Arabian Nights – and Art Nouveau
By Rebecca Bruns
Like Kipling in literature, time and fashion have passed him by. Once, though, Edmund Dulac’s lush colors and romantic visions filled England’s books—and children’s dreams.

The Turn of a Century
By Paul Lunde
In the West it’s the 20th century – A.D. But in the world of Islam, where the calendar started on a different date, the 14th century – A.H. – is just drawing to a close.

KFSH: Showcase of the Future
By Mary-Jo McConahay
Four years ago, in Riyadh, Saudi Arabia opened the King Faisal Specialist Hospital—a showcase of 21st-century medicine, a model for future health care and a monument to the man who planned it.

Siwa – Resort of Kings
By Farouk El-Baz
To compare observations and photographs made from space with the actual terrain, a party of geologists traveled to the edge of the Great Sand Sea—to Egypt’s Siwa Oasis, once a resort of kings.

The Nubians in Brooklyn
By William H. Rockett
To the Brooklyn Museum last year came 100,000 people eager to see the arts of ancient Nubia, now, for the first time, emerging from the giant shadow of ancient Egypt.
For the first time that day, the road sloped abruptly downward. The palms and houses of the oasis we had come so far to see sprang into focus like a mirage that had suddenly come alive. Following the footsteps of kings and conquerors, we had reached the Siwa Oasis.

Of all the oases in Egypt’s Western Desert, Siwa is the farthest from the Nile. It lies on the old caravan route from Cairo to Marzuq in Libya, where the desert roads fork north to Tripoli, south to Lake Chad, and west to Timbuktu. These routes in the Sahara have been used from time immemorial, leading across relentless desert from one well to the next—sometimes in stages of 200 miles or more. Such journeys by camel caravan must have truly tested the travelers’ courage and perseverance, sometimes fatally: many who set out to cross the Sahara never returned.

We had every intention of returning, however, and our trip to Siwa took a longer but safer route. Starting from Giza, near Cairo, five geologists from Ain Shams University and I traveled easily north to Alexandria, then west along the Mediterranean coast to Mersa Matruh. From there southward to Siwa, the road was treacherous, but a line of telephone poles—the non-functional ghosts of a communications system—still marked the route and kept us from losing our way. Along that 200-mile extent of dry wilderness, that would have been a disaster.

We had spent all morning driving up the limestone plateau that lies between Siwa and the coast, and most of the afternoon crossing a bleak and barren desert pavement. Though one of our two cars burst into flames along the road and had to be towed by the other, our hardships on the route were small compared with those that travelers before us must have suffered.

In the middle of the sixth century B.C., Cambyses, the son of Cyrus the Great of Persia, began the expansion of his father’s conquests. With the support of a Samian and Phoenician navy, he conquered Egypt; from Siwa he penetrated into The Sudan and Ethiopia. Siwa was also the site of the Temple of the Sun God, Amon, and the nearby Oracle Temple. There Alexander the Great was honored by the priests of Amon as the son of the Sun God in 331 B.C.; Alexander wanted to become pharaoh and Egypt would not accept that unless he had been declared divine. Not far from the temple, a water pool glistens where, it is said, Cleopatra used to bathe.

In this century, King Fuad of Egypt made the trip to Siwa along the coastal road we took, the same one that had nearly exhausted Alexander’s army some 23 centuries earlier. Before Fuad’s party took to the road, however, several wells were dug along the way. King Farouk, the last of Egypt’s monarchs, also made the trip to Siwa, although he chose the more southerly desert route of the camel caravans. Other Egyptian leaders have also gone there, one of whom left Siwans a deep water well and—an especially wel-

No, what brought us to Siwa was not the scientific study. Under my direction, the American astronauts of the Apollo-Soyuz joint space flight had made photographs and observations from orbit of this area—part of a larger NASA study of Middle Eastern deserts (See Aramco World, November-December 1976). Now we geologists had come to try to match up the “ground truth” with the space observations.

To study the general setting of the Siwa area before the trip, we had spliced together two Landsat satellite photographs that contained parts of it. The images confirmed the descriptions of earlier explorers and cartographers, showing that Siwa and the surrounding smaller settlements lie nearly in the center of a shallow depression about 30 miles long—the Siwa Depression. But they also showed that there is another smaller depression in the desert surface 10 miles to the east, and it was a surprise to learn, when we got there, that neither the mayor of Siwa nor the commander of the border patrol in the
area was aware that smaller depression existed. (The mayor was particularly happy to learn of it since it constituted an increase in his territorial jurisdiction.) More surprising was the fact that the smaller depression was totally uninhabited, even though the favorable conditions prevailing in the Siwa Depression were nearly duplicated there.

Dr. Hassan El-Etr, the structural geologist with our group, noted that both depressions are bounded by faults that intersect in an "X" pattern. His observation helps explain the origin of the depressions: fractures and faults weaken the solid rock along the ruptured zone, and the weakness makes the rock vulnerable to the erosive powers of rain and wind. These forces are helped by the enormous temperature difference between the intense heat of the day that expands rock, and the freezing cold of the night that contracts it — a difference that can reach 70 or 80 degrees in summer in the Siwa area. As erosion proceeds, grains that were once part of the solid rock are loosened and, one by one, lifted by the winds to become part of a migrating dune.

The power of wind abrasion is limitless. In the act of separating grains of sand from their mother rock, nature creates sculptures whose beauty cannot be duplicated by the most inspired human hands, and so, in a dry, hot windy desert climate like that of the Siwa area, we found beautiful weathered land forms. Natural bridges arch next to spinele rocks that seem to be balanced on tiptoe. Near the western edge of the depression, natural erosion has created numerous conical and pyramidal hills. Some of them reminded me of the stepped pyramid of Saqqara, and I wondered if the ancient Egyptians had studied such natural structures before deciding to erect their own monuments in this most stable of forms.

There has been a meteorological station at Siwa since the early 1940s that provides important data about local wind erosion, sand movement and the rate of dune migration. Since these are important aspects in our study of deserts, we visited the station, whose instruments include an evaporation tank, to measure water loss to the dry desert atmosphere, and a sunshine recorder. If the sun disappears behind a cloud, this device can record the fact — but all the records we saw showed uninterrupted sunshine. Near a rain gauge we asked the young station meteorologist about rainfall during the past year. His answer was simple: "Zero!"

This dryness must be relatively recent, for there are numerous indications that the Sahara was fertile some 7,000 years ago. For example, many rock paintings showing cows and herds indicate that enough grass grew over much of the Sahara for these animals to feed on and that the inhabitants of the region knew the arts of farming and of domesticating animals. Other rock paintings showing giraffes imply that trees may have grown there as well. About 2,000 B.C., however, the climate became drier and most people apparently moved south to more fertile lands.

There is one obvious suggestion of rainfall in times past in the Siwa Depression. The old village of Siwa is clustered atop a hill, as if to avoid the floods that must have followed torrents of rain. In a similar setting is al-Qara, about 60 miles northeast of Siwa, though founding a village on a hilltop may also have served as a defense against unwelcome intruders. Al-Qara village reminded me of the pueblos built on the Arizona mesas. Both were built of dried mud bricks,
Clockwise from top left: A young Siwa girl and her brother; a communal gathering place in the old village of Siwa; the ruins of a temple to the god Amon, the sun god, to which Alexander the Great once came to consult an oracle; the old mud and thatch soup; an overview of the ruins of old Siwa.
the pueblo multi-storied to house an entire community, and al-Qara composed of clustered, individual one- or two-story shelters.

As a break from our geological studies, the mayor of Siwa suggested a visit to the fabled Temple of Amon, one of the reasons why Siwa has always been an important town despite its size. Only one wall of the temple remains standing today, but the decorative carvings, painstakingly created by the ancients, are still visible. Most of the paint once used on the carvings has weathered away, but what remains adds color to the ruins, and the whole still has great beauty and majesty. It also has a minor scientific association. The priests of Amon here burned camel dung as fuel, like most desert dwellers. The soot that settled on walls and ceilings contained white crystals that came to be called “sal ammoniaca” — the salt of Amon. The gas from this salt is what we know today as ammonia.

We turned back from tourists into geologists as we left the temple, for strewn near it were blocks of beautiful Egyptian alabaster, a stone the ancient Egyptians carved into beautiful objects (See Aramco World, September-October 1978). Since these blocks were the size of a large office desk, it was not likely that they had been brought here from Bani Suwail in the Nile Valley, where this type of alabaster is still found; there had to be a local source. We located a 10-foot thick layer near the top of nearby hill, called Jabal Takrur. It was deposited over 20 million years ago, in layers, radially and in grape-like “botryoidal” clusters.

Twenty miles to the west we saw a very bright rock atop a hill almost completely covered by an advancing sand dune. We climbed the hill to study the dune and to see if the bright layer was also alabaster. One stroke of Dr. Abdel Rahman’s hammer brought a familiar ring; it was marble, and its snow-white color and the numerous

Above: One wall of the Temple of Amon, the Egyptian sun god, still stands in Siwa with its carvings and even traces of ancient paint still intact. Left: Near the temple the geologists found blocks of fallen stone identified as calcium carbonate rock and called Egyptian alabaster.
embedded fossils made it one of the most sought-after varieties.

It was not only geological interest that drew us to Jabal al-Mawta, the Hill of the Dead. It is made of marl, a limestone mixed with clay that makes it relatively soft, and this composition may have determined Jabal al-
Mawta's use. The hill is laden with rock-cut tombs from Roman times. The upper levels reveal large, symmetrically carved tombs, inside are human bones, their surfaces polished by the winds of a thousand years. The lower levels of the hill also expose Roman graves, these perhaps for the less distinguished citizens, for they were dug haphazardly and without form.

Standing atop the Hill of the Dead, we were impressed by the magnificent panorama. To the north were table mountains that led to the limestone plateau; to the west were the conical and pyramidal hills; to the south the luscious green fields, beyond which sand dunes spread as far as field glasses could reveal; and to the east were more graves, beyond which Birkat Zaitun, Olive Lake, sprawled in silence.

Zaitun may be the largest lake, but it is not the only one. There are half a dozen or more smaller lakes, depending on the season and the corresponding evaporation rate. The lakes are salty but they originated from sweet underground water. The erosion that created the depression carved the rock down to 100 feet—in some places 200 feet—below sea level. This allowed underground water reservoirs to spill some of their reserves onto the open ground. In the Siwa Depression alone there are about 200 springs that water the fields and groves.

Most residents of Siwa are farmers. Their harvests include excellent dates and olives in addition to oranges, grapes, wheat and vegetables. But there is much waste of the underground “fossil” water, which does not seem to be replenished by any natural flow. Wells are peppered throughout the depression, each farmer digging his own 30 to 100 feet deep to tap the reservoirs below. The water rises by its own pressure and then flows unhindered into a walled pool, and the farmer simply pulls out a plug from a hole in the pool's wall to water his fields.

The water, of course, flows continuously into the pool whether it is needed or not; much of it evaporates, and the natural salts in it are concentrated. In low-lying parts of the fields, the water quickly becomes saturated with salts—it cannot drain into the soil because of a non-porous shale layer under the depression—and the salts left by evaporation form a crust on the land. The Siwan farmers use special broad-bladed hoes to scrape off the crust before they plant, but it was similar misuse of salty water that ruined the once lush fields of Mesopotamia. There, land that once produced wheat and then barley each season became arid about 2000 B.C.

The inhabitants of Siwa are very tenacious. They have managed to live in their nearly isolated environment for thousands of years, and have even developed a dialect of their own, a mixture of Arabic, Berber and some other elements. The oasis has been a crossroads for many different peoples: ancient Egyptians, Greeks, Romans, Berbers, Carthaginians, Africans, and Arabs. Today about 7000 people live there, under the leadership of nine local shaikhs. Most of the children attend schools, and two girls from Siwa are studying at the University of Alexandria—no small achievement for people from a remote oasis town without radio or television, and where mail and the pilot's newspaper arrive by plane twice a week.

The Siwans learned about our study visit while we were there and three meetings were arranged as it became known that I had played a role in the Apollo exploration of the moon. First I met with the school children, then the townspeople, and then with the nine shaikhs. At the last meeting, a thoughtful old man looked at me and said, "Doctor, I wish to start by telling you that I emphatically reject all the tales of space travel. No missions to the moon were ever made; what we heard were fabricated stories. This is what I believe. Now, you start from there." I presented my case, and our discussion went on far into the night.

The following day the shaikhs invited our group to dinner at sunset, when the day had turned cooler and serene. We were led through planted fields to an open-ended structure whose walls and roof were made of palm fronds, and there we were treated to mashwi, a whole sheep cooked on a spit and flavored with sweet-smelling herbs. Our hosts honored us by serving us themselves, and only joined us for the dessert of oranges and bananas. For me, the high point of the evening came when the same man who had questioned space flight the night before told me, "I now believe your stories of astronauts and the moon." I was glad he did, for our researches at Siwa, coordinated with observations from space, might someday help the Siwans to a better life.

Fawaz El-Baz, born in the Nile Delta, graduated from Cairo's Ain Shams University and went on to the University of Missouri and M.I.T. As America's space program took shape, Dr. El-Baz became the astronauts' instructor in geology and helped choose lunar landing sites. He also worked with NASA as director of the Apollo-Soyuz Earth Observation and Photography Experiment.