was trying to find the mood of the village—a mood that at times, surely, must have reflected the severity and struggle of life in a harsh and demanding environment—but try as he might, he kept coming up with the children of the mountain, children with cheeks roughened and reddened by the wind, with teeth as white as the snow on the peaks above, with smiles as bright as the flowers just then pushing their way into the sunlight on the terraced farmland below.

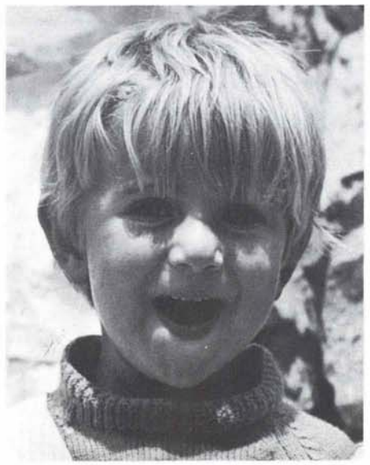
There was, obviously, only one thing to do: forget Gibran and photograph the children. Which, thank heaven, he did.

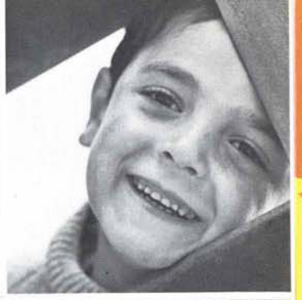
THE EDITORS

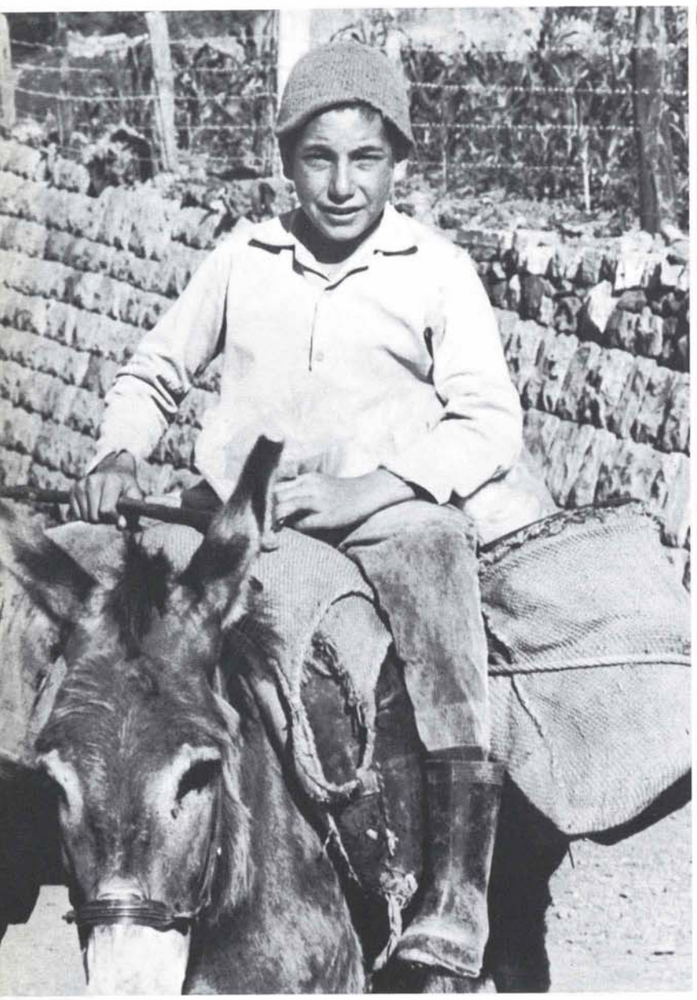


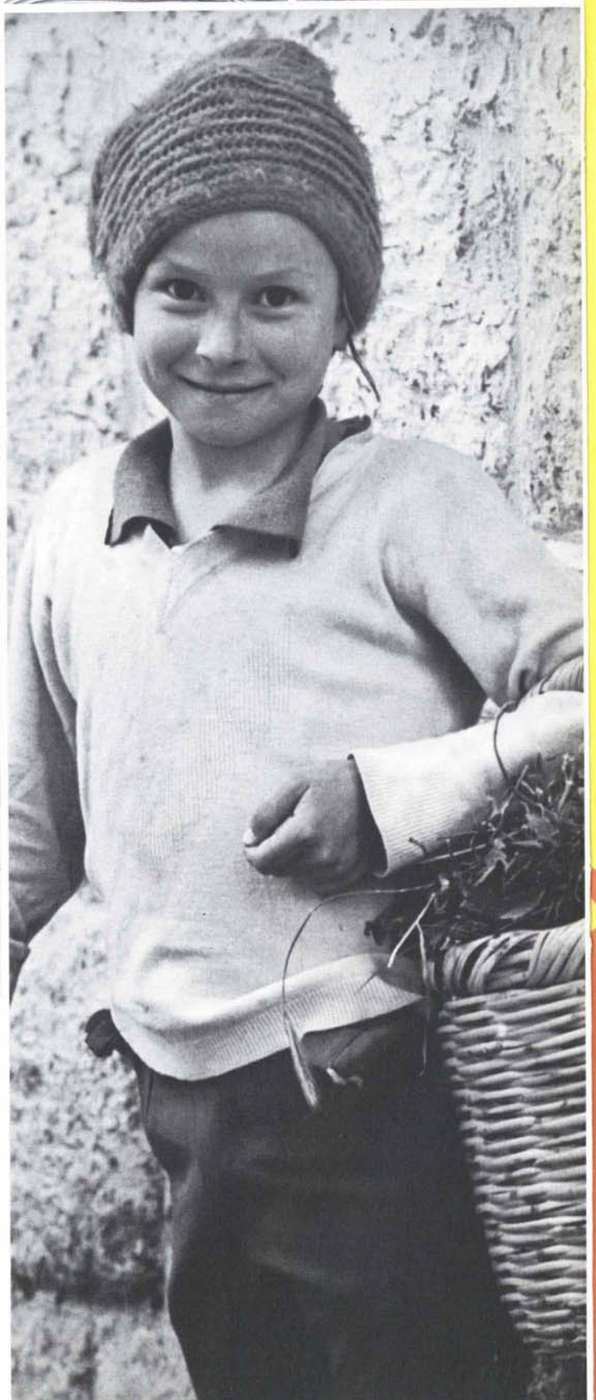












DISCOVERY!

the story of ARAMCO then

CHAPTER 10: THE TEN DAYS AT DAMMAM 12

BY WALLACE STEGNER

ILLUSTRATED BY DONALD THOMPSON

SYNOPSIS—The year 1939 stands out in Aramco's history. It was the year King Ibn Sa'ud paid his first royal visit to the Company's now extensive installations and turned the valve that let Saudi Arabian oil pour into the first oil tanker ever to call at the new port they called Ras Tanura.

The King's visit also marked the end of the first stage of Aramco's history, a stage that began with the first gropings of financiers and adventurers in the 1920's and reached its climax on March 4, 1938, when Dammam No. 7 finally proved that Saudi Arabia had oil in commercial quantities. It also marked the end of the pioneering period and the beginning—or so they thought then—of the development period when their main worries would be production, competition and the training of the new men who even then were boarding ships in harbors half way across the world.

One of those men was a young mining engineer named Tom Barger. Barger, later to become president of the Company and chairman of the board, had been sent off to Arabia in a hurry and almost as quickly sent off to help explore the northern edge of the Empty Quarter. There he made the acquaintance of the great guide Khamis ibn Rimthan, immersed himself in the study of Arabic and set himself to learning how to send Morse code by wireless, cure constipation, fix generators and grease cars. They were skills most geologists may not have needed but which veterans in Arabia did.

Back in the Eastern Province, meanwhile, the Company was also tackling extra jobs. One was an effort to help define, on a contract basis, Saudi Arabia's traditionally vague but now suddenly valuable boundaries. The other was a hydrographic survey to take soundings in the Gulf.

To get on with the first job the Company had picked two surveyors, but one of them, Charlie Herring, was soon asked to take charge of the hydrographic party. He did but never completed the assignment. On July 5, 1938, Charlie and his wife Pauline were killed when the Calarabia, *a Company launch, exploded between al-Khobar and Bahrain. They were the first American casualties, but not, as it turned out, the last.*

Dammam No. 12 was the fourth large producing well in the Arab Zone. Spudded in on October 23, 1938, it was down to 4,725 feet on May 31, 1939, and by June 7, the crews had finished cementing the casing. Oil well drilling in 1939 was a great deal different from what it was in the early years of the century when a "gusher" was expected to drown half a county in valuable and irrecoverable crude before they got it bottled up. No. 12 was bottled from the beginning. They had her curbed like a dangerous horse.

On June 21 they began test-perforating at 4,565 feet, let the well flow for a while, and got a test of 1,700 barrels a day. Below the perforated section lay 150 feet more of productive strata. By July 8 they were ready to perforate the next stage of it under the direction of Harry Rector, who was acting as resident manager in the absence of Floyd Ohliger. Now that the camp had got past its hectic time and its gala time and settled into a routine, Floyd and his family were en route to the States for a vacation, by way of Rome and London.

On a midafternoon in July in the Eastern Province the heat does not beat down as it does in drier climates. It pours in a great engulfing tide, down from the brassy sky and up from the blinding rock and sand and breathes like a steam boiler through every wind that moves. Even with dark glasses, the eyes have trouble taking in all the light, and photographers, in the beginning, all think their light meters have gone crazy. The attention is inclined to wander, the body and brain to focus on minimum survival, on the mere exhalation and inhalation of hot wet air, on the heavy pound of the blood. Since they learned about them, there has been a stiff consumption of salt tablets among the drilling crews.

Against the fierce sky around No. 12, the derricks of neighboring wells shimmered, crawled, almost disappeared. The *jabals* over toward No. 1 did their special July dance. If an American fell into a daydream about the beach a few miles to the east of them, he adjusted his daydream to the realities, to a cool drink and a shower: the Gulf lapping the fringes of this white-hot shore would have been steaming like a fumarole.

Up on the stabbing board, 20 feet above the derrick floor, Bill Eisler and a helper had got the perforating gun into the lubricator (on top of the casing-head connections) and were preparing to lower it into the casing. In another minute, they would have come down from the stabbing board. A worker in khaki pants—the doctor objected if workers were allowed to work around machinery in their loose robes—was under the floor at the one-inch equalizer valve. Three crewmen stood outside the rig at the remote controls of the 6 3/8-inch master valve, awaiting Eisler's orders to open the gate. Monte Hawkins, the second American on the crew, had started for the hoist 150 feet away. Over in the shack three or four petroleum engineers, greasy with sweat, tried to keep their wet forearms and spongy hands from sticking to the papers they worked on.

That was when Dammam No. 12 exploded.

All Monte Hawkins heard was a sharp hiss as if the airhose of a compressor had been cut. Then he was flat on the ground, dazed and scrambling. Inside the shack the engineers felt the walls ram inward as if something soft and very heavy had hit them. Almost simultaneously they heard a dull, mushy BOOM! And a massive deafening roar like a waterfall or a hurricane swept over them and around them. They rushed to look out, their hair blown back, it seemed, by waves of overwhelming sound. They saw each other's opened mouths but heard nothing except their own shouting, faint and far away, as they took in the incredible scene uncoiling before them.

At No. 12 black smoke, shot with red and yellow flames, boiled out of the cellar. Up, through and around the laced steel of the 135-foot derrick it rose and bent stiffly southward in a wind they had not known was blowing. Then, one shocking instant later, a column of flames 200 feet high shot into the air like something played from a hose.

The men in the shack did the frantic, random things that great excitement makes men do. They rushed toward the fire, they grabbed up papers as if their own shack were burning and they must save the records, they seized the telephone and gabbled in it, as if the explosion would not have shocked the whole camp alert in a split second. Ernie Wichern, like the man who points and clicks his camera instinctively as the *Hindenburg* blows up in the air before his eyes, rushed outside and stood spraddle-legged, trying to focus on the boil of flame and smoke with the derrick's tower almost hidden in it.

Up nearer the rig, the action was more critical. Some said afterward that at the first hiss, as the perforating gun fired prematurely in the lubricator, Bill Eisler shoved the worker beside him off the stabbing board, clear of the fire. Blown or pushed, the worker never moved after he struck the derrick floor. A second or two later, as Monte Hawkins was scrambling to his feet, Eisler himself jumped, hit the derrick floor, and lay where he had fallen. Hawkins, looking back, saw Eisler begin to crawl, and without a moment's thought went back into that terrible heat to get him. His face shriveled, his eyes slitted and his lips drawn back from his teeth, staggering, half-blind, being cooked alive, he struggled toward Eisler and was chased back, gathered his arms before his face and drove in again. Eisler was hitching himself along, a broken and agonized animal. Hawkins caught at his hands; the skin peeled off in his grip. He got hold of armpits, wrists, the remnants of clothes, and dragged and rolled him and got his arm and lifted him and pulled him along with his burned arm hooked around his neck. The crewmen who had been at the remote controls of the master valve were by now with him, helping, and Roy Hollingsworth, the first man from outside to reach the fire, skidded up in a sedan. Together they lifted Bill Eisler into the car.

Now others were there to help. From over at the camp the cars and trucks were roaring in. It turned out that the worker who had been under the floor had crawled out miraculously unhurt. It was just as well he had; about this time the fire began setting off the caps and powder on the derrick floor to add their bit to the conflagration.

They sent Eisler off to the hospital to die. Before the car had turned around, within 10 minutes of the explosion, the crowd standing back away from the heat, not yet organized for anything, saw the derrick begin to lean. Before their eyes the steel girders at its base melted like wax. Wichern, his film running out, got a shot as the derrick lurched downward toward the blown funnel of smoke, and then ran a few yards closer, behind some rolls of roofing paper, and squinted through his finder again.

The derrick was gone, flattened out in the smoke, not even the crash of its falling audible over the howl and rush and roar. Things less combustible than steel might have melted, and things taller than derricks fallen inaudibly, in that holocaust. Oil at tremendous pressure, coming from nearly a mile down, was feeding the fire at the rate of probably 10,000 barrels a day.

Nobody could ever quite reconstruct how it had all happened, except that, somehow, the perforating gun went off in the lubricator. The worker below the floor had opened the one-inch equalizer valve, and this might have caused a surge of gas to kick the gun up to the top of the lubricator, where it hit its firing pin against the "go-devil" that normally is dropped down the hole later. Or the wire line might have tightened up enough to pull the gun up against the top of the lubricator and the "go-devil." Whatever it was, it was enough. Some tiny tick or scratch or jar, some bubble of gas as inconsequential as a hiccup, and all that enormous curbed energy erupted in destructive flame.

For the 200 American men of Dhahran, isolated, remote from the equipment and expertise of experienced professionals, the fire at Dammam No. 12 was a staggering challenge. It was one of the world's most spectacular oil-well fires, one that brought people to emergency stations halfway around the globe, and to fight it, Harry Rector, facing the worst emergency in the Company's history, had not a single professional to call on. He had cabled San Francisco. He had advised Bahrain. He had intercepted Ohliger at Rome. But he couldn't wait for their answers: the emergency was now. Inexperienced he may have been, but then and there he and Herb Fritzie, in charge of one crew, and Bill Eltiste in charge of another, were the best there was.

The first step was obvious: assign priorities. Because No. 12 was a good distance from the other wells, there was no serious danger of the fire's spreading. The real danger was that the master valve and the connections on the main casing would be destroyed, which would probably destroy the well, and might also spray the entire camp with burning oil. Besides, if the well ran wild, it might seriously deplete the whole oil field by releasing gas pressure and possibly channeling water into the oil zone. Later there would be the problem of the toxic gas being released. If they put out the fire without controlling the well, a shift in the wind could wipe out the whole camp. The women, therefore, might have to be evacuated. But that would come later. Now, they would focus on the casing valves and fittings.

The fire fighters started water flowing continuously into the cellar to carry off the unburned oil from there and from the immediate surroundings of the well. They also flowed water onto the casing fittings to help keep them cool. They strung together about 400 feet of eight-inch pipe and with a side-boom tractor shoved one end of it to the head of the fire to carry away the oil and gas, and burned these fuels as they came out the other end. Herb Fritzie and a drilling crew went to work on one of the six-inch lines

normally used to pump oil to al-Khobar for the Bahrain refinery, and, after installing pumps at al-Khobar, converted the line to carry water. But the pumps could deliver only about 300 gallons a minute, and a minimum of 400 gallons was needed for the Casoc fire engine. So Fritzie's crew ran a pipeline to Dammam No. 8, which had been completed in salt water, and got enough water from that well. John Ames and another drilling crew, working all night, laid steam lines from several of the boiler plants adjacent to No. 12, and rigged steam nozzles to blast the fire away from vital connections. Then they installed steam jets in the eight-inch line to boost the oil and gas through, so as to get these fuels away from the fire more rapidly. Steam nozzles were also used to keep the flames from blowing in the faces of the workmen, but they were only partially effective. The fire engine was used to pump water through the nozzles.

Efficiency was their trademark. Long before dawn they had a first-aid station, a motor pool, a stockpile of all available pipe and fittings, awnings under which exhausted men could rest in the shade during the day, and a field kitchen where Chow Lee dispensed coffee and hamburgers. A little after 2:30 in the morning the word came down from the hospital that Bill Eisler was dead. Red-eyed, exhausted, they went on setting up their battle gear, and after daylight they went off to their shifts on other wells, and the crews which had been working at these wells all night replaced them at the fire. Production was what they were all there for; it could not be stopped just because of a fire.

By daylight, asbestos screens had arrived from Bahrain. Bill Eltiste and Herb Fritzie pushed a screen up as close as they could stand, while men with hoses, coming behind, kept them wet and steaming. They thought they could see that the fire was coming from a broken side line in the cellar below the master gate, and their baptism of fire convinced them beyond any doubt that they needed asbestos suits, more screens, extra fire hose, fog nozzles, gas masks and Bullard fresh-air masks. Rector wired San Francisco to get them started, and Skinner telephoned Roy Lebkicher in London, asking him to enlist help from Abadan and Basra, and to send down by chartered plane what London could provide. Lebkicher ran into difficulties, for in midsummer of 1939 London was in the midst of war jitters and was desperately preparing for anything. He couldn't get any equipment released in London, but by hunting all over the United Kingdom, he and the others in the London office managed to pick up gas masks, asbestos suits and other gear and to put it aboard a plane at Croydon airport within 48 hours after Skinner's call.

It turned out that the shipment could go only as far as Rome, but Floyd Ohliger there arranged a transfer to an Italian plane; the Italians were remarkably eager to cooperate. The British, harassed and in trouble, but not likely to permit Italians to fly over and among their oil strongholds of the Middle East, intercepted the Italian plane at Basra and took the equipment on from there. That was July 13. Meantime, some asbestos suits, together with additional fresh-air masks, had been sent by Bapco from Bahrain and by Anglo-Iranian (formerly Anglo-Persian) from Abadan. Bapco had also sent over Mollie Brogan, a registered nurse, with special medicines and supplies.

Since it was summer, the geologists had returned to camp to work on their reports, but Max Steineke had a futile time trying to keep them away from the fire. Dick Kerr and others were helping at the well every night. All over the camp, crews finished their regular shifts and were drawn irresistibly down to No. 12. Shop men who had worked all day spent all night helping to lay water lines, making special wrenches and devices that suggested themselves to the fire fighters. They were getting constant advice, much of it good, from San Francisco and elsewhere, but advice wasn't what they needed most. What they most needed was to get a clear idea of where the main trouble was; then they could devise ways of fixing it.

Fritzie, Walt Sims of Bapco, and especially Eltiste did it for them. First Fritzie and Sims, in asbestos suits, with wire cable around them, went in behind a screen, right to the base of the roaring, boiling column of flame and smoke, and fought to close the upper and lower Shafer gates. Before they were driven back, writhing and almost insane with the heat, they closed one wheel two turns; there it stuck. The control rod of the other was bent, and would have to be straightened before the gate could be closed off. But the stuck one might yet be broken loose; they tried it again next day, four of them on a four-foot wrench, working behind a bigger movable shield that the shop had built overnight.

With the hoses and fog nozzles spraying over their laboring bodies, and soaking the ground and the hissing, steaming shield, it was like working in the throat of a volcano during a cloudburst. But heaving together on the wrench, they broke the wheel loose and started it around, staying in the furnace blaze until it could not be borne another second, and still hanging on for one more turn, and another. Then the control rod broke clean off, and they were dragged back to safety. But when they could look again they were cheered; the flame was definitely lower. They could not tell whether the roar was less or not; they had a feeling they would never hear properly again.

Now it was Bill Eltiste's turn to go in behind his screen, clear to the cellar wall. He could see the source of the fire—it came mainly from the split swage nipple on top of the control valve. And it seemed to him that there were better ways of working on it than by trying to straighten the bent rod of the second wheel and get the lower Shafer shut that way. He was a big easy-going low-voiced man with the kind of imagination that inventors draw on, and a brain as orderly and reliable as a good watch. He found a pencil and a scrap of paper and he drew a picture of what seemed to be a huge iron spoon. The "spoon," he said, would partly cap the nipple. John Box took the drawing and went to work in the shop.

Next day, Box brought up the iron spoon he had made to Eltiste's specifications. Eltiste had already had his crew join together two hundred feet of eight-inch pipe. Box fitted the spoon to the end of this pipe and a pair of side-boom Caterpillar tractors picked up the pipe and shoved the spoon into the center of the fire. It took some steering; they jockeyed and probed through the heat and smoke, with Eltiste trying to direct them from behind the shield. Then suddenly

the spoon slid over the broken swage nipple and the column of fire dropped as if a burner valve had been turned down. At the end of the two hundred feet of pipe, the oil gushed out in a thick stream that blackened the sand and flowed down into a low spot and began to puddle. The noise fell with the column of fire; they found themselves shouting more loudly than they needed to.

With the flames reduced by half, Eltiste, Cal Ross, and Ed Braun got closer to the valve than they had been able to before, and as soon as they got a look they gave up both the plan to straighten the bent rod and the notion of trying to close the Shafer. There was an alternate plan, suggested from San Francisco, that they tunnel in from sixty or seventy feet away, put a "hot tap" on the main casing fifteen or twenty feet below the cellar. A hot tap is a routine procedure by which an intercepting line is attached to a main line while oil is still flowing through. Engineers simply weld a fitting to the line to be tapped, attach a flange to the fitting and bolt a valve to the flange. Then it's a simple matter of inserting a specially fitted tapping machine through the valve and cutting a hole into the main line. Through the intercepting pipe line that is attached to the valve, oil can be drawn out or, as San Francisco was suggesting, mud could be pumped into the well, to block the oil shooting upward from below.

Everybody knew it was going to take a good deal of time and might be dangerous because gas might seep into the tunnel through the porous and cracked limestone near the bore hole, so Tom Barger, once a mining engineer, was assigned to work it out. He drew up his plans during the night and work started at daybreak. But this plan was abandoned too. Eltiste, Ross and Braun saw that it would be easier to put a hot tap on the four-inch bypass line that emerged from the casing below the main valve, and force mud in that way.

By now, though they had worked with only snatches of rest, going from routine shifts to fire-fighting shifts and back again for a solid week, they were doggedly determined to get the rest of that fire out—and by themselves. The word had got around that not only was Anglo-Iranian coming in with men and equipment, but that Charley Potter, the drilling superintendent on leave in the States, had started by plane from Los Angeles to New York to meet Myron Kinley. Kinley, the most famous oil-well fire fighter in the world, was on his way with a crew from Texas, and had announced that he was prepared to fly the Atlantic in a chartered airplane to kill the fire. This was not something many people had done in 1939, but the tired boys in Dhahran were not impressed. "Nuts!" Ed Braun is supposed to have said. "This is our fire." So while they owned it, they made the most of it.

The one-inch equalizer valve was burned, and could not be closed. On July 15, a week after the fire broke out, they decided to try to pinch off the one-inch equalizer, although they recognized that it would be a dangerous job: a split in the already burned pipe at the pinch point could spray the crew with blazing oil. Nevertheless, seeing no alternative, they put a clamp on a 20-foot torque tube, and very slowly, expecting the pipe to crush or split at any moment, they screwed down on it and pinched the pipe shut. Again they were cheered, for the fire and noise fell abruptly.

By now they had reduced the flare to a quarter of what it had been in the beginning. Ohliger, who had sent his wife on to London and flown back to Dhahran, cabled Skinner that there were only 1,000 to 2,000 barrels a day coming through the swage nipple now. Skinner began to slow up on his assembling of world-wide help; Potter held Kinley in New York pending developments. While the professionals were hesitating, the amateurs closed in.

There were two valves on the four-inch line from the cellar connections: one near the casinghead, and one at the top end, near the rim of the cellar. They knew that the top one was closed, but they could not get near enough to open it because of the intense heat. They hoped and believed that the lower one was open, so that an effective hot tap might be put on the line between the two valves. After the shop built the hot tap, they screwed the nuts on one by one under the protection of shields, with their heads and shoulders hanging over into the cellar which even at one-fourth of its original fury was a fair substitute for Hell. Ross and Braun put the nuts on, alternating, being dragged out half dead and going in again after a rest. It was a job that called for muscle and bravery, and it took two days.

On July 18, 10 days after the explosion seared the flesh from Bill Eisler's bones, they tested the connections for the last time. Haggard, blistered, scorched, exhausted, they got the word that things were about ready; they dropped back and waited, watching the diminished but still fearful flare that roared into the summer sky and the smoke that blew thick and rolling across the *jabals*. Their unheard shouting fell away. Somebody, somewhere, gave a signal—a nod, a lifted hand. They felt how the bit began boring into the side of the bypass line. Unable to see what they knew was happening, they could only watch the column of smoke and fire for the hoped-for results. If it worked, if the lower valve *was* open, mud would rush down the bypass line into the well as soon as the bit broke through. If it didn't work—well, then they would have to try something else. They waited, watching the apparently quenchless column of smoke and flame.

Then they sprang from the ground, they turned to pound one another on the back; the shouting that for 10 days had gone unheard in the roar of the fire burst hoarsely into an abrupt stillness. The fire had gone out like a turned-out light.

There was some self-conscious understatement, a certain controlled pride, in the cable that Ohliger sent Skinner. It spoke for the whole two hundred amateurs. "Fire extinguished," it said. "Hole full of mud. Professional fire fighters not needed."

They proved themselves on No. 12. If they had not been initiated before, they were now. The fire cost the Company vast amounts of money and deprived the Government of substantial royalties; it cost the crew two lives and 10 days of heart-bursting work. Shaikh Abdullah expressed everybody's most fervent wish when he cabled that he hoped this would be the last accident of its kind. But as a test of what was in them it could hardly have been better devised. Every capacity that they possessed had a chance to shine during those 10 days and in celebration of the way they had handled themselves, the Government—for this one occasion—relaxed its prohibition law, and the first beer that was ever in al-Hasa came across from Bahrain, and the firemen really tied one on.

TO BE CONTINUED

In a single bound the Kingdom of Saudi Arabia leaped from the most primitive means of animal transport to the most sophisticated jet aircraft available.

SILVER THREADS AMONG THE OLD

BY DANIEL DA CRUZ / PHOTOGRAPHY BY TOR EIGELAND

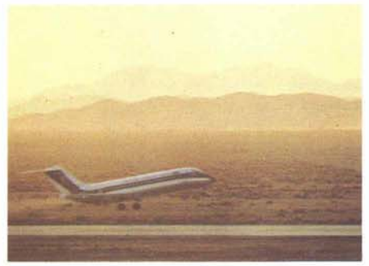
For thousands of years the immense, desolate, arid Arabian subcontinent, devoid of waterways, its shifting sands inhospitable to paved highways, was tenuously stitched together only by the trails of countless camel caravans. They plodded forward unhurriedly from the dawn of history toward modern times at the same steady two-and-a-half-miles-an-hour pace they traveled in the days of Moses, and Jesus, and Muhammad. And then, abruptly, the thread was broken in the mid-twentieth century as the camel yielded to the airplane, a beast of burden indifferent to heat and cold, of a calm and predictable disposition, consuming dark liquids from the soil as plentiful in Arabia as water is scarce, a silver needle weaving a silver tapestry high in the sky.

The leap from the most primitive means of animal transport to the most sophisticated jet aircraft in a single bound of less than 20 years is a remarkable feat of technical agility. But in a sense it was inevitable, for the early 1950's in Saudi Arabia saw the emergence of a bustling business and governmental community that needed fast communications with all parts of the kingdom—ten times as extensive as New York state—that had a national income from oil revenues sufficient to cover the formidable costs of building a modern airline from scratch, and that was developing a fledging generation of educated, dedicated young Saudis eager to win its wings by learning to run a complex industrial enterprise on its own.

That enterprise had been born, quite by accident, as the result of the visit by President Roosevelt to King 'Abd al-'Aziz ibn Sa'ud in 1945. Assigned by the President to conceive of a gift for the King of appropriate magnificence, Colonel Harry Snyder, the Pentagon's Islamic specialist and part-time adviser to the State Department (now a dean at Saudi Arabia's College of Petroleum and Minerals), after rejecting refrigerators, air conditioners and other cool ideas as too trifling, suggested a DC-3.

His Majesty was delighted with the present—it was, after all, a distinct improvement over the usual autographed photo—and forthwith became a flying fan, as indeed did most of the numerous members of the royal family. Almost without realizing it, the government was soon transporting princes, their friends, their friends' families, and *their* families' friends. As those categories comprise a large part of the Saudi population, the original DC-3 (still in honorable service, incidentally) was supplemented by the purchase of five more, and, willy-nilly, Saudi Arabia was in the airline business.

From the beginning, Saudi Arabian Airlines had a distinct flavor all its own. Schedules were an earnest of good intentions, like a politician's campaign promises, rather than an obligation to provide transportation to cash customers. In the early days more than one loaded aircraft was called back from the taxiway, emptied of its indignant passengers, and pre-empted by an official of some rank for a spur-of-the-moment junket to Beirut, Baghdad, or perhaps a distant Saudi oasis. In that same era many passengers, whatever their rank, insisted on wearing their habitual dress, and if that included a .30-30 rifle, crossed bandoliers bristling with ammunition, a pistol and a curved dagger stuck in the belt and maybe even a hooded hunting falcon on the wrist, who was going to object? Pilots did discourage passengers from brewing tea in the aisles, pointing out that this beverage, along with coffee and milk, was available to all on request, but to the nomads of 25 years ago, a rifle was almost as vital as water. Besides, for all the hardware, it is a matter of record that not a single Saudi plane was ever diverted to Havana.



The Saudi Arab Government started its air operations bravely enough, but soon discovered that it takes more than planes to make an airline, that it takes pilots, mechanics, tower controllers, meteorologists, radiomen, economists, engineers and men from dozens of other specialties; that it takes airstrips, hangars, repair shops, sales offices, fueling facilities; that it takes organization, financing, record-keeping, planning, initiative, vision, perseverance. All these vital elements were either in short supply or wholly lacking. In early 1950, for example, there were only two airstrips in the entire kingdom, no Saudi pilots, no Saudi airframe and powerplant mechanics, no Saudi radar operators—the list was long.

It didn't become miraculously shorter later that year when the government retained Trans World Airlines (which had supplied the original pilots under contract) to provide management, technical and financial services, but the airline finally had a name—it had been merely a department in the Ministry of Defense and Aviation—and a goal: to train Saudi citizens to take over all aspects of the operation of Saudi Arabian Airlines in measured steps of increasing responsibility.

Considering the years that pilots spend attaining their exalted status, it may seem surprising that one of the less complicated tasks of the TWA advisory group, today numbering more than 300, was the training of flying officers. Yet the production of pilots is a process of almost machine-tool precision. Given the raw material—young men clear of eye, sound of wind, and intelligent—flying schools the world over can turn out first-rate pilots in periods that vary only according to the rating desired. Saudi Arabian Airlines went them one better by becoming the first airline to adopt *ab initio* training, handcrafting the pilot from the pre-flight stage to the moment when, nearly a million miles later, he takes command of the big jets.

Arriving in batches of 20, fresh from high school, potential pilots are given intensive ground school and concurrent flight practice for from 14 to 20 months, depending on the student's background and ability. Although each class is the pick of Saudi Arabia's schools, the course maintains such tough standards that no more than 15 will eventually graduate and proudly take the right-hand seat of a DC-3 or Convair as first officer, there to gain the experience and maturity which, after years of carefully observed development, leads to the captain's four golden stripes. But before he can take that first step toward the goal of his career, he will already have logged nearly 300 flying hours (plus 1,250 hours of ground school and 1,000 hours of individual study), and qualified for commercial, instrument and multi-engine tickets under the FAA, whose rigorous procedures he follows from the first.

Saudi Arabian Airlines became airborne more than 20 years ago with Americans at the controls, but progressively the Saudi's themselves are guiding the airline's destiny. Of a total of 68 captains and 52 first officers, Saudi pilots already account for 30 and 40 respectively, and within a decade it is probable that the airline's flying complement will be exclusively Saudi Arab.

That the same may be true of all echelons within the company is the purpose of a unique cadet training program directed by Mr. Hamza Dabbagh and designed to supply the voracious appetite of all Saudi Arabian Airlines departments for skilled administrators and technicians.

"In a nation developing as fast as ours, there just isn't enough trained manpower to go around, so we have had to attract ambitious youngsters and train them from the ground up," explains Mr. Dabbagh, a serious, zealous educator who has studied American

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With an American colleague Captain Nassar stops by Dispatch Office, then runs pre-flight check.

HORATIO ALI, JR.
the Story of Nahar Nassar

"To me being a Boeing captain is like being president of a $7 million corporation, with the significant difference that human lives depend on every single decision I make..."

There's a story they tell about Nahar Nassar.

As a 10-year-old boy he used to visit the Dhahran Airport with his father. As far as they knew he spoke no English, but one day as a DC-3 lifted off the runway he pointed a stubby finger at it and said: "I want fly! I want fly!"

True? No one knows, including Nahar. All he remembers is that when he was 10 he did want to fly and that within two years he *was* flying. Not, to be sure, as a pilot, for then as now the market was rather thin for 12-year-old DC-3 captains, but as a fleet-footed messenger in the Personnel Department of Aramco's Dhahran headquarters. There his energy and his aptitude for the English language won him a transfer to an apprentice mechanic's job in the hangars, one step nearer the clouds. Two years and a fistful of bashed thumbs later, he was rescued from the shop by his father, who decided that if Nahar was really serious about flying he might as well get on with it and, not long after, sent Nahar to Egypt's Misrair Flying Institute.

At the institute Nahar spent a year and a half in rigorous training, and graduated with private and commercial licenses. At Southampton's University of the Air in England he polished his flying skills for an additional eight months, and returned to Jiddah in 1957 to take his Instrument Rating. After flying the line—at last—in DC-3's and Convairs, first as copilot and then as captain, Nahar Nassar in 1960 cleared the U.S. Federal Aviation Agency's highest hurdle when he qualified for the coveted Air Transport Rating in Fort Worth, Texas, having by this time logged the requisite minimum of 3,000 flight hours.

In night flying, instruments take on even more importance.

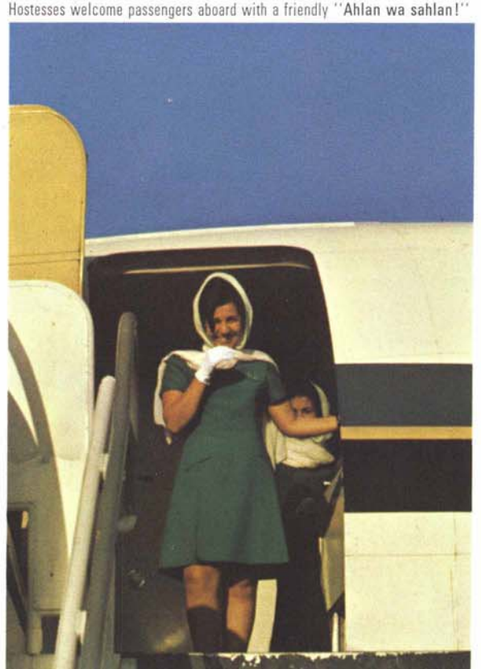
"It's been calculated by experts," says Captain Nassar, looking back, "that the ATR represents the fruit of study equivalent to four—count 'em—*four* Bachelor of Science degrees. You'd think that was enough for anybody. But no," he continues with a wry grin, "a pilot's studies are literally never done. It's easy to see why when one considers that today's airline captain must know how to operate and troubleshoot all systems on aircraft comprising millions of parts; master the techniques of aerial navigation, radio communications, radar, personnel and passenger relations—a Boeing can carry nine crew and nearly 200 passengers—and weather forecasting; and have some knowledge of international law, aerodynamics, mechanical engineering, foreign languages and a dozen other subjects, all changing every week. Also, it helps to know how to fly ...

"To me, being a Boeing captain is like being president of a $7 million corporation, with the significant difference that human lives depend on every single decision I make. To be sure they're the right ones, I must keep in top shape physically, check out in my aircraft every year and under the eagle eye of an FAA examiner simulate every emergency in the book—including two-engines-out landings, fire on the aircraft, emergency high-speed descents, stalls and engine failures on takeoff, and spend 10 to 15 off-duty hours a week reading and absorbing the experiences of other pilots. Then, of course, I'm always learning from that best teacher of all: actual flying, some 20 hours every week."

Captain Nahar Nassar learned his lessons well enough to become Saudi Arabia's first airline captain, then to add to his kudos by qualifying as his nation's first commercial jet pilot and first commercial jet captain. When he made the transition from prop planes to jets in the United States (whose FAA standards, incidentally, are those by which Saudi as well as American pilots qualify), he became the youngest airline jet captain in history—at the age of 25. Soon after, Captain Nassar became the youngest commercial jet commander to fly the Atlantic, when he took delivery of Saudi Arabia's first Boeing 720-B. With such qualifications, plus 8,000 hours of flight time, it is little wonder that he is his country's senior airline pilot, and the pilot usually assigned to command the royal aircraft whenever King Faisal flies.

udi Arabian Airlines chic hostesses come from Arab and European countries and are at ease in Arabic, French and English. Silk scarves add an eastern flavor to their practically-cut uniforms.

Hostesses welcome passengers aboard with a friendly "**Ahlan wa sahlan!**"



The tender care modern-day air travelers expect—and sometimes actually get—is only the visible part of the iceberg whose vast, hidden portion is a complex logistical organization with a simple purpose: keep the passenger safe and happy, and he'll be back again to fly with our airline.

With Saudi Arabian Airlines, as with other major carriers, the process can be best observed as one of its big Boeing 707's swings toward its assigned parking place on the hardstand at a transit airport. A swarm of vehicles surrounds the aircraft the moment its engines whine to a stop, and while one set of vehicles removes passengers, baggage and mail, another brings several tons of special jet kerosene to fuel the aircraft, two hundred complete meals to fuel the passengers, and a host of workers to

First class passengers enjoy gourmet dinners of European and eastern cuisine served elegantly and followed by steaming cups of traditional Arab coffee.

"COFFEE,CHI,OR..."

handle these and other chores with split-second precision.

Five cleaners empty ashtrays and vacuum the cabin, overseen by two supervisors; two catering service employes remove the debris of the previous meal and replace it with the makings of a six-course dinner kept hot in portable ovens, then put aboard ice for cold drinks; three men load fuel with high-pressure hoses, two workers service the three bathrooms; five mechanics check the proper functioning of all aircraft systems; six porters move baggage.

The five hostesses, meanwhile, (who, passengers assume spend the entire 45-minute stop chatting with the handsome copilot), have begun to inspect the emergency escape slides (two of them), the nine oxygen units, the five fire extinguishers, the passenger service consoles (overhead units for each three passengers), the eight life rafts, the cabin communication system, call bells and lights. Nor can the labor be divided: regulations specify that *all* hostesses and stewards inspect *all* systems personally. With what time is left, they arrange baskets of fresh newspapers, re-stow hand luggage that has gone adrift, and prepare for the next meal in flight.

On Saudi Arabian Airlines, the first-class service offers one of the best, a gourmet dinner served on table linen with monogrammed silver seven-piece setting. Typically, a dinner aloft will include Beluga caviar, hors d'oeuvres, asparagus salad with such eastern specialties as *humus b'thini*, a main course of shish kebab, roast beef, chicken and potatoes, green beans, rice and stuffed tomatoes, followed by—for those who can still lift a fork—six kinds of European cheese and fresh fruit.

Long after the transient passengers have filed off the aircraft, the captain, first officer and flight engineer work through the meticulously-scheduled check list which must be completed on landing to ensure the proper function of every piece of equipment aboard. Only then are they free to slump into a comfortable passenger seat, stretch, and then bolt a hasty meal before returning to the flight deck to finish the 20-minute pre-flight check just as the first passengers troop aboard, into a cabin now clean, serene, and inviting, where smiling hostesses greet them—as trim and fresh as if they really had spent the entire 45-minute stop chatting with the handsome copilot.

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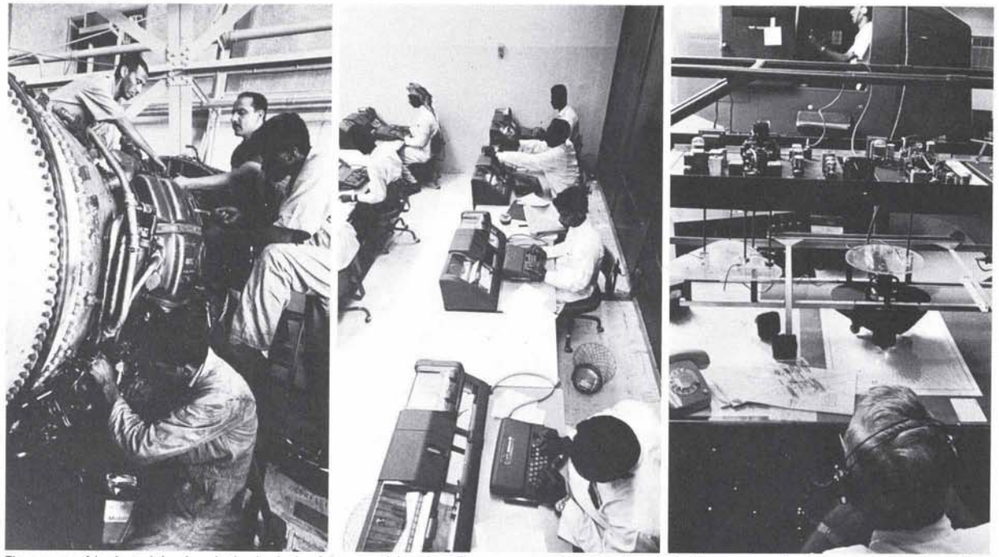
and continental teaching methods, and adapted them to a Middle Eastern environment. "Beginning in 1963 we have taken the country's brightest junior high graduates and put them through a crash course that qualifies them to enter any phase of the airline business, about on par with the best in the West. Since the average student's background is quite unlike his American counterpart's—remember, he may have begun life in nomadic, pastoral surroundings, and in school concentrated on Arabic literature, history and religion—this is no mean accomplishment. We start almost from scratch in making these green young men mature, responsible, well-trained adults. And we give ourselves exactly three years to do it."

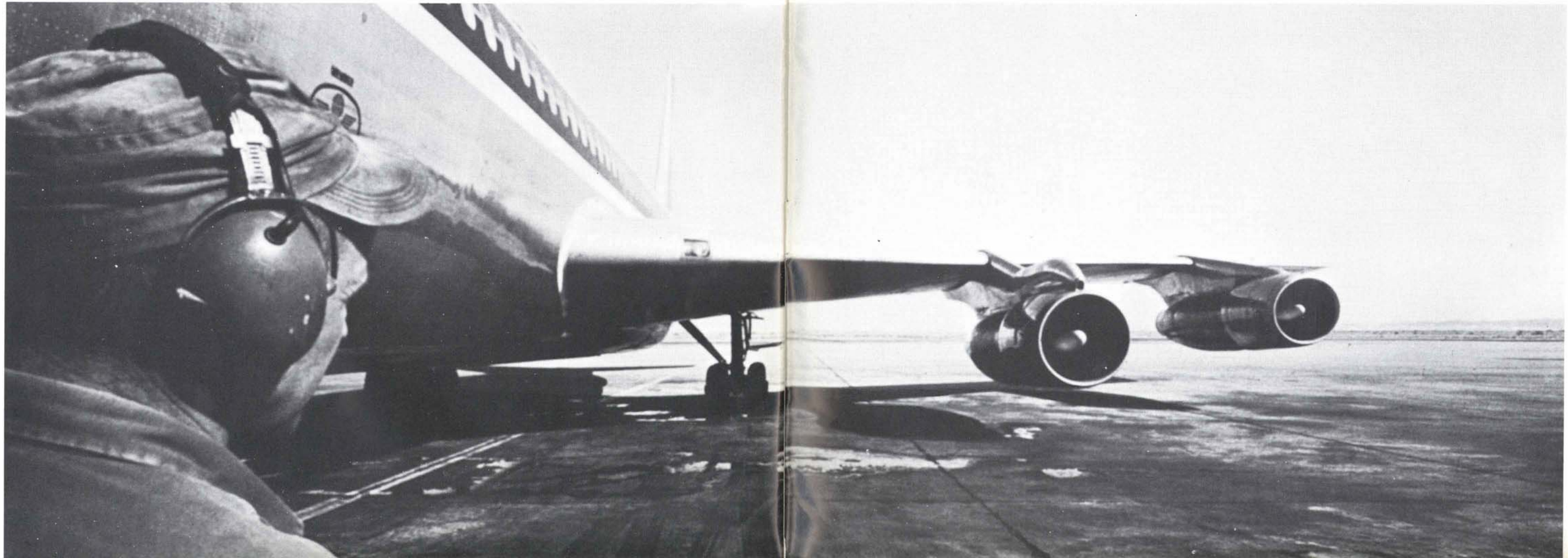
The three-sided curriculum covers the student's every waking hour from morning calisthenics to supervised study before lights out. One segment of the forced-draft study program prepares the cadets to qualify for the high school diploma of the Ministry of Education. In the second, the students plunge into the world of aviation: aerodynamics, theory of flight, airline history, organization, economics and scheduling, and shopwork with strong emphasis on airframe and engine repair. They also learn to drive an automobile and to type, and they spend 800 classroom hours mastering the lingua franca of international travel—English. The program's third part is devoted to cultural orientation. Here the cadet duplicates everyday experiences of young men in the West which are so foreign to many young Saudis: how to chair a meeting, introduce strangers, select a wardrobe and how to treat women clients—all those commonplaces of social contact that each culture takes for granted but are so different for people of other lands to understand and adopt.

For the successful cadet, three years of basic training is only the first step in his career. A further period of study, ranging from six months to several years, follows in engineering, pilot training, management, sales or other specialties before the young man finally has a firm grasp of his trade.

The wisdom of this painstaking attention to the business of training is apparent when one considers the immense cost and complexity of the airline's basic commodity, the airplane. The Boeing 707 368-C, for example, of which Saudi Arabian Airlines has two—in addition to two Boeing 720-B's, three DC-9's, two DC-6's, eight Convairs and nine DC-3's—costs upwards of $7 million each, and is assembled from well over a million parts, most of them expensive. The galley (there are two aboard each 707) costs $20,000; a passenger seat is $1,500—and there are 199 of them; the pilot's glass windscreen is also $1,500; a main-gear tire (there are eight) costs $276, and sometimes survives but a single landing; and each of the four engines sells for $225,000. One set of maintenance manuals makes a stack seven



Three years of basic training is only the beginning for successful cadets. Then comes specialization in such fields as engineering, management or pilot training.



feet high weighing 300 pounds, and four men are employed merely to keep them up to date. The pilots must know intimately the function of every mechanism aboard, which means practically memorizing two operating manuals each the size of the Manhattan telephone directory.

Keeping the big birds safe and serviceable is the responsibility of hordes of clerks, mechanics and engineers, whose very existence the average traveler never suspects. Every part of the plane has a card on which its history is recorded, its inspections noted, and at specified intervals beginning with each 50 hours of flight time, thorough checks are made to insure its proper condition and function. The "C" hangar check for each 800 flying hours totals 64 working hours by 150 men, and every 10 "C" checks the airplane is literally pulled to pieces, tested, X-rayed, and reassembled, at a cost of three weeks' work totalling 15,000 man-hours. For added insurance, the life of each aircraft component is carefully and conservatively computed and, when this period expires, it is thrown away, regardless of condition. Some planes, such as the airline's original DC-3, thus contain virtually nothing of the original plane but the brass registration plate. The theory of modern aircraft maintenance is that nothing can be left to chance.

It is this policy of careful checking and rechecking, deliberate redundancy, methodical attention to the smallest detail, that characterizes the mentality of the airline professional, on the ground as in the air. It is this characteristic that is often difficult to transfer to the Saudi student, whose once-pastoral culture demanded an entirely different outlook. But since the cadets will one day completely assume the heavy responsibilities of operation, their abilities in such areas must be artfully shaped, sharpened to a razor's edge, and kept bright by constant challenge, contact and competition with the airlines of other nations.

The current status of Saudi Arabian Airlines indicates that considerable progress toward this goal has already been made. Its fleet of 26 commercial aircraft is the largest in the Middle East, and twice as big as, for example, the national airlines of Turkey and Austria. In 1967 it flew 300 million passenger-revenue-miles, plus 11 million ton-miles of cargo and mail. It employs 3,900 people, operates out of 24 airports in Saudi Arabia, and from 24 airports in 18 countries on three continents abroad. Its overall-load factor is now 48 per cent, a respectable figure for an airline with such fast-expanding services, and total traffic is increasing by approximately 20 per cent annually.

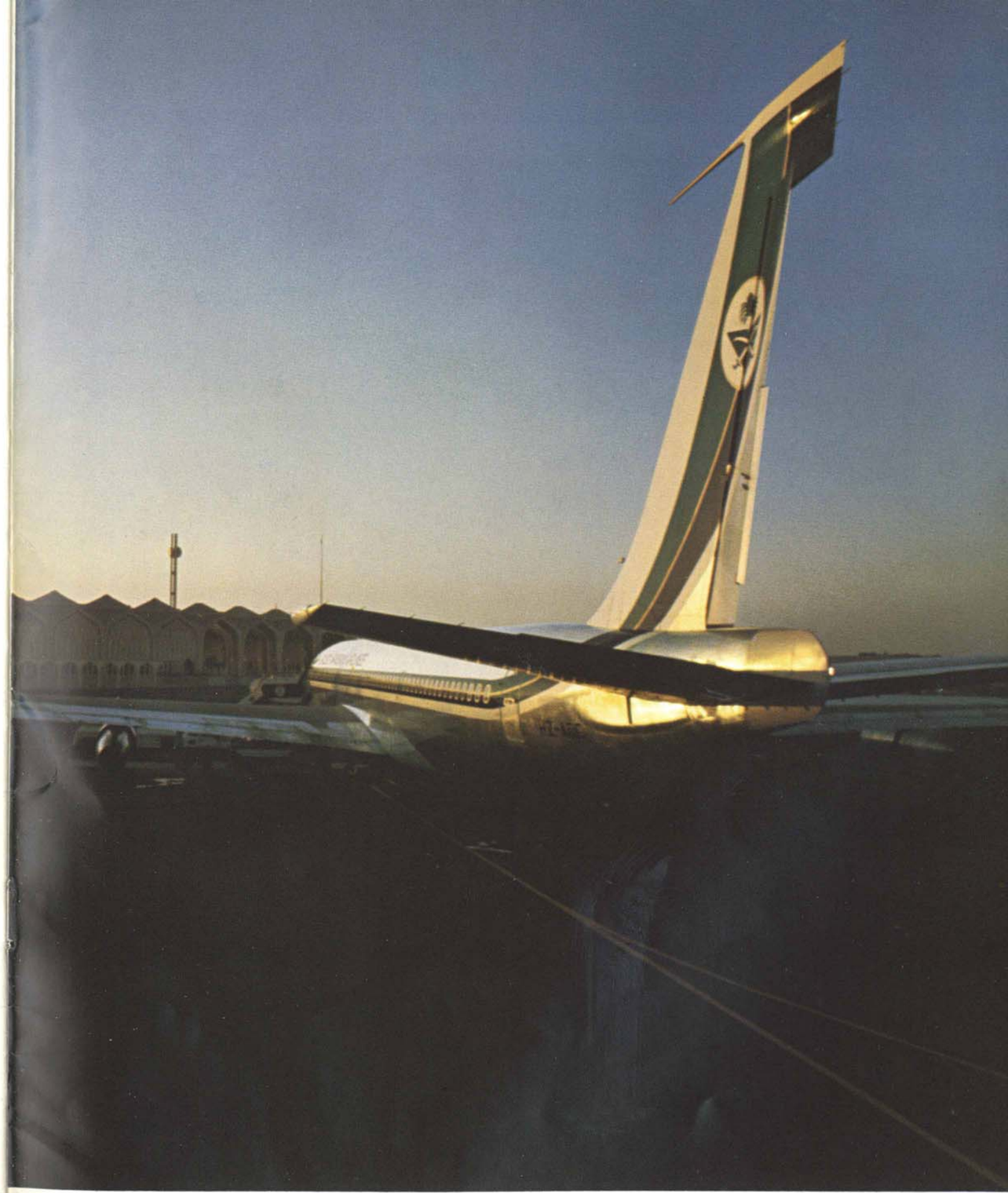
One unusual aspect of the operations is the high proportion—around 35 per cent—of non-scheduled to scheduled flights, arising from the twin circumstances that Saudi Arabia is the goal of the annual pilgrimage which devout Muslims try to make at least once in their lifetimes, and also the temporary residence of thousands of foreign teachers who vacation at home each summer. In 1967, of the 316,226 foreign hajjis who made the pilgrimage to Mecca, one-third arrived and departed by air, mostly within one month, and about 25 per cent of them used Saudi Arabian Airlines. That same year, between June 5 and July 5, some 18,000 teachers were transported home —mostly to Syria, Jordan, Lebanon and Iraq—for vacation, and returned to their posts once more between August 15 and September 15. The requirement that planes be available for these peak periods plays havoc with regular schedules and turns traffic dispatchers gray, but whatever the temporary inconvenience, it beats the congestion and misery that used to attend the mass movements of people in Saudi Arabia in the days of camel caravans.

Some traditionalists profess to disapprove of the rapid transition from the romantic ship of the desert to the fairly impersonal ship of the skies. They see it as a symptom of the mechanization of life which is cheerless, cramped, unexciting and probably unnecessary. Captain Nahar Nassar, the chief pilot, dismisses the complaint with an indulgent wave of the hand.

"Let 'em travel camelback from Jiddah to Dhahran as people did in my father's day: three hot, dusty, miserable months it used to take. Then let 'em travel with me: cool, comfortable, and exactly one and a half hours. Then ask 'em again which they prefer ... Of course," he muses, "I don't speak from personal experience. You see, I've never been on a camel, myself."

Daniel da Cruz, who writes regularly for Aramco World, *is also chief correspondent in the Middle East for McGraw Hill World News.*

Another jet lifts off and heads westward with another thread to tie Saudi Arabia to the world.



Twilight catches the scimitar sweep of royal colors on a Saudi Arabian Airlines Boeing and silhouettes the traditional roofline of Dhahran International Airport's handsome terminal buildin