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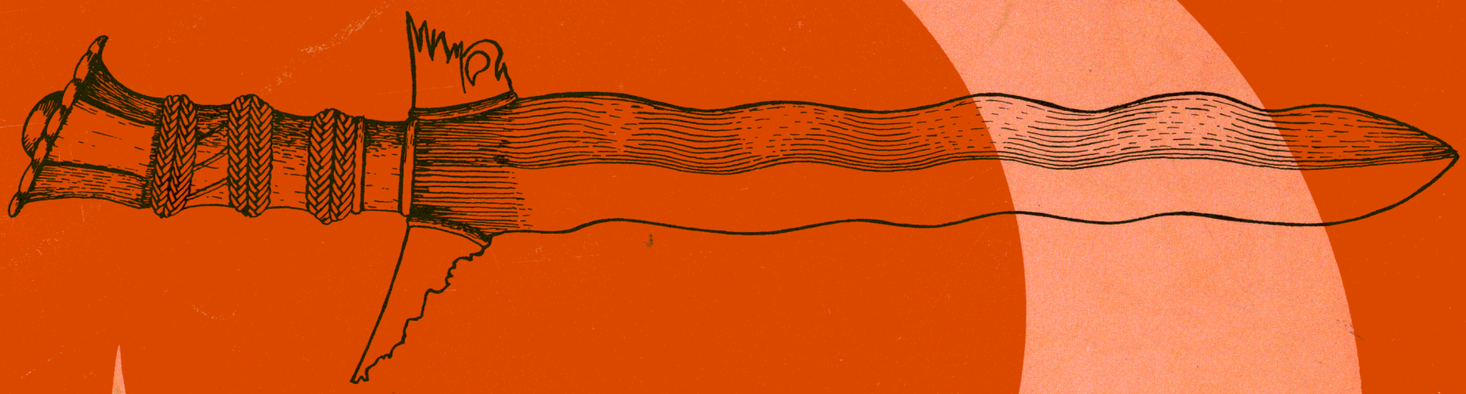

Kris and Crescent

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Mrs. David Carlson
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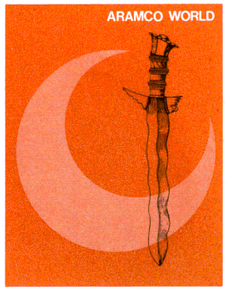

The kris, shown in this drawing by Max Abellaneda, is a deadly, serpentine dagger — almost a sword — that is not only a weapon, but a symbol of the courage of the Moros, the famous fighting Muslims of the Philippines. It is not the only Moro symbol, however. Of much more importance is the crescent, the mark of the faith that has strengthened and preserved the Moros for centuries.

Illustrations: Kris and Crescent — photographs by Irvin E. Winship; map by Max Abellaneda. An Enemy Below — photographs by Khalil Abou El-Nasr and Tom Walters. Have Rug — Will Sell — drawing by Don Thompson. Arabists in the U.S.A. — photographs by Ronald Perkins, Orren Jack Turner, Ted Polunbaum and the Harvard News Office. The Big Shop — photographs by Burnett H. Moody.

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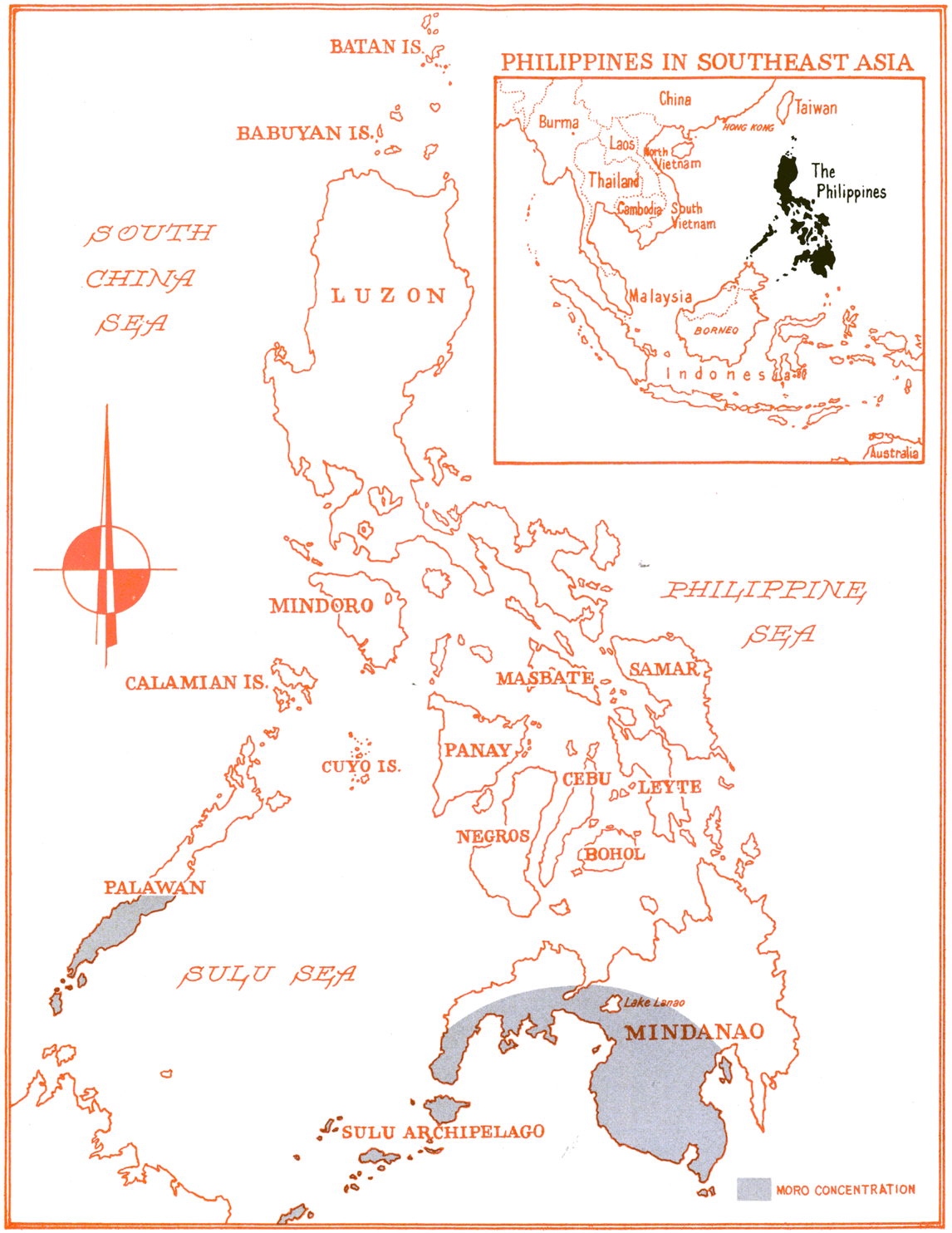


In the Philippines, Islam has begun to play a dynamic role in the future of the Moros ...

KRIS AND CRESCENT

BY PETER G. GOWING

When reports of savage skirmishing between American soldiers and Filipino warriors drifted back to the United States intermittently during the 15 years prior to World War I, the American public would have been hard put to explain what the fighting was all about. All most people knew was that the United States had just acquired the islands from Spain, that a captain named Pershing was doing a fine job and that a hand gun called the Colt .45 had been developed to bring down certain fanatical warriors who were terrifying the troops with wild suicide charges. They also knew, vaguely, that the warriors were called "Moros."

Considering that those same Moros today constitute a body of Muslims more numerous than the populations of either Kuwait or Libya and that they occupy an area larger than Denmark, this vague memory scarcely did them justice. Yet there has always been something unforgettable about the fierce courage of the Moros. In frail *praus* they ranged over the southern seas in quest of plunder and wrote a savage page in history as pirates and raiders. Armed with little more than the kris—a long, serpentine dagger that is as much symbol as weapon—the Moros went out to win tribal honors by killing wild elephants. With the same simple but deadly weapon they fended off Spanish conquistadors for more than three centuries, fought American doughboys to a standstill for 15 years and harrassed the imperial troops of Japan throughout the period of occupation in World War II.

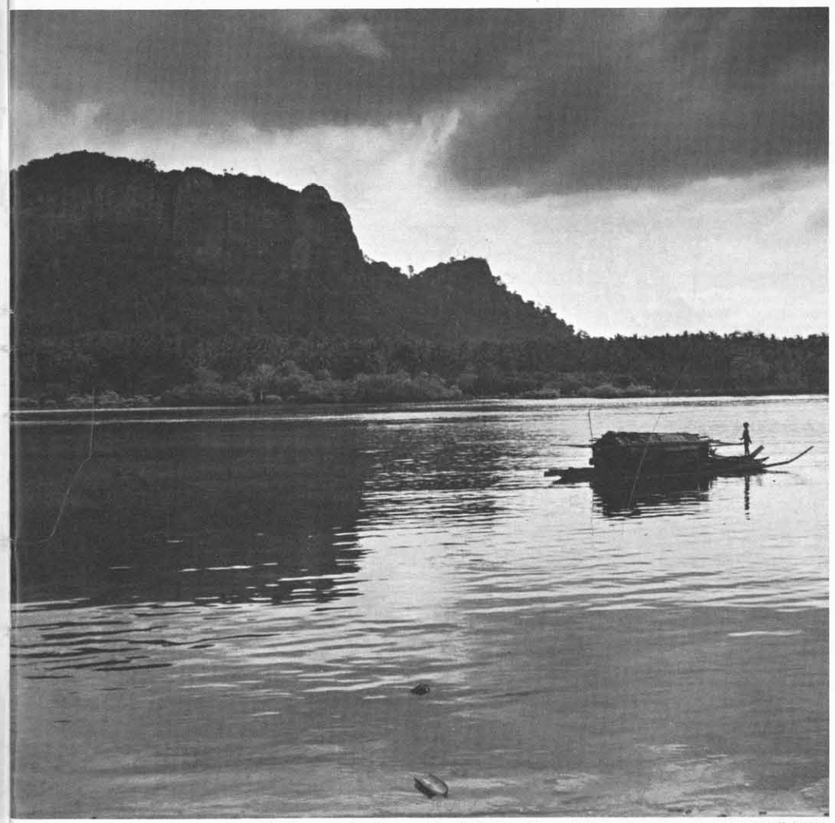
To remember the Moro only as a fierce warrior, however, is not entirely fair. For the kris is not his only symbol; indeed it is not even his most important symbol. Of much greater significance is the crescent of Islam, the mark of the Muslim faith. The very name "Moro," in fact, comes from Spain's identification of the Muslims they found in the Philippines with the Moors of North Africa who conquered much of Spain in the name of Islam and planted the crescent in Spanish soil for eight centuries. And it is the crescent, adorning the domes and pinnacles of Moro mosques in the Philippines and embedded deep in the hearts of believers, that has shaped, inspired and preserved Moro unity, and is today having a strong impact not only on the future of the Moro peoples, but on the entire Philippine nation.

Islam, curiously enough, came to the Philippines not on an Arab dhow, but on a Chinese junk. That was about 1380, when, according to tradition, one Sharif Aulia Karim al-Makhdum, an Arab missionary, who probably sailed to the Philippines via the Arab trading center in Canton, stepped ashore at Bwansa on Jolo Island in the Sulu Archipelago and began to spread the teachings of Muhammad. Ten years later Raja Baguinda, a Muslim prince from Sumatra, appeared off Jolo and—since he commanded a fleet of *praus* and a company of armed adventurers— easily persuaded the islanders to accept him as their leader. Fifty years later still a third Muslim came. He was Sayyid Abu Bakr of Mecca, an authority on Islamic theology and jurisprudence and—he claimed— a direct descendant of the Prophet Muhammad. Abu Bakr married the young daughter of the aging Raja Baguinda, inherited his rule, assumed the authority of a Caliph, crowned himself Sultan of Sulu and claimed all of Jolo for his own. When this did not entirely suit the local *datus* (chieftains) the new Sultan proposed a compromise.

"I will take all the land within the sound of my great gong, as well as the coast, the coastal waters and all that is in them," he told the chieftains. "And the rest of the island shall be yours."

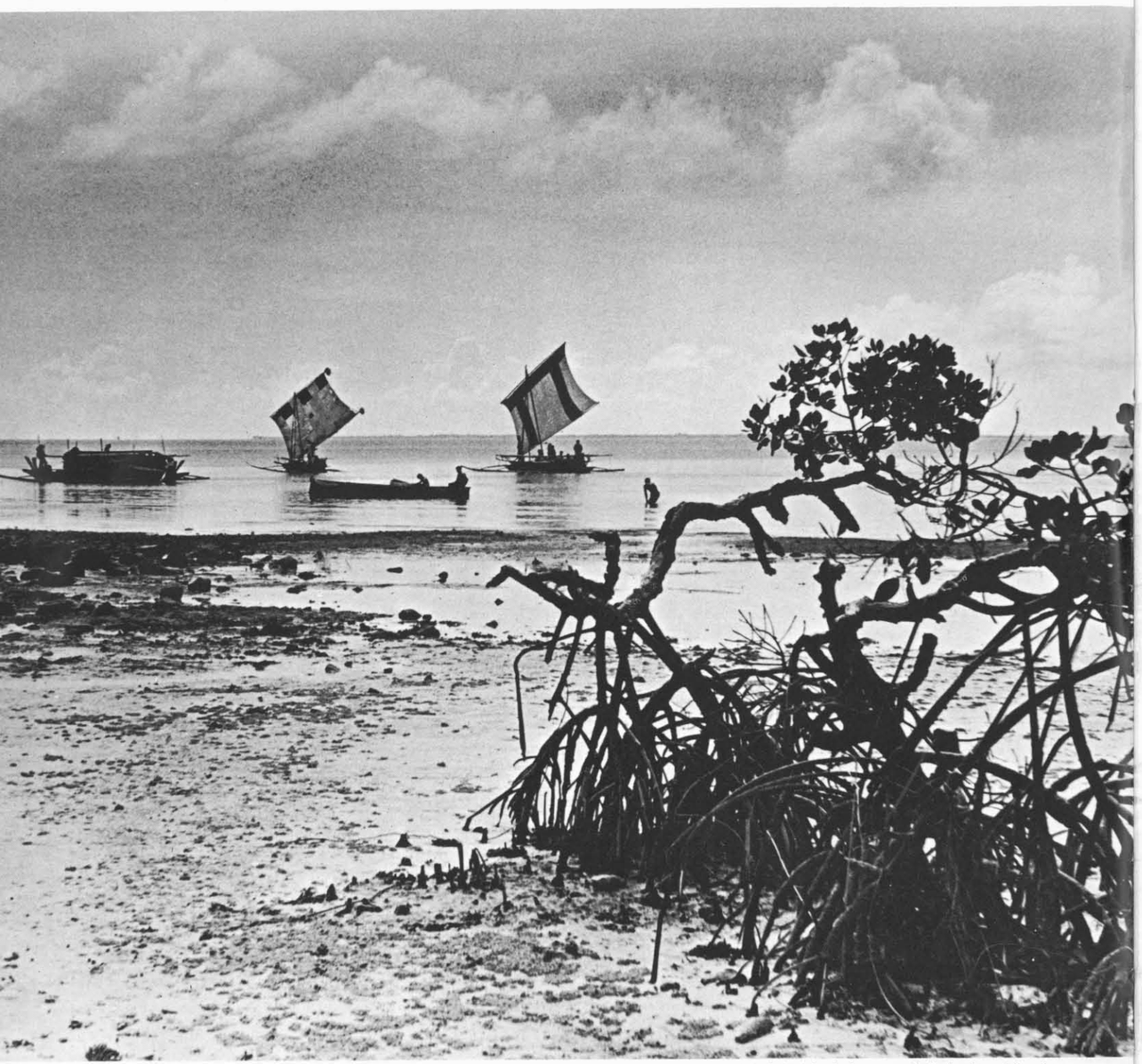
Forgetting, apparently, that the island's rich deposits of

A Maranao woman, hair in traditional knot, carries beaded curtains to market.



A Badjao "lipa" moving with the current in Bongoa Strait. Badjaos live out their whole lives in these small boats.

Blacksmith in Bongoa shapes swords and knives in homemade forge.



From the coast of the Philippines, Moro fishermen head for sea in their small, bright-sailed "vintas." The "vinta," a symbol of the islands, is now an insignia of an airline there.

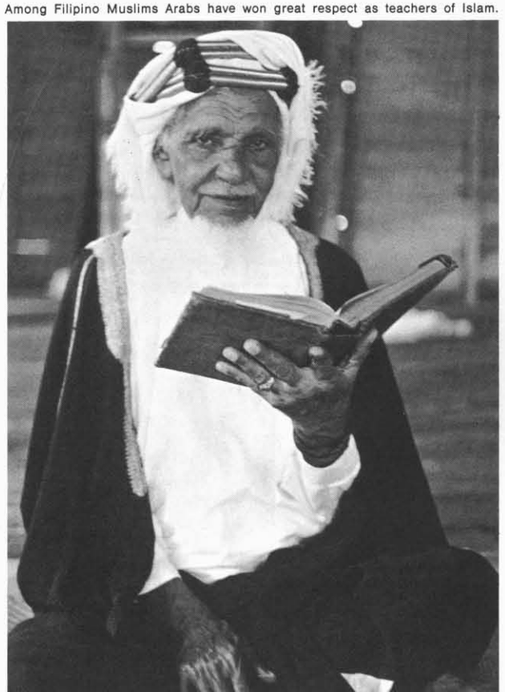
Using a "baliong" (axe), a Badjao carpenter makes usable boards out of driftwood.

pearls lay in those same waters, the chieftains agreed. So began what was in effect a constitutional monarchy that was to last until 1915 when Jamalul Kiram II, the 25th direct descendant of Abu Bakr, surrendered his temporal sovereignty over Sulu to the United States government in exchange for a pension of $6,000 annually.

The Sultan of Sulu, as he and his successors came to be known, undoubtedly played the most important role in the Islamization of the islands. They were generally the most powerful of the Moro leaders. But there were others too. At one time, in fact, there were more than 30 sultanates of which the most important was the sultanate of Mindanao, founded in 1475 by Sharif Muhammad Kabungsuwan, son of an Arab father and a Malayan mother. In addition, although the islands were not on the usual trade routes of the Arab dhows, many Arabs and Persians dropped anchor in the Philippines and along with their cargoes of merchandise unloaded ideas and customs as well. More missionaries came and gradually the Arab influence seeped into all aspects of what had been primarily a Malayan culture. Tales from Arabian Nights crept into the folklore. Arabic words slipped into the dialects. The Koran became the source of law, and Arabic calligraphy replaced Malay script as the written language. With immigration continuing right through the unrest on the Arabian Peninsula in the 1920's, the Philippines today can boast not only of Arab ancestors, but of a substantial Arab population.

It would be a mistake, however, to equate Moros with Arabs. Despite the strong influence of individual Arabs in planting the seeds of Islam, the most important thrust came from Malaya, one of the many places to which fervent Arab missionaries had carried the Muslim faith centuries before. Moros, in fact, are indistinguishable from other Filipinos

Among Filipino Muslims Arabs have won great respect as teachers of Islam.



A Marawi artisan carving traditional designs in wood.

Typical small Maranao farm in the neighborhood of Lake Lanao.

In a "bogo," a boat carved from one log, a Badjao woman kneads cassava bread flour.

who are generally a blend of southern Mongoloid, Indonesian and Malay stocks, with the Malay strain predominating. The Moros, furthermore, are split into ten ethnolinguistic groups which differ from each other almost as markedly as the Moros collectively differ from Philippine society as a whole. Even their dialects are not always mutually understandable.

Among these groups are the colorful *Yakan*, who are thought to be of Polynesian origin, the *Badjao*—"sea gypsies"—who live in communities of houseboats like the sampan colonies of Hong Kong, and other seafaring Moros who live in bamboo-frame houses perched on stilts above the water and connected to each other and to the land by narrow catwalks. And although most Moros—92 per cent—belong to the four major groups—the *Maranao* of Lanao, the *Maguindanao* of Cotabato, the *Tau Sug* of Sulu and the *Samals* of South Sulu and Zamboanga—there are still great differences among them. The *Tau Sug*, for example, wear tight *puttees* while the *Samals* wear loose, baggy trousers and the *Maranao* and *Maguindanao* wear large oblong cloths that wrap around the waist and hang to their ankles like skirts. Some Moros are farmers who live inland and cultivate rice, coconuts and hemp. Others are fishermen riding their bright winged *vintas* far out to sea in search of fish. And many are artisans. The *Maranao* and *Maguindanao*, for instance, are renowned for fashioning splendid brass trays, urns and betel nut boxes. The people of Sulu are famous for their exquisite carving of boat prows, grave markers, wall panels, furniture and the handles of weapon and tools. Moros are famous too in making fine-bladed weapons—particularly the kris—and have won a measure of fame for rattan mats and such musical instruments as the *gabbang*, a bamboo xylophone, the *suling*, a six-hole flute and the *kulintangan*, a scale of brass gongs.

For all their internal differences, however, the Moros, 1,600,000 strong, still form a distinct united religious minority. This is apparent in the domes, mosaics, richly-tiled flooring and ornately carved pulpits of the mosques.

Handsome Maranao mosques, often constructed in settings of great natural beauty, symbolize the unity Islam has given to the 1,600,000 Moros scattered throughout the southern islands.

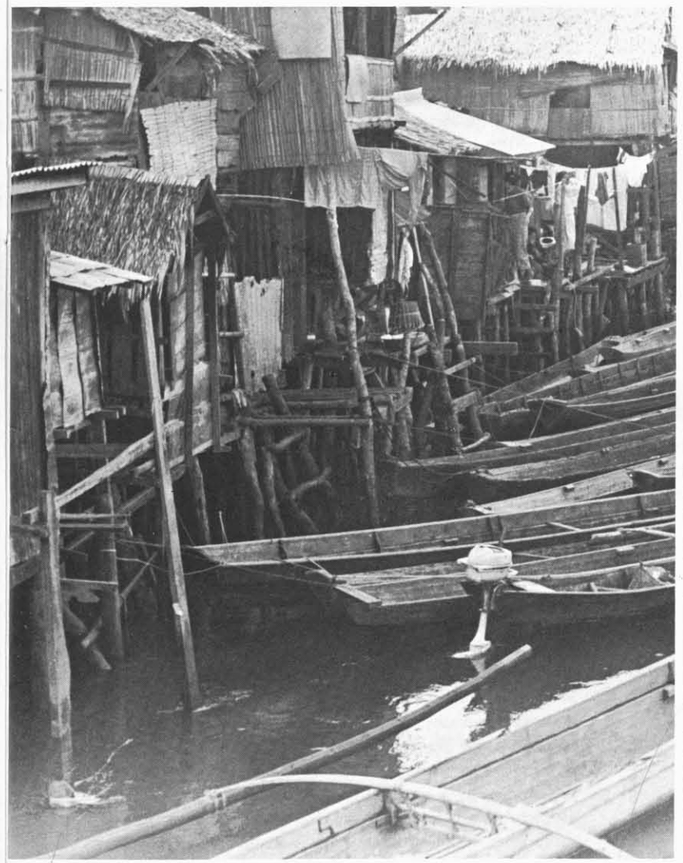
Skilled hands that once shaped weapons today turn out fine brass trays for sale to tourists.

It is also apparent in the existence of special laws passed by the Republic of the Philippines permitting the Moros to practice polygamy and divorce—in accordance with Islamic teachings. It is equally evident in the political structure which is only now beginning to change. At the top of this structure are the sultans and those of royal blood. Below them are the *datus* and below these, the freemen. There are traces too of the days when the Sultan's chief adviser was an official called a *kadi*, a man well versed in Islamic jurisprudence, who exercised general supervision over religious courts and over the preachers and teachers. Although not recognized by the Philippine government, these courts continue to function, adjudicating both civil and criminal cases, particularly divorce and property settlement, according to a blend of Islamic law and local custom.

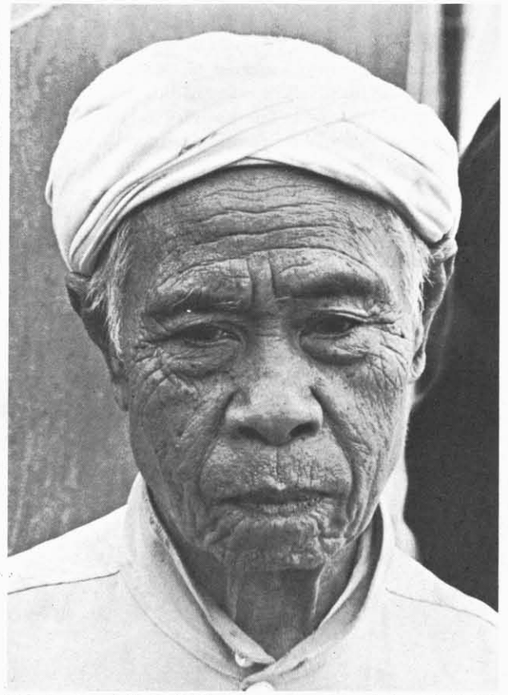
This isolation from Philippine society as a whole is a serious problem in the Philippines and it goes back a long way—to 1565 when Spain, at the apex of its power, established its rule in the islands and began to impose Christianity on all Filipinos. In general the Spanish were quite successful; most Filipinos swapped their vague paganism for Christianity with little protest. With the Moros, however, there was trouble. Miguel Lopez de Legaspi, the captain-general of the first wave of conquistadors, ran into strong opposition from Raja Soliman, the Muslim prince who governed what was then a small town called Manila. In 1571 war broke out, Soliman was killed and his followers were driven from the northern and central islands forever. In the southern islands, however, the Moros dug in deep and not only held out against the Spanish for the next 300 years, but continued, during that period, to expand into the interior of Mindanao and other southern islands and to unite the new converts with the older sultanates in a war against the invaders and the newly converted Filipinos.

It was a bloody, savage war, with no quarter given on either side. The Moros waged what is now a familiar kind of warfare—fast, mobile guerrilla attacks out of jungle and mountain and sporadic, swift raids from the sea. Cruelty and reckless slaughter were not the monopoly of either side, but to this day the image of the Moros as a merciless foe remains sharp in the non-Muslim Filipino mind, and is the most difficult barrier to understanding between the Moros and other Filipinos. This image developed partly because of the particular ferocity exhibited by the Moros against the Filipinos who accepted Christianity—thus becoming "infidels"—and partly because of *juramentados*.

With the possible exception of Japan's *kamikaze* pilots in the closing days of World War II, warfare has rarely known a more frightening phenomenon than the *juramentados*. Known as *sabers* by the Maranao and *sabils* by the Tau Sug, *juramentados* were fanatics who, believing that they would enter Paradise if killed in battle against infidels, would whip themselves into obsessed states of self-hypnosis and, kris in hand, charge blindly into the ranks of the enemy, be he Spaniard, American, Japanese or Filipino.



On their old praus the River Moros of the Cotabato Province now use modern outboard motors.



White headgear indicates that the wearer has made a pilgrimage to Mecca.

The Moros' traditional weapons, the long, curving kris and the heavy full-bladed barong.

In this semimystical trance the *juramentados* often raced directly into heavy volleys of rifle fire, shrugged off incredible wounds, and had to be killed on their feet literally, before their attack ended. These slashing attacks kept the Spanish in a constant state of terror until, it is said, the Spanish military governor of Jolo stumbled on a harsh but effective solution. The governor had complained to the Sultan of Sulu that *juramentados* had made repeated attacks against Spanish troops in Jolo town. The Sultan who lived in nearby Maimbung apologized but explained that he could not control suicidal fanatics. Soon after, a Spanish gunboat appeared off Maimbung and began to shell the town, killing many Moros and destroying a large part of the town. The horrified Sultan immediately reported this to the Spanish governor who apologized but replied that there was nothing he could do. The captain of the gunboat, he said, had obviously gone *juramentado* and as the Sultan well knew there was no controlling fanatics. After that, according to the story, Jolo was not troubled by *juramentados* for a long time.

In the 1860's, with the introduction of steam-driven gunboats, the Spanish broke the back of Moro sea power and drove the Moros into the countryside. It was as much of a victory as they ever achieved. They controlled the towns but the Moros controlled the countryside and so matters stood when, in 1898, Spain ceded the islands to the United States at the end of the Spanish-American War.

In Maguindanao live the Moros who are called "People of the Flood Plain."

The Moros were no more ready to obey Americans than they were the Spaniards and so it wasn't long before American troops took up where the Spanish had left off. In the process they developed the Krag rifle and Colt .45—both weapons having tremendous hitting power—specifically to stop the *juramentados*. They also took part in some of the most savage campaigns American troops had ever faced. On Jolo, for example, 800 soldiers were ordered to take a mountain top called Bud Daho which was held by 1,000 Moros. Although armed with only krises, spears and a few rifles, the Moros refused to surrender and American soldiers had to call up artillery before launching their charge. When it was over only six Moros had survived.

Faced with that kind of unyielding courage, the United States had to adopt a new policy. In 1914 the Moro areas were transferred to civilian control. Under the influence of progressive programs of education, medical care and road construction, and a guarantee of religious freedom, the Moros gradually accepted the new American rule. So effective was that policy that when the Philippine Commonwealth was inaugurated—the first step toward independence—the Moros pleaded that they be permitted to remain under American control or at least form their own government. Neither request was granted and before further steps could be taken Japan had swept over the Philippines and the Moros had once again picked up their krises and gone back to war.

In view of this history, it is remarkable that the Moros are not even further apart from Philippine society as a whole. It is even more remarkable since Islam, as a driving force in the life of the Moros, has had an unparalleled resurgence in the Philippines since the end of World War II. Responding to the influence of Muslim missionaries and visitors from the Arabian Peninsula, Egypt, Pakistan, Indonesia and Malaysia, and to the flood of tracts and other publications pouring in from the Ahmadiyya Movement in Pakistan, Moro communities have begun to construct mosques at a surprising rate, to attend services and to observe other religious obligations. Attendance is at an all-time high. Two Muslim schools of higher learning have been founded: Kamilol Islam Colleges in Marawi City and the Philippine Muslim College in Jolo. Muslim organizations like the Muslim Association of the Philippines, the Knights of Muhammad and the Sulu Islamic Congress have been formed. The number of Muslims who make the pilgrimage to Mecca annually is now in the hundreds and religious practices have been reformed along orthodox lines. Moros have even launched a strenuous campaign to shed the name "Moro"; they want to be called "Muslims."

Among the non-Muslims of the Philippines there is some concern about this resurgence of Islam, a concern lest the Filipino Muslims link up too closely with Muslims in Indonesia, a country with which the Philippine Republic has had difficulties.

Actually this concern has little basis. Indeed it is already becoming clear that the resurgence of Islam has helped unite the Moros with their fellow Filipino citizens. Due to the revival of Islam, the Moros have a new self-confidence as a religious minority and have achieved a heretofore rare organizational cohesiveness, as a result of which they have begun to seek their rights peacefully rather than belligerently, and with a good measure of success. In Jolo recently, for example, an *imam* requested use of public school facilities for religious instruction of Muslim children. His request was readily granted.

In other ways, too, the separateness of the Moros is being overcome. They are increasing in numbers and, consequently, are able to exert more political power. As possessors of vast acres of rich agricultural land desperately needed by the rest of the Philippines, they have an additional power. More youngsters are taking advantage of education opportunities and the lower classes in Moro society have already discovered that schooling is a social and economic escalator. Many Moros have studied in the United States on Fulbright and other scholarships. Transistor radios carry news, information, opinions and ideas deep into the most remote areas of "Moroland." Marawi City has a Rotary Club, Cotabato City has a Junior Chamber of Commerce and one of the most active organizations in Jolo is the Bud Daho Masonic Lodge. More and more Christian Filipinos are moving into the Moro areas, bringing with them ideas and opinions that, despite inevitable clashes, have already begun to break down the isolation that has surrounded the Moros and to cross the barriers that time and history have erected.

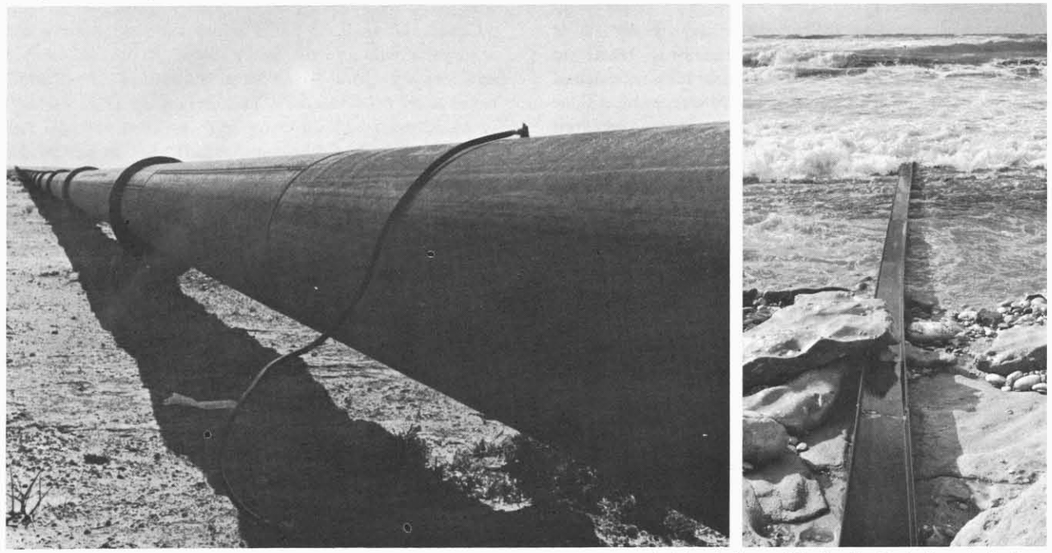
The changes are not taking place painlessly, of course, but they are inescapable and most leaders of the Moros know it and have begun to prepare for it. Some *datus*, for example, have sought elective office so that their influence as tribal chieftains can be brought up to bear on the central government. Others have been appointed ambassadors, judges, commissioners and even cabinet officers. Still others work with such groups as the Commission on National Integration which concerns itself with finding ways of uniting the Moros more closely to the rest of the Philippines.

These leaders know that the change will be slow. To transform a free, dauntless people, proud of their traditions and independence, into settled, sedentary citizens requires time and evolution. But they also know that if the Moros are to play a significant role in the future of their country the crescent, not the kris, must be their symbol.

Dr. Peter G. Gowing is associate professor of Christian History and World Religion at Silliman University in the Philippines, and editor of the Silliman Journal, *a scholarly quarterly. He is the author of the book* Mosque and Moro.

A Marawi girl weaving a beautiful "malong," a traditional garment of the Moros of Maranao.

Day and night the current flows into the ground — an electrical shield against . . .



In both the desert and the sea, corrosion, a slow electro-chemical decay, ate away at the trans-Arabian pipeline until Tapline tried "cathodic protection."

AN ENEMY BELOW

BY DANIEL DA CRUZ

Next to rats, Public Enemy Number One in the United States is corrosion, which eats away industrial and public facilities at the rate of one billion dollars a year—an amount well above the combined annual budgets of Lebanon, Syria, Jordan, Sudan and Iraq.

Corrosion is a subtle force. It doesn't destroy wholesale, like fire or flood, but gnaws slowly at hidden places until one day, suddenly, an engine sputters to a stop, a cable snaps, or a pipeline springs a leak.

Corrosion and rust are commonly used as interchangeable terms, but the scientist makes an important distinction between them: rust is a purely *chemical* action, which involves the combination of atoms of oxygen and atoms of iron into molecules of iron oxide. Corrosion, on the other hand, is an *electro-chemical* reaction, which involves the movement of metal particles from one point to another.

"The distinction is not, as you might imagine, semantic nit-picking," points out Fahd M. Maasry, planning analyst and former corrosion engineer of the Trans-Arabian Pipe Line Company—Tapline—which has pioneered in corrosion prevention techniques. "In dry desert air, rust is not a significant problem. It's true that sulfur and salt water impurities in crude oil could theoretically cause rusting *within* the pipe, but their quantity is small and in the absence of air they actually do no harm whatsoever.

"Corrosion is another matter entirely. It costs Tapline, to cite but one example, $500,000 a year to keep corrosion at arm's length. Yet, if we didn't, the ultimate price tag of neglect would be astronomical—nothing less than the replacement of all the buried portions of the pipeline between the start of the line in Saudi Arabia and Sidon, in Lebanon—and that's nearly 380 miles."

Corrosion of buried metal is the result of an electric current flowing from the metal into the adjacent soil, carrying with it minute particles of the metal. When enough particles have been carried off, a hole appears in the metal. This loss of metal is what is called corrosion. And roughly this is how it comes about: the electric current, which is composed of minuscule particles (electrons) moves from a high point (the anode) to a low point (the cathode), much like water seeking its own level. For the current to flow, two conditions are required: differences in electrical potential between the two points (one high, the other low) and a bridge or path (called an electrolyte) by which the particles (electrons) can move from one point (the high point) to another (the low point).

With respect to an oil pipeline buried in the ground the process of corrosion is somewhat difficult to visualize. Two parts of the same pipe—sometimes only a fraction of an inch apart—may have different potentials due to minute differences—such as impurities in the metal, or even just scratches on the pipe's surface. When those two points are bridged by an electrolyte—in this case damp sand or soil—an electric current is generated. This current flows from the high-potential point on the pipe (the anode), through the soil (the electrolyte), to the low-potential point on the pipe (the cathode). It then flows back through the pipe wall to the high point, forming a complete circuit. The flow of this current causes the pipe to corrode at the anodic point. To put it another way, the flow carries away metal particles from one point and deposits them at another.

The millions of galvanic cells created by these combinations of iron pipe and damp soil are individually so weak as to be virtually undetectable to all but the most sensitive instruments. The difference in potential at any two adjacent points in the pipe wouldn't produce a tingle in a nervous gnat, and the resistivity of the soils surrounding the buried portions of Tapline ranges from 400,000 to 100,000,000 times that of copper, so that the tiny particles move through it as if wading through glue.

Even so, the infinitesimal direct current generated over the years steadily robs the pipe of tiny particles of iron at the anode, so that a pit is gradually formed on the pipe surface. The day comes at last when that tiny pit at the anode has gone straight through the pipe wall, and oil, moving through the pipe under high pressure, spurts out into the surrounding soil.

"Any high school physics student," Fahd Maasry observes, "can tell you how to prevent corrosion on a pipeline; wrap it with a good insulator to shield it from the electrolytic soil, thus breaking the electrical circuit and the flow of ions. And he would be one hundred per cent right. Before Tapline's pipe was put into its ditch and covered, some 16 years ago, it received an application of petrolastic primer, a coat of asphalt, a wrapper of glass floss to add strength, and finally an outer wrapper of asbestos felt.

"But, even that was not enough. No insulator will last forever, especially one encircling buried 30-inch and 31-inch pipe such as Tapline uses. Pipe expansion and contraction in the desert and the extremes of hot and cold wear off the insulation in some places, while at other points various acid or alkaline soil constituents rot it. And as soon as the pipe is bared, corrosion begins."

Well aware that the attrition of time would one day imperil the pipe, Tapline engineers took out an insurance policy in the form of a well-proven technique called "cathodic protection." Reasoning that the trouble in buried pipe is entirely due to those points on its surface that function as anodes, and thus corrode, electrical engineers decided that *if the whole pipeline could be made into one huge cathode*, the outward flow of iron ions would stop and pitting would be arrested. This was done by burying "anodes" made of conducting material, such as old steel rails or graphite, some distance from the pipeline and connecting them to the positive terminal of a direct current source, such as a direct current generator, and connecting the negative terminal of the power source to the pipeline. Current was then sent into the sacrificial anode from which it flowed through the soil and into the pipeline, through the pipe wall to the cable connecting the pipe to the power source, and into the negative terminal of the generator. This formed a complete electrical circuit. With the whole pipe a cathode, particles of metal (from the sacrificial anode) were now *deposited* on bare spots rather than *drawn off* from them.

Instead of stringing a power line the length of the pipeline—a prohibitively expensive operation—Tapline derives its direct current for cathodic protection from rectifiers at each of the pump stations from Turaif to Sidon, and from 25 unattended cathodic-protection stations posted at regular intervals between. Each station has two diesel generators rated at 6.5 kilowatts with outputs of up to 162 amperes at 40 volts (equivalent to 8.7 horsepower), which run on crude oil piped directly from the pipeline. The total power applied to the entire pipeline is equal to 270 horsepower. To keep the current flowing toward the pipeline, the soil-electrolyte at the anodes must, naturally, be kept damp. In the driest areas this means that the ground anode bed must be watered as often as twice a month in the blazing hot summer; this in turn requires the dispatch of a tank truck of water from the nearest well, which may be as far as 90 miles away.

A similar system guards the submarine facilities at Sidon, where the oil is transferred from pipeline to tanker. Each underwater pipe is protected by a 600-foot length of steel rail laid on the sea bottom parallel to it, and receiving electric energy from a shore-based rectifier. The rail lasts up to five years. Buoys, on the other hand, are protected by aluminum anodes bolted on the buoy below the water line, with a rubber insulator between. The bolts become the conductor, the sea water the electrolyte, and the combination of these elements produces the required flow of electrons, just as in a battery.

Though theoretically a perfect system to forestall corrosion, in practice cathodic protection is not foolproof. Three layers of protective asphalt, glass floss and asbestos may with time lose their bond to the pipe, permitting moisture and oxygen to reach the pipe's surface. Because the protective coatings are insulated, the protective current of the cathodic protection system cannot reach the pipe surface and so corrosive activity begins. This type of corrosion is referred to as "shielded" corrosion because the corrosive cell is shielded from the effect of the protective current by the enveloping coating around it. Sections of the pipe affected by shielded corrosion are constantly being unearthed and their coatings replaced at considerable cost.

"As expensive as cathodic protection and pipe reconditioning may seem," Engineer Maasry says, "the alternative—doing nothing—would be corporate suicide. You see, iron corrodes at the rate of 20 pounds per ampere-year (the current consumed by a 100-watt bulb burning one year). Now remember that we apply approximately 2,000 amperes to the line to neutralize the line-generated currents..." Mr. Maasry fiddled a moment with his slide rule "... the tiny pits caused by corrosion—literally millions of holes—*could* add up to a maximum of 40,000 pounds of steel a year. If we failed to take countermeasures, the pipeline in a few years would look very much like a gigantic colander—dandy for draining spaghetti, but of very little use in transporting oil."

Daniel da Cruz writes regularly on technical, cultural and historical subjects for Aramco World.

HAVE RUG—WILL SELL

. . . being some notes and comments on the sellers—and buyers—of Oriental carpets . . . BY KURT ERDMANN

This will come as somewhat of a shock to many people, I suspect, but I shall say it anyway: to the carpet merchants of the Middle East, tourists can be a trial.

I say this knowing quite well that to some visitors to the Middle East it is rather like saying that for sharks, swimmers are a nuisance. Travelers who have had only casual experience with the teeming suqs—bazaars—of Middle East cities undoubtedly will have vivid memories of clamoring merchants, indifferent merchandise, and most unrealistic prices. To such a tourist the very suggestion that *he* might be a bother to *them* would be hilarious if it were not absurd.

(I should insert here, I think, that this is not what the editors had in mind when they asked me to write an article. What they wanted was a sort of thumbnail guide to buying carpets and this isn't going to be like that at all. I decided, you see, that these decidedly personal—and obviously exaggerated—observations would really be of much more value than a few lines on patterns and knots which would, probably, be forgotten long before readers ever get to the Middle East and which would in any case be discarded immediately upon confrontation with one's first genuine Oriental rug. These comments, of course, may be discarded too, but in hopes that a few faint echoes may linger and be of comfort, if not of help, I offer them anyway.)

I will start by saying that buying carpets, like selling them, is an art. It is an art, true, in which the instincts of a pirate are as important as those of a poet, but an art nonetheless, that is not easily mastered. To practice it properly requires extraordinary patience—especially at the beginning. A skillful buyer begins with a casual stroll through the bazaar, a very casual stroll. It is a stroll totally without purpose, entirely for pleasure. During it, he exchanges greetings with one and all, pauses frequently, wanders aimlessly. Suddenly, with surprise, he notices that he has chanced upon the shop of Ahmad, the carpet vendor. Ahmad, of course, greets him effusively and serves coffee or tea, and they launch into lengthy and presumably pointless discourses on any subject of interest, except that of carpets. Eventually, however, during this discussion the buyer blandly inserts an ever so casual and most disinterested inquiry as to whether, by some strange chance, Ahmad happens to have just received any new carpets that might be worth a quick inspection. Or, if he is particularly adept at the game, he might even wait until Ahmad, as a matter of general interest, mentions that a carpet of almost priceless value has just fallen into his hands. It is a deft, light exchange, but it is also the beginning of what is in effect an ancient ritual with prescribed, if unwritten, rules, in which, like in courtship, both parties desire the same thing yet begin with expressions of mutual disinterest.

Once it is established that there does indeed happen to be in the shop a carpet which is priceless to the vendor and of at least casual interest to the seller, there begins a discussion of the rug's merits. It is a long discussion touching, naturally, on the carpet's beauty and pedigree, but also on such factors as the intricacy and regularity of the pattern, the depth of the pile, the number of knots per linear inch, and perhaps the number of threads between the rows of knots—this being of great importance since it determines the strength of the carpet. Lastly, there comes the matter of price.

The price, of course, is the point of the game, and so naturally this stage of negotiations must be conducted very skillfully, for it is understood that once an offer is made and accepted, it is final and binding. Not even a handshake is necessary. At that point the game ends. Thus it is vital that the cycle of offers and rejections, counter-offers and rejections be timed just right, and that offers be neither too low or too high, but just enough to keep the negotiations going until the moment when both buyer and seller know, instinctively, that the game is finished, that this is the best that either is going to do, and that the time to close the transaction is at hand.

That is the way one buys a carpet. It is a ritual established a very long time ago and smoothed and polished by years, perhaps centuries, of practice. To the vendor, who has probably spent most of his life perfecting his skill at it, the ritual is as important as the profit and, be he Arab, Turk or Iranian, he would, I'm certain, prefer to sacrifice profit rather than change it.

Is it really surprising, then, that brusque, bustling tourists dashing into shops for quick looks and quicker purchases are a trial to carpet vendors? Consider a scene I witnessed many times in Istanbul as I sat in a shop with merchant friends sipping coffee and discussing, probably for the tenth time, the good and bad points of a certain rug. It would always begin with the blast of a steamer whistle—the announcement that a cruise ship was coming in. Almost immediately, the merchants, suddenly tense, would withdraw from the conversation, and would nervously begin to check their carpets or prowl nervously in front of their shops. Soon after the tourists would appear—men in bright shirts, women in brief shorts (a breach of etiquette in most Eastern circles), or, at best, tight skirts and sleeveless blouses. And always, of course, in sunglasses. They would come from Birmingham, Düsseldorf and Milwaukee. They would have nothing in common, yet they would act exactly alike—which is to say, naively, and without judgment. And my vendor friend would be ready. He'd leap to his feet and pull down rugs from the shelves. He'd heap them on the floor and pour forth a torrent of words in any of the four or five languages he knew, and the spiel would always be the same—that this rug—of decidedly inferior quality I would note—is a prize that Monsieur, Mister or Meinherr should not pass by. "It is not only fit to grace a Sultan's palace, but indeed may have once done just that and yet—please note this, Madam—has retained such a freshness of color that it might have been dyed just last month..."

And so it would go on until, most often, the visitor succumbs and pulls out his wallet.

On seeing such scenes I began to wonder how the man from Birmingham, Düsseldorf or Milwaukee could possibly be taken in by such a blatant approach. Why is it that a man who at home would be a cautious, hard-headed buyer, becomes in the Middle East, a feverish bargain hunter? At home he would not, I hope, go forth to a major furniture store to buy anything of comparable value without first of all being decently dressed and seeing that his wife was too. Nor would he really expect to complete a transaction involving hundreds of pounds, marks or dollars without making comparisons or seeking advice. He would take his time, visit several stores and compare prices. Whether success even then would be insured is questionable, but at least he would have a chance. Here in the carpet bazaar he has none, yet he proceeds in this unwise fashion. Why?

In some cases it is because he desires to decorate his home with an item that is recognized around the world as a thing of beauty. But the strongest motive, I think, is that a tourist believes that he has a better chance of getting a "genuine" carpet in the country of its origin and also of getting it cheaper.

It is true that the chances of getting a genuine carpet in the country of its origin are better; machine-made carpets are rarely stocked in a carpet bazaar of the Middle East. But as to getting it cheaper, it is most unlikely. In the first place a tourist is in a strange country negotiating in a strange currency for a product about which, as a rule, he knows little and the merchant knows all. In the second place, time, as I've tried to suggest, is of the utmost importance in buying carpets, and that is precisely what the tourist doesn't have. Under such circumstances is it any wonder that his demands are a source of annoyance to a truly dedicated vendor?

I must add that the vendors are not always on the side of the angels. They are not really waiting eagerly to bestow their friendship, their knowledge and their carpets upon visitors, even visitors who have respect for their traditions and reverence for their wares. I, for example, made regular visits to the carpet bazaar two or three times a week for most of a year before the merchants began to bring out their really excellent carpets, the *Kazaks* and *Shirvans* from Caucasus, *Yuruks* and *Koulaks* from Turkey, and *Baluchis*, *Kashans* and *Bakhtiaris* from Iran. These were all kept carefully out of sight because I was not, for a whole year, considered sufficiently knowledgeable to appreciate them.

In fact what I've said adds up to this: tourists rarely have much of a chance to find bargains in the bazaar and if you wish to enjoy your holiday in the Middle East I suggest that you simply make up your mind that although you can get your money's worth if you're careful, and can make excellent purchases if you take your time, there are few bargains to be had. In carpets, anyway.

The late Dr. Kurt Erdmann was director of the Islamic Department, West Berlin State Museums, and an authority on carpets and ceramics.

ARABISTS IN THE U S A

T. Cuyler Young, Princeton University.

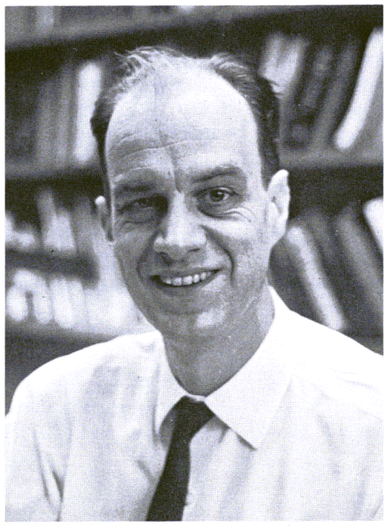
Gustave E. von Grunebaum, U.C.L.A.

Charles Issawi, Columbia University.

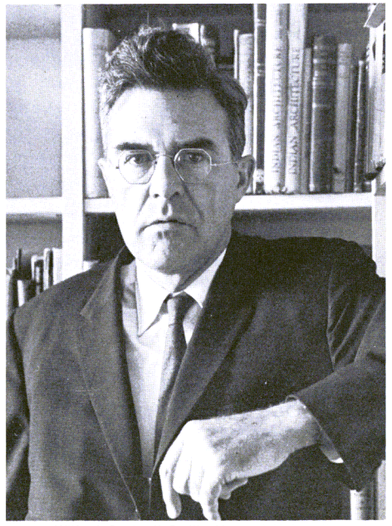
Richard N. Frye, Harvard University.

John S. Badeau, Columbia University.

Majid Khadduri, Johns Hopkins University.



Dankwart A. Rustow, Johns Hopkins University.



Wilfred Cantwell Smith, Harvard University.

BY JOHN R. STARKEY

In 1939 a professor from the American University at Cairo spoke before a group of Baltimore businessmen. After his talk, entitled "Islam's Impact on the Middle East," a man raised his hand. "Professor," he asked, "can three hundred million Muslims really live in a *desert*?"

The question may sound naive in 1965, but actually that businessman was far more sophisticated than many Americans of his day. That was the era when numerous Americans thought that the "Middle East" was somewhere near Harrisburg, Pennsylvania, or equated "Middle East" with "desert" and "Arab" with the "sheikhs" of the Valentino tradition—robed raiders carrying maidens off to silken tents or swarming wildly over the parapets of Foreign Legion forts.

Today, less than three decades later, this has changed. There is a new image of the Middle East in the United States, still blurred perhaps, but getting clearer every year. It is an image in which the bewildering complexities and contradictions of the region are beginning to assume a semblance of clarity in which neither camel nor Cadillac predominates but in which each has begun to assume its proper perspective.

Much of the change is due to the efforts of American journalism, which has begun to take a sharper look at all of the formerly "exotic" regions of the world, and to the enthusiastic help given by experienced government officials, military officers and businessmen who have backed, promoted and even taught in special programs on Middle East affairs. Above all, it is due to the efforts of able, dedicated educators who have developed programs of research, study and instruction that rank with the best in the world.

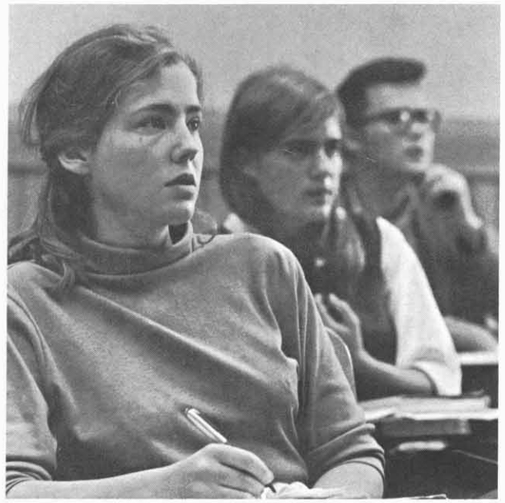
It is probably true that there are more distinguished concentrations of scholars in certain universities in Europe, especially in France, England and Germany, where great Arabists have been trained for centuries. But the list of scholars at what are generally considered as America's five major centers of Middle East studies—Harvard, Princeton, Columbia, Michigan and the University of California at Los Angeles—is unsurpassed anywhere. It includes, for example, Sir Hamilton A.R. Gibb, the West's foremost Islamic scholar and authority on Arab society, of whom a colleague said recently: "He's 70 and sick and he's still worth six of us." It includes also Dr. Gustave E. von Grunebaum, rated second only to Gibb in the West, and Philip K. Hitti, who has spent nearly 40 years prodding Princeton to improve and expand its Middle East programs.

No one list, of course, could begin to include all of the top Arabists in the United States, nor even all the universities, colleges and special institutes and societies which have played an important role in the promotion of understanding of Middle East affairs, but their impact is undeniable and can be measured by this significant statistic: the number of colleges and universities offering courses in Middle East subjects has risen from 10 in 1939 to nearly 300 today.

This change is all the more astonishing in the light of America's historic lack of interest in the Middle East. It was not until 1841, nearly a century after Europeans had begun serious study in the field, that the first course

Morroe Berger, Director of Princeton University's Near Eastern Studies Program, presiding at a seminar.

From Michigan to Texas, from Harvard to Stanford, interest in the Middle East soars to new levels . . .



Students attending a class in first-year Arabic at Harvard University.

concerning the Middle East was offered. That was a course in Arabic at Yale University. Harvard followed Yale's lead—but not until 1880, nearly 40 years later. The University of Michigan—curiously, since it is in the heart of the generally conservative and isolationist Midwest—was third, in 1894, and by the turn of the century a student wishing to learn Arabic could still only choose from among six universities: Yale, Harvard, Michigan, Columbia, Chicago and Pennsylvania. Even as the 20th century got underway, progress was far from swift. Although the United States did take a few tentative steps into Middle Eastern affairs during and immediately after World War I, they were quickly retraced in the 1920's, as the country withdrew to its traditional position as a spectator of world events rather than a participant. For the country's few Arabists the outlook was so discouraging that at the University of Chicago Professor Martin Sprengling felt obliged to advise students against seeking doctorates in Arabic studies. "There's no academic future in it," he would tell them. And for most there wasn't. As late as 1939 the 10 universities which did offer Arabic—the original six plus the University of California in Los Angeles, Catholic University, Johns Hopkins and Princeton—still offered nothing but languages—and minimal courses at that.

This was the situation when World War II erupted and the United States, confronted with the need to keep the Middle East out of enemy hands, turned to the academic world for expert information and advice. Officials quickly discovered that there was virtually no sound knowledge of the area, only a handful of specialists available and no facilities for training personnel. In no other area of the world was the United States so poorly prepared to play a strategic role.

In the emergency, however, the government had to act and so it recruited men like John S. Badeau (later to be American Ambassador to the United Arab Republic) from the American University of Cairo, Lewis V. Thomas from Roberts College in Istanbul, and T. Cuyler Young from Toronto. They, along with Sydney N. Fisher of Ohio State University, Richard N. Frye and Derwood W. Lockard of Harvard, and many others who later would become big names in the field of Middle East studies, helped to fill huge gaps in such agencies as the Office of Strategic Services, the Office of War Information, the Office of Naval Intelligence and the State Department itself.

Filling the gaps on campuses proved to be even more difficult and it was with considerable gratitude that the government discovered that there had been at least one American Arabist who for 13 years had stubbornly refused to accept the prevailing disinterest: Princeton's Professor Philip K. Hitti.

Professor Hitti began his career at Princeton in 1926 as an instructor of Semitic languages. A year later he had organized an Oriental department and had set about making it grow. "The administrators cared nothing about Oriental studies," he said, "so I had to smuggle courses in the window."

About 1939 attitudes and conditions began to change. First came a generous grant from the Rockefeller Foundation for the instruction of Turkish. Then came the war and with it the formation of the Army Specialized Training Program, great infusions of money and a sudden, urgent interest. "Train us 150 men in Arabic and 50 each in Turkish and Persian," the Army told Hitti, "and do it in six months."

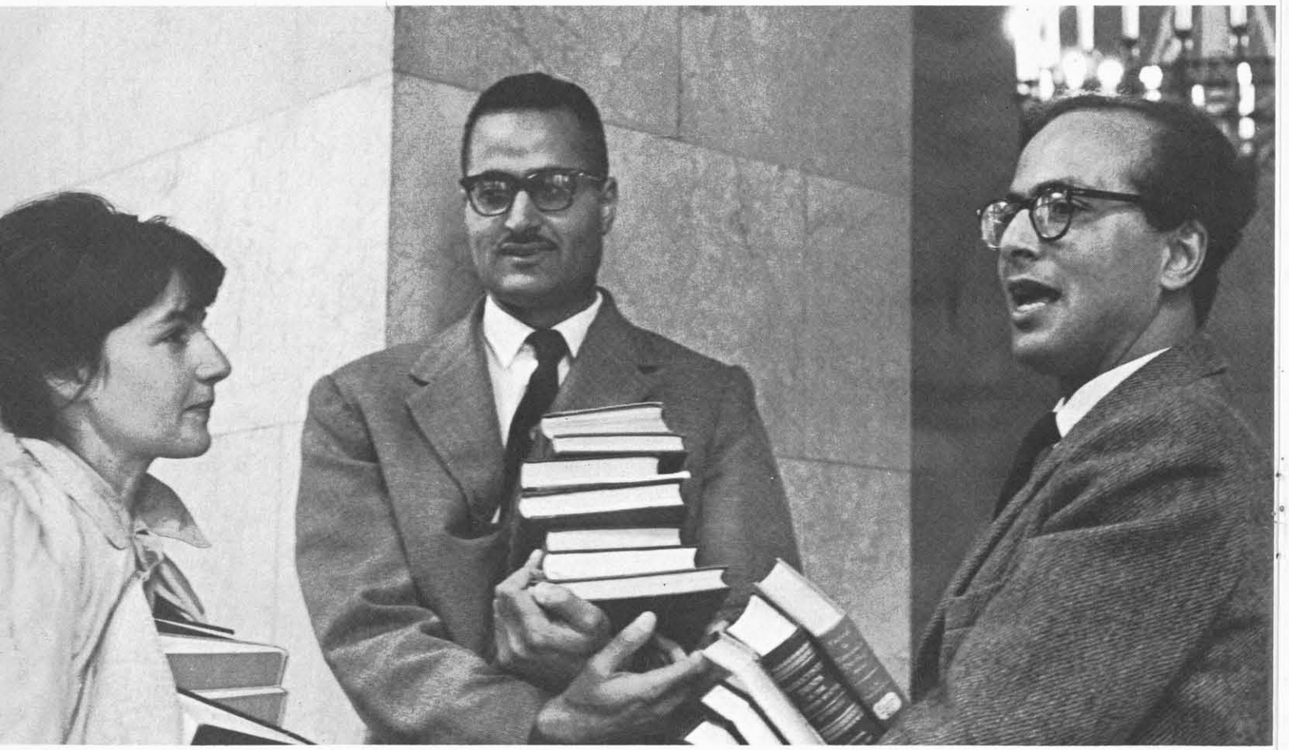
It was an almost impossible challenge. Arabic simply isn't a language that students master in six months—not, at least, when there are no experienced teachers, no books and no language laboratories. But Professor Hitti gave it a

Student relaxes in Princeton's Near Eastern stacks.

good, and at times ingenious, try. Mustering a group of students who spoke some Arabic, Turkish and Persian, he organized lessons for them that they could in turn teach others a day later. It was difficult, often chaotic and it didn't produce experts, but it did equip students with enough knowledge of the languages to carry out their assignments. Furthermore, it provided the foundation for the establishment of regular Turkish and Persian courses at Princeton at the end of the war in 1946.

From that time on, of course, the Middle East engaged the attention of the United States almost continually. As event followed event—the struggle over Palestine, the declaration of the Truman Doctrine, the upheavals in Egypt, the granting of aid to Iran, the Baghdad Pact, the landing of the U.S. Marines in Lebanon—interest in the Middle East soared and the nation's universities groped their way toward what eventually came to be known as "centers" of Middle East studies.

Centers of Middle East studies do not merely offer courses on Middle East subjects. To be rated as a center requires courses that lead to a doctoral degree, plus comprehensive programs including at least two languages and a wide variety of courses in history, literature and the social sciences. Most centers, moreover, participate in numerous related programs. Princeton's center shares its



At Harvard's Middle East Center Mrs. Irene Gendzier of Boston and Muhammad Abu 'Ali of Egypt, center, research fellows, exchange views with economist Salah al-Sarafy, also of Egypt.

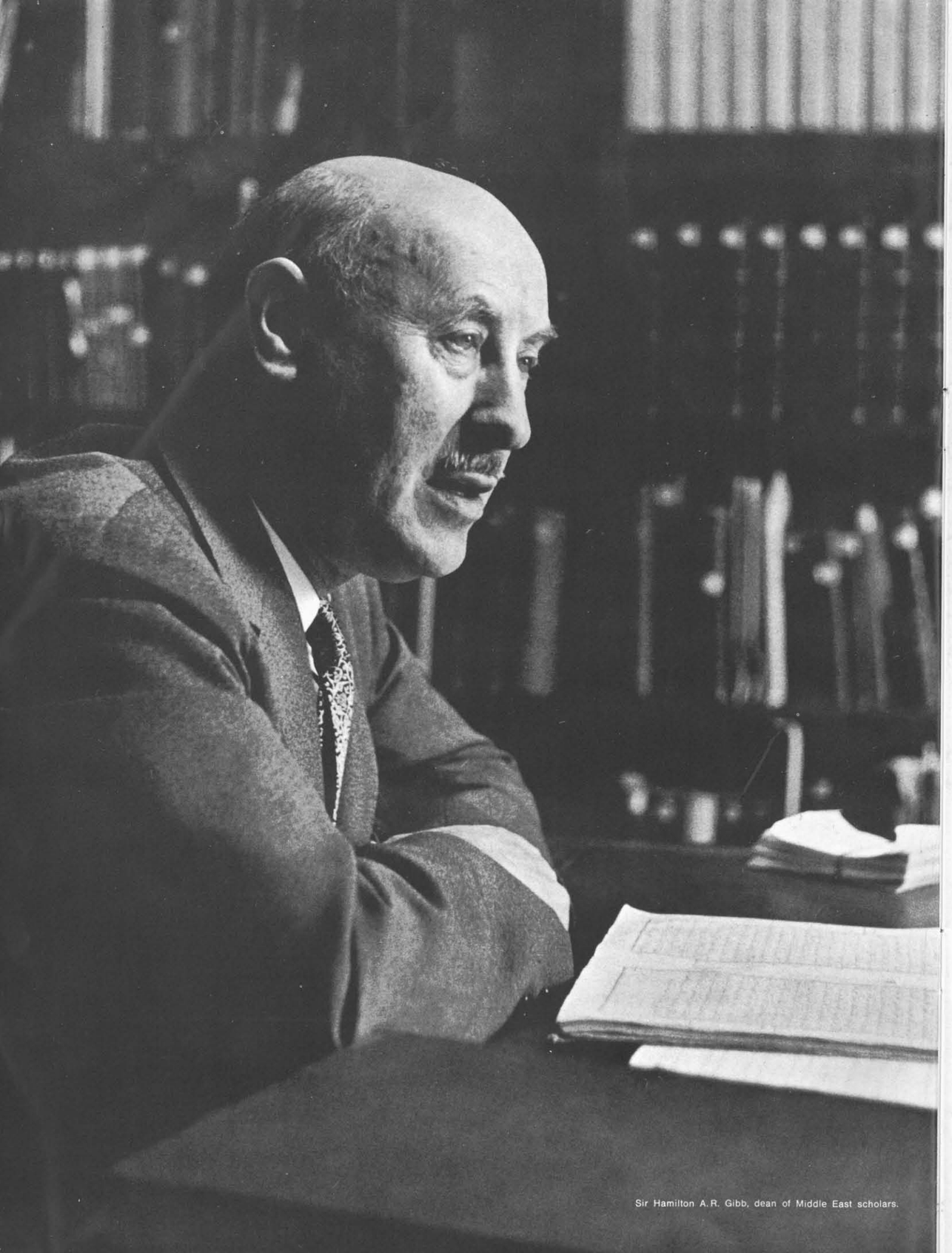
facilities with the Foreign Service and the Defense Department, training personnel on one-year study tours. It also participates in the national Critical Languages Program, under which top college students learn Persian and Turkish at an advanced level not offered on their campuses. Harvard, which has developed extensive research and publication programs around its library has, in 10 years, awarded 65 research fellowships and published 10 books and 14 monographs. Some centers have sponsored archeological expeditions such as U.C.L.A.'s in northern Sudan. U.C.L.A. has helped initiate the interuniversity center in Cairo and the American Research Institute in Istanbul. And all centers, of course, have accumulated great libraries—although few equal the size of U.C.L.A.'s which amassed 85,000 volumes in less than seven years.

The real strength of Middle East centers, of course, depends upon the men who staff them and in searching out top scholars the centers in the United States have added a remarkable number of able men to their rosters. Some, such as Gibb and Von Grunebaum, came from Europe. Others—economist Charles Issawi, law specialist Majid Khadduri, language expert Aziz S. Atiya and Hitti—came from the Middle East itself. Still others, like J.C. Hurewitz, came out of the ranks of the students who began to interest themselves in the Middle East and went on to become authorities.

The result of the great search, in any case, was the emergence on many campuses of first-class centers each staffed with some of the most eminent scholars in the field. A complete list of the top scholars would of course be too long, but even a sampling of those who staff the major centers suggests the quality of the men available. Harvard, for example, can boast not only Gibb, but Richard N. Frye, an authority on the history, folklore and languages of Iran, economist A.J. Meyer, and religion expert W. Cantwell Smith. Columbia has Badeau, returned from his ambassadorial duties to head up a center that already had Hurewitz, Issawi, Turkologist Dankwart A. Rustow and Joseph Schacht, an expert on Islamic law. In Princeton in addition to Hitti, Young and Thomas, there are Morroe Berger, America's leading Middle East sociologist and R. Bayly Winder, a specialist on Saudi Arabia. In the Midwest, Michigan has William D. Schorger for anthropology, George Cameron for pre-Islamic literature, George F. Hourani for Islamic history, Oleg Grabar for Islamic art and Herbert N. Paper for linguistics. U.C.L.A.'s leading figure is Von Grunebaum but it has also Andreas Tietze, a Persian and Turkish specialist, and Malcolm Kerr, a rising young political scientist.

At other centers, there's Professor Khadduri, heading the Middle East Program in the School of Advanced International Studies at Johns Hopkins University. Professor Atiya is the founder of the Middle East program at the University of Utah. The University of Chicago has historian Marshal G.S. Hodgson and political scientist Leonard Binder. George Lenczowski represents the University of California (Berkeley) and at Stanford University

Harvard Arabic instructor Catherine Bateson stresses an Arabic sound for first-year class.



Sir Hamilton A.R. Gibb, dean of Middle East scholars.

there's Dr. George W. Rentz, who spent 17 years in government relations work with the Arabian American Oil Company (Aramco) before becoming curator of the Middle East Section of the Hoover Institution at the university.

There are, of course, also specialists at institutions not classified as centers—Hisham A. Sharabi of Georgetown is one—and experts not necessarily attached to any institutions. Among the latter group, for example, would be men like Dr. Saba Habachy, a lawyer who lectures in international and Islamic law at the Parker School of Foreign and Comparative Law in Columbia University; Sami Fahmi, Aramco Government Relations employe, also a lecturer at the Parker School; Col. Charles W. Hostler, U.S.A.F. (Ret.) and Kerim Key of the U.S. Department of Commerce, who lecture on Turkish affairs at the American University in Washington, D.C.; Robert Sethian of the U.S. Department of Commerce, a lecturer on Middle East economics at the School of Advanced International Studies at Johns Hopkins; Richard Ettinghausen, a linguist and art historian, and William F. Allbright, an orientalist, archeologist and writer.

The contributions of such notables, however, tend to be restricted to the graduate levels at the centers. But the new surge of interest in the Middle East has occurred at the college level too, where, on scores of campuses, students curious to know more about an area that suddenly —after the Suez crisis—had begun to absorb a large measure of the world's attention and concern, began to demand courses. Like the graduate schools, colleges had paid scant attention to the Middle East; in 1950 fewer than six colleges had courses in Middle East studies. After "Suez," however, many schools introduced courses on Middle East affairs on their own initiative—courses which in some cases were taught by nonspecialists who just briefed themselves on the Middle East and began to teach. Then, with the launching of Sputnik by the Soviet Union in 1957 and the searching reappraisal of American education that followed, the federal government also took a hand. Under the language provision of the 1958 National Defense Education Act, for example, the government authorized the expenditure of funds to encourage the organization or expansion of courses in uncommon languages—which included Arabic.

The major effect of the NDEA was to bolster programs already in existence. Only eight schools qualified for federal support and seven of them had programs in operation before the act was passed. But NDEA money did provide a shot in the arm where it was needed: a significant percentage of the funds financed fellowships. Last year at Harvard, for instance, 18 out of 43 students had NDEA fellowships. Ford, Fulbright and other fellowships financed a year's work for 14 students, leaving only 11 who had to pay their own way. In the first year the aid took effect, the availability of fellowships helped boost enrollment at Harvard's center from 31 to 43 students. The pattern has varied only slightly at six of the seven colleges, the exception being Portland State College, the only Middle East center exclusively devoted to undergraduate training in the country. Portland's center was established with NDEA funds in 1959 and enrollment is already up to 94 students. Its influence extends down to precollege level, too. Under its auspices, 20 high schools in the Portland area began senior courses in Arabic last fall. The first such high school program was instituted in Salt Lake City by the Middle East Center at Utah.

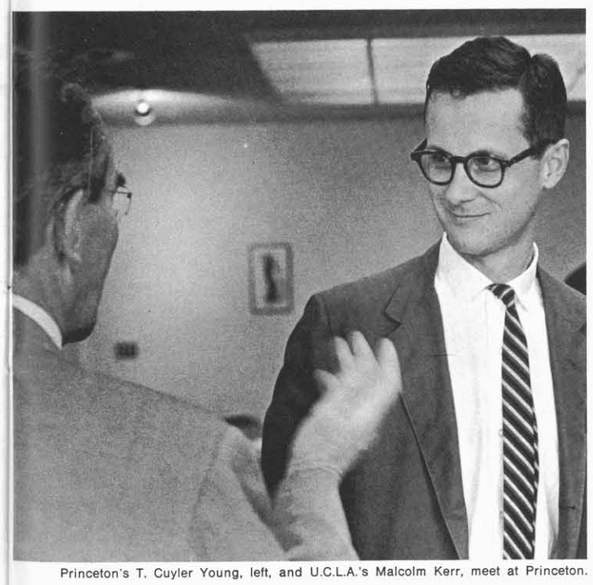
In language laboratory graduate students work with taped Arabic lessons.

Counting the high school students, it is estimated that about 3,000 young men and women were taking Middle Eastern courses in the United States this year. Of that 3,000 approximately 30 to 35 will earn doctorate degrees in the field, proportionately a small number, but actually a surprisingly large number considering the rigorous requirements.

J. C. Hurewitz confers with student in his study in Columbia University's Middle East Center.

In the Jewitt Room of the Widener Library at Harvard, George Makdisi, a professor of Arabic, and an advanced class discuss the translation of a difficult passage.

Philip K. Hitti, former head of Princeton's Oriental Studies and Near East Program.



Princeton's T. Cuyler Young, left, and U.C.L.A.'s Malcolm Kerr, meet at Princeton.

At Harvard, for example, the M.A. alone requires two years, the first devoted exclusively to Islamic history and culture and intensive language training in classroom and language laboratory. It is only in the second year that students turn to modern area studies—the *raison d'être* of the center, since most American courses are oriented toward the modern Middle East rather than to the classical periods. And even that program, geared for the training of business and government personnel, offers no more than a broad, general background in Middle East studies. For those who want a deeper knowledge, or who aspire to an academic career, the road is even longer. The Ph.D. usually requires three to four years of study beyond the M.A. and is conferred by an entirely separate department, rather than the center, to insure that the graduate will not be only a Middle East specialist but a disciplined scholar as well.

For that reason, Ph.D.'s can be sure of being absorbed. Says the acting director of the Harvard center: "There are still not enough competent academics. A rosy future awaits anyone who wants to take the arduous route to the doctorate."

The same can be said for those who are interested in government—a field in which the demand for Middle East specialists has continued strong since World War II—but not for those interested in business. Opportunities in business are narrowing because jobs filled by Americans in the Middle East are dwindling. For the most part, U.S.-owned companies have been responsive to the nationalist feelings of their host country. Where possible, they replace American employes with native-born personnel. Aramco, for instance, employed 3,400 Americans in Saudi Arabia in the late 1950's. The number now is 1,475 and is still going down.

The significance of the new interest in the Middle East, however, is the impact it has had upon American viewpoints with regard to this area. It has contributed to a new understanding of the Middle East—of its history, its religion, its people, its hopes, aspirations and problems. The expansion of knowledge touched off at the university level has changed the outlook of educators down the line. The number of schools with Middle Eastern curricula is growing—and no longer merely in the wake of wars, crises or emergency government aid programs. The schools are establishing courses because they themselves recognize the importance of the Middle East, and because today's equivalent of the Baltimore businessman has come to realize that his image was not only false but dangerous. For the United States and the Middle East it is a meaningful change.

John R. Starkey, Producer of News at Channel 13, New York's educational TV station, is a former writer and producer for NBC-TV, a former reporter for the European Edition of the New York Herald Tribune *and one of the first Ford Fellows in Columbia University's Advanced International Reporting Program.*

THE BIG SHOP

BY WILLIAM TRACY

The door of the building slid back easily on oiled rollers and the supervisor stepped inside and waved his arm. "This is it," he said to the visitors. "Big enough to take a diesel locomotive." He chuckled. "And I wouldn't be surprised to find one here. It's about the only thing we haven't fixed yet."

The structure they had just entered was the Consolidated Shops building in Dhahran, the town where the Arabian American Oil Company (Aramco) has its headquarters. It is big indeed. Floor space totals 60,000 feet, or one-fourth again larger than a football field. Its highest work area measures 38 feet from floor to ceiling, as tall as a three-story office building. The huge interior appears somewhat less impressive than these dimensions would indicate, however, because Consolidated Shops is divided by columns and partitions to provide separate space for an industrial arts training center, spare parts cages and specialized shops with machines able to fix anything from a diesel mud pump to a galvanometer or a stop watch.

The big building also houses office space which is the nerve center of all company maintenance and repair work in the Dhahran area except that done on aviation and vehicular transportation equipment. Here are administered the hundreds of Saudi Arab craftsmen and artisans who staff the sheet metal, welding, paint, carpentry, plumbers, heavy equipment and other shops both in the building and outside, and work at some job-site on oil-handling, industrial or residential property, keeping the district's physical plant in top physical condition.

But the Consolidated Shops building itself is the place to observe under one roof large-scale, versatile maintenance practice of a remotely-situated oil company in action. During one recent tour, for example, visitors saw a huge Clark diesel engine for driving a 500,000-watt generator being ripped down while on one side of the same building a repairman with tweezers patiently eased a tiny screw into an almost invisible hole deep within the interior of a typewriter. In another section a masked welder touched the tip of a blinding blue flame to the damaged, mud-encrusted track of a bulldozer, while in still another a watchmaker picked carefully at the delicate springs of a chronometer.

Every day during regular company working hours, which begin at 7:30 in the morning, the variety of jobs underway simultaneously at the shops creates a colorful and memorable mosaic of motion, color, sound and texture. In the electrical shop one group might be hard at work rebuilding motors, their colleagues testing starters and rewinding a generator. In an adjoining shop machinists are grinding crankshafts, refacing valves and overhauling water and oil pumps. The refrigeration section might be hard at work on anything from huge refrigerated trailers which carry frozen provisions deep into the desert for exploration crews, to office water coolers, air conditioning units, or oxygen tents for use in company medical centers. In the instrument shop at any given time there would probably be movie projectors, gauges, adding machines, scales, fuel injectors, sewing machines, and in the engine shop waiting for an overhaul there could be anything from a five-horsepower lawn mower to the 730-horsepower generator that powers Aramco's drilling barge.

In the earliest days of the company's operations, repair and maintenance in such variety were a major headache. Thousands of miles and many months away from the technicians, plants and warehouses of either the United States or Europe, Aramco engineers had to keep highly complicated and frequently delicate machinery running and in good repair in the face of the great heat and constant dust—two major enemies of all machinery—and the strictly limited supply of spare parts. Their work was made

Bigger than a football field, as tall as a three-story building, Aramco's Consolidated Shops building in Dhahran houses 750 skilled workers who fix anything from cranes to stop watches.

In designing the Consolidated Shops, engineers eliminated the usual dim and noisy atmosphere of shops, substituting instead a quiet, bright, spacious structure with such features as self-propelled cranes on overhead I-beams and chain hoists, above, on pillars.

particularly difficult since eastern Saudi Arabia at that time wasn't even on the threshold of industrialization. Dependable local distributors and skilled workers were still in the future. If an essential machine lacked parts in the early days, pioneering oilmen had two choices: fabricate the part themselves or wait long months for it to arrive from some source as much as half way around the world.

With time and planning, however, these conditions steadily improved. The Saudis, nomads and townspeople, often proved highly adaptable to the demands of the industrial age being introduced to their country, and gradually, by rigorous training, a work force of competent craftsmen and technicians began to be built up. The tiny fishing village of al-Khobar, six miles from Dhahran on the shores of the Gulf, grew into a busy trading center where astute Saudi merchants took on heavy machinery distributorships and started to stock spare parts in their own warehouses. Along with these developments, the $1.3 million Consolidated Shops building went up in 1956 near the Main Gate entrance to Dhahran.

In designing the building, Aramco's engineers had two goals in mind: efficiency and safety, and to achieve them they departed from one of the oldest traditions of the mechanical trades: that the shops where the work is carried out must invariably be grim, dim and dirty. The Consolidated Shops is anything but that. Banks of fluorescent tubes set high in the lofty ceiling bathe the area in a white, daylight brilliance. Massive lathes, presses and drills, bolted firmly to the concrete floor, gleam with fresh forest-green paint touched with yellow—to identify moving parts—and silver—to set off the cutting edges of drills and blades. It shines too on brilliant red fire equipment, on blue-painted nitrogen tanks and on the orange paint which identifies electric outlets and switches. One visitor, struck by the Consolidated Shops' severely clean, vividly colorful aspect, compared its appearance with the interior of one of the newest-model refrigerators.

The men who planned the Shops building, of course, had a reason other than aesthetics for specifying all that

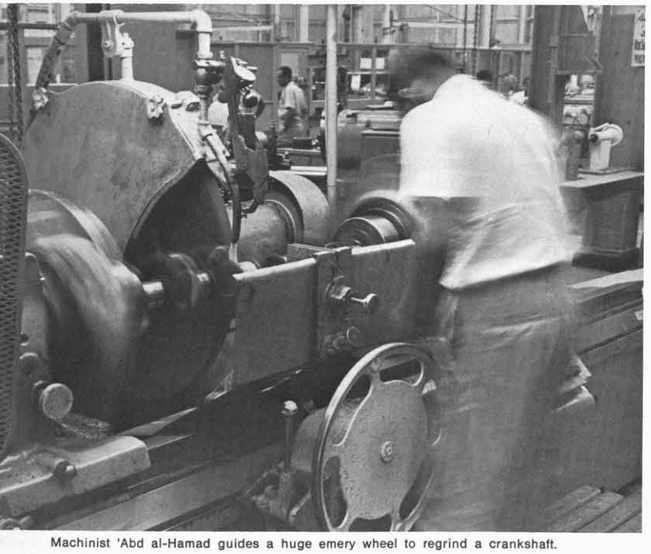
'Abd al-Rahman Genari works with a "lapping" machine which measures flatness with the aid of light waves.

color. It is much easier to spot a tank containing nitrogen if it is painted a uniform blue. Similarly, the orange on outlets and switches gives them instant visibility. And the Consolidated Shops certainly did not pioneer the use of easily-seen red for emergency fire-fighting equipment.

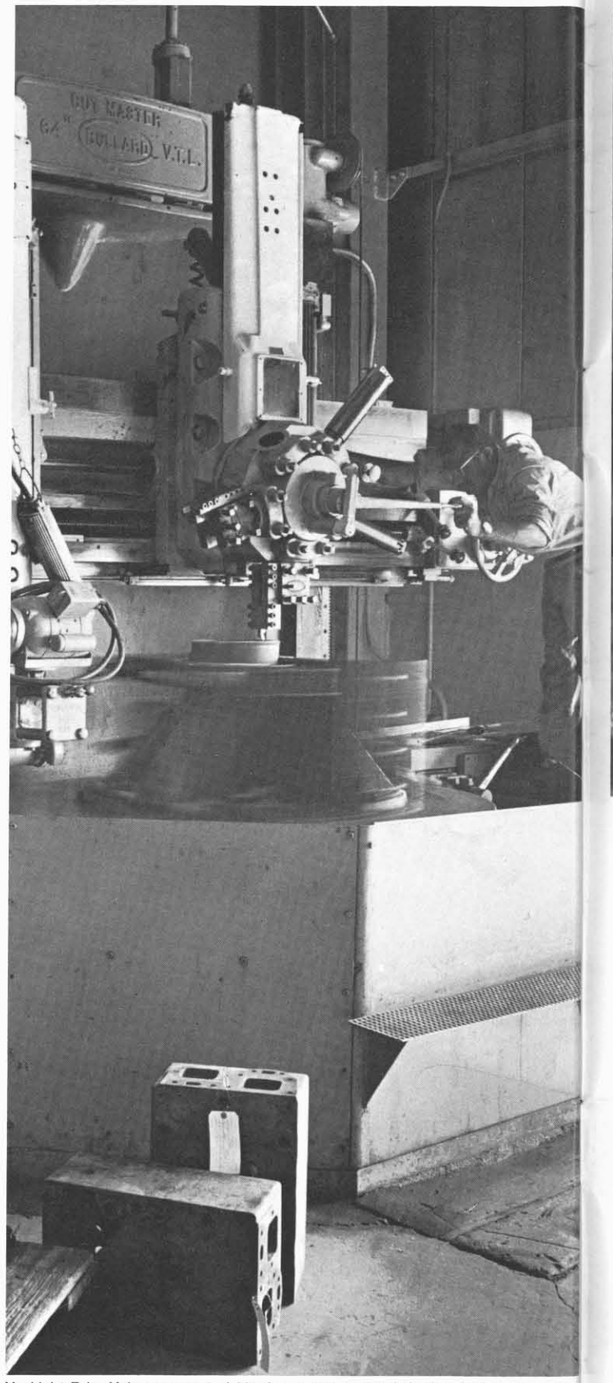
Everywhere in the big building there is evidence of the company's concern for the safety of the men working there. Traffic lanes for movement of personnel and fork-lift trucks are bounded by heavy lines of yellow. Whirring blades, grinding stones and flywheels are covered by carefully prescribed shields. On jobs requiring them workers are made to wear safety goggles, gloves and shoes. By each machine lies a slatted wooden platform, placed there to relieve the strain on machinists' legs and to insure that their feet do not slip on what could be slippery concrete.

Such attention to detail marks the entire operation. Four 50-ton air conditioning units remove the extreme heat of summer from shop spaces at the rate of 600,000 BTU's (British Thermal Units) an hour for the workers' comfort. Panels of perforated, sound-absorbent aluminum sheeting muffle the high whine of drills and grinders so effectively that conversations can be carried on in normal tones. Self-propelled cranes, hanging from I-beams high above the floor, lift and move great weights at the touch of a switch, and chain hoists on swivel frames attached to steel pillars throughout the shop enable workers to jockey heavy loads or unwieldy objects onto their machines. "The shop as a whole," said the supervisor, "is as efficient as any machines we have in for repairs."

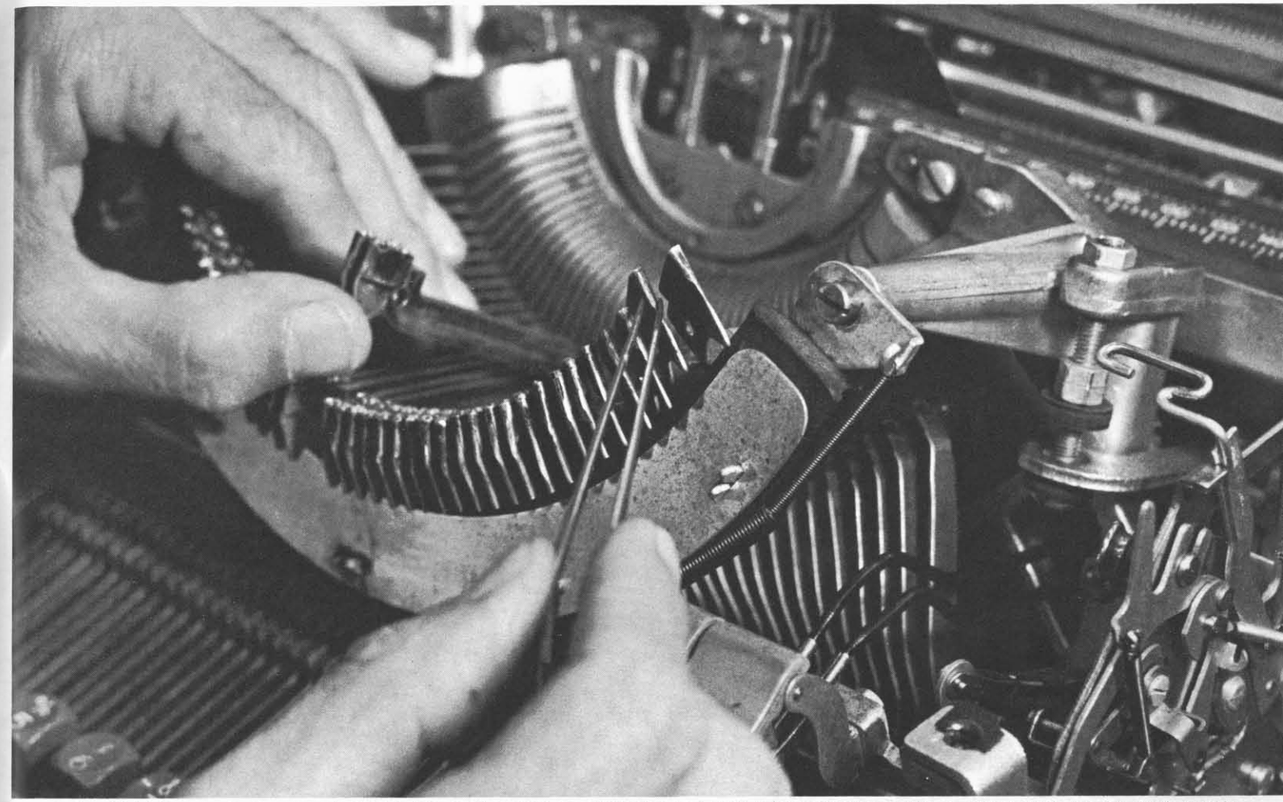
Unlike industrial companies in the United States, Aramco has never been able to go out in the local market to pick up welders, electricians, typewriter repairmen or men skilled in the dozens of other trades the company



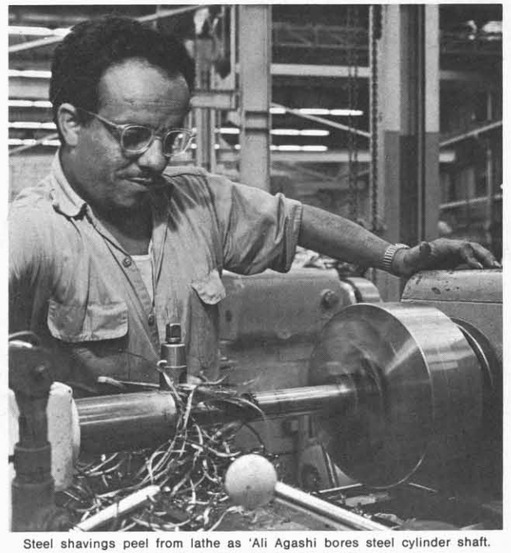
Machinist 'Abd al-Hamad guides a huge emery wheel to regrind a crankshaft.



Machinist Taha Ma'mun eases tool bit of a vertical turning lathe into boring position.



In Consolidated Shops nearly all equipment needed to keep an oil company going is handled, be it heavy machinery for oil operations, or office machines, like this electric typewriter.

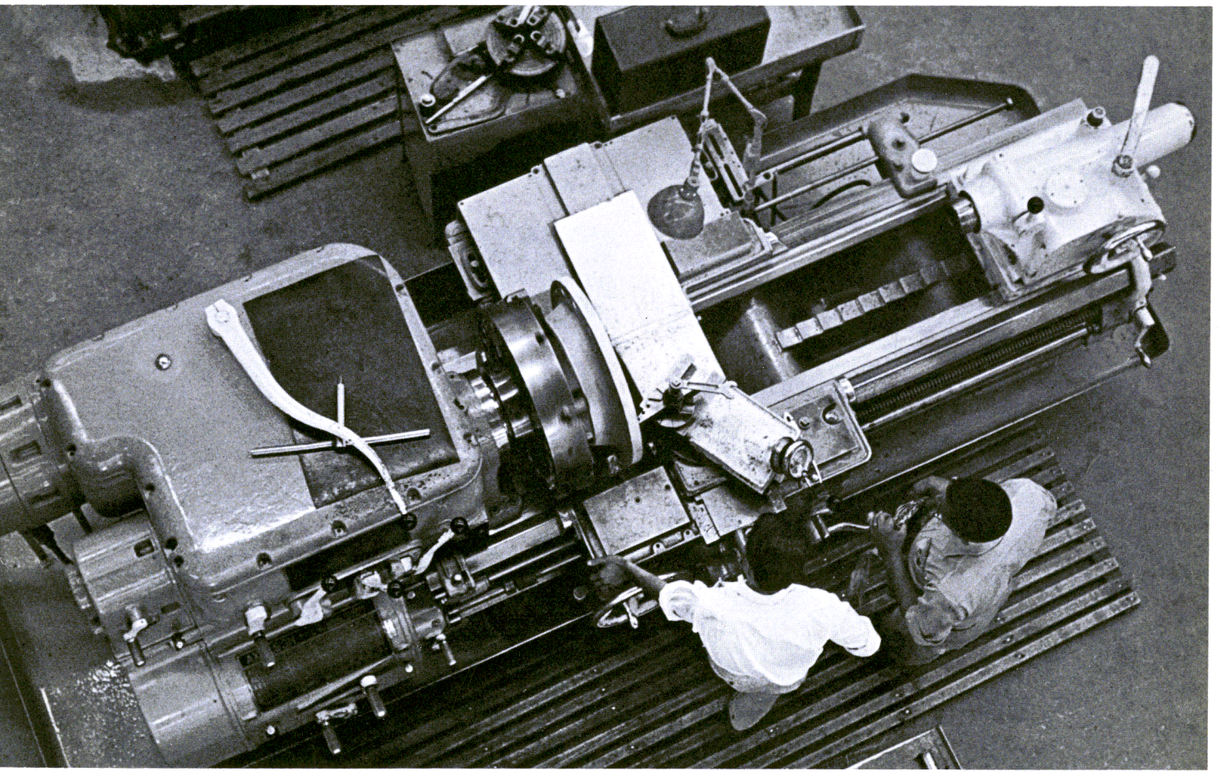


Steel shavings peel from lathe as 'Ali Agashi bores steel cylinder shaft.

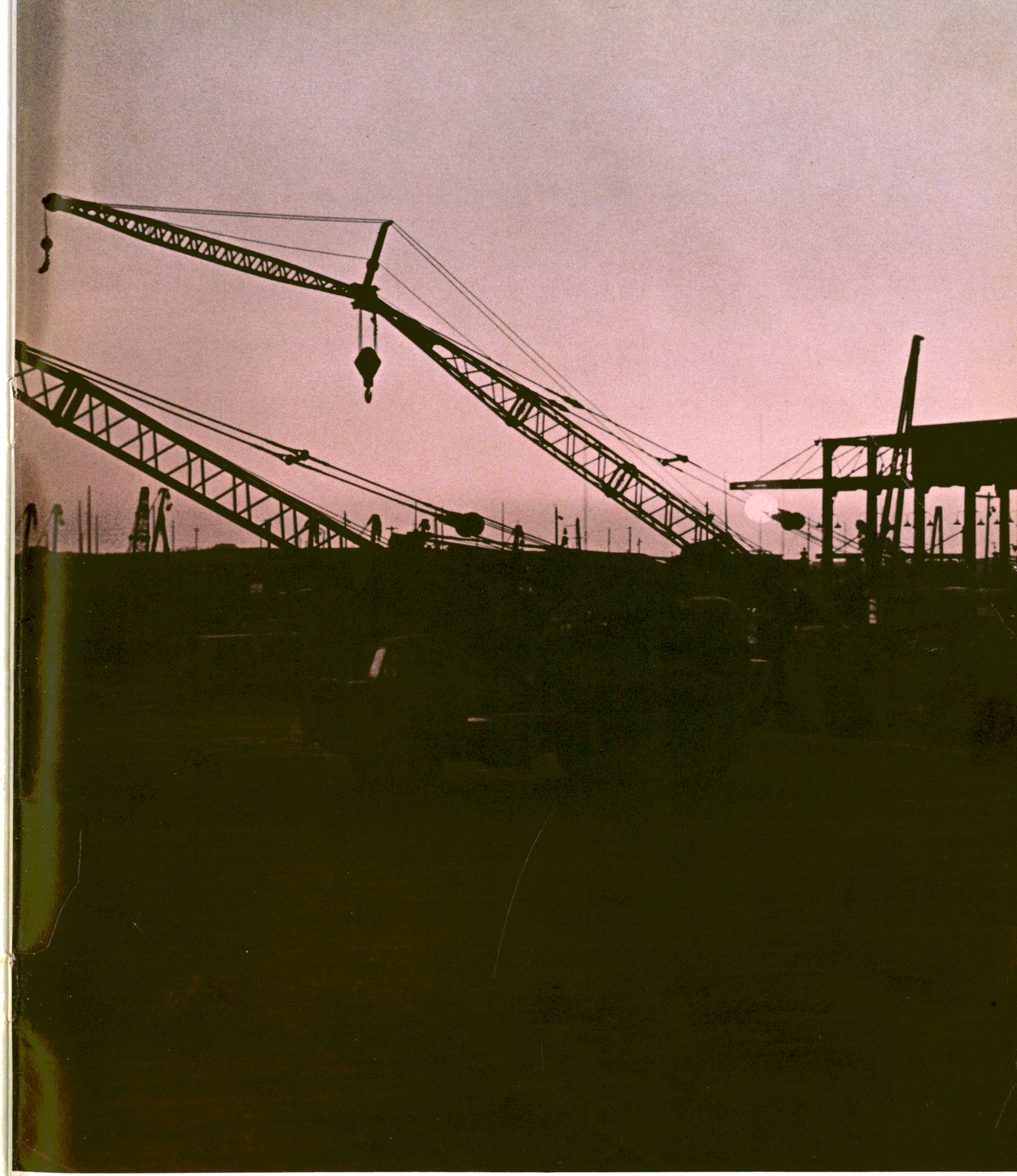
needs to keep itself operating. Until the discovery of oil in Saudi Arabia, there was very little demand for such specialists. Every one of the 750 or so Saudi Arabs carrying out maintenance and repairs for the company in the Dhahran area, including the 110 working in the Consolidated Shops itself, has been trained by Aramco on the job, in classes, or both.

Each working day now, 130 Saudi Arabs are given time off from their jobs for practical classroom instruction in the Industrial Training Shops section of Consolidated Shops at some trade specialties relating to their work. In regularly-scheduled courses they learn the proper use and care of hand tools and, depending on the type of work they are doing, progress from there through house-wiring, plumbing, blueprint reading and the fundamentals of electronics. As today's Saudi Arab employes move up to become shop foremen or higher or leave for retirement, Aramco is filling their ranks with skilled replacements who will take over the lathes and work benches to help keep company-supporting operations running smoothly far into the future.

William Tracy is a regular contributor to Aramco World.



e the building is entirely soundproofed, workers can exchange information without raising their voices. Slatted wooden platforms prevent men from falling if the floor is slippery.



Parked near the huge Consolidated Shops building, awaiting their turn, are these cranes needing everything from minor repairs to complete overhaul, before they can return to the job site.