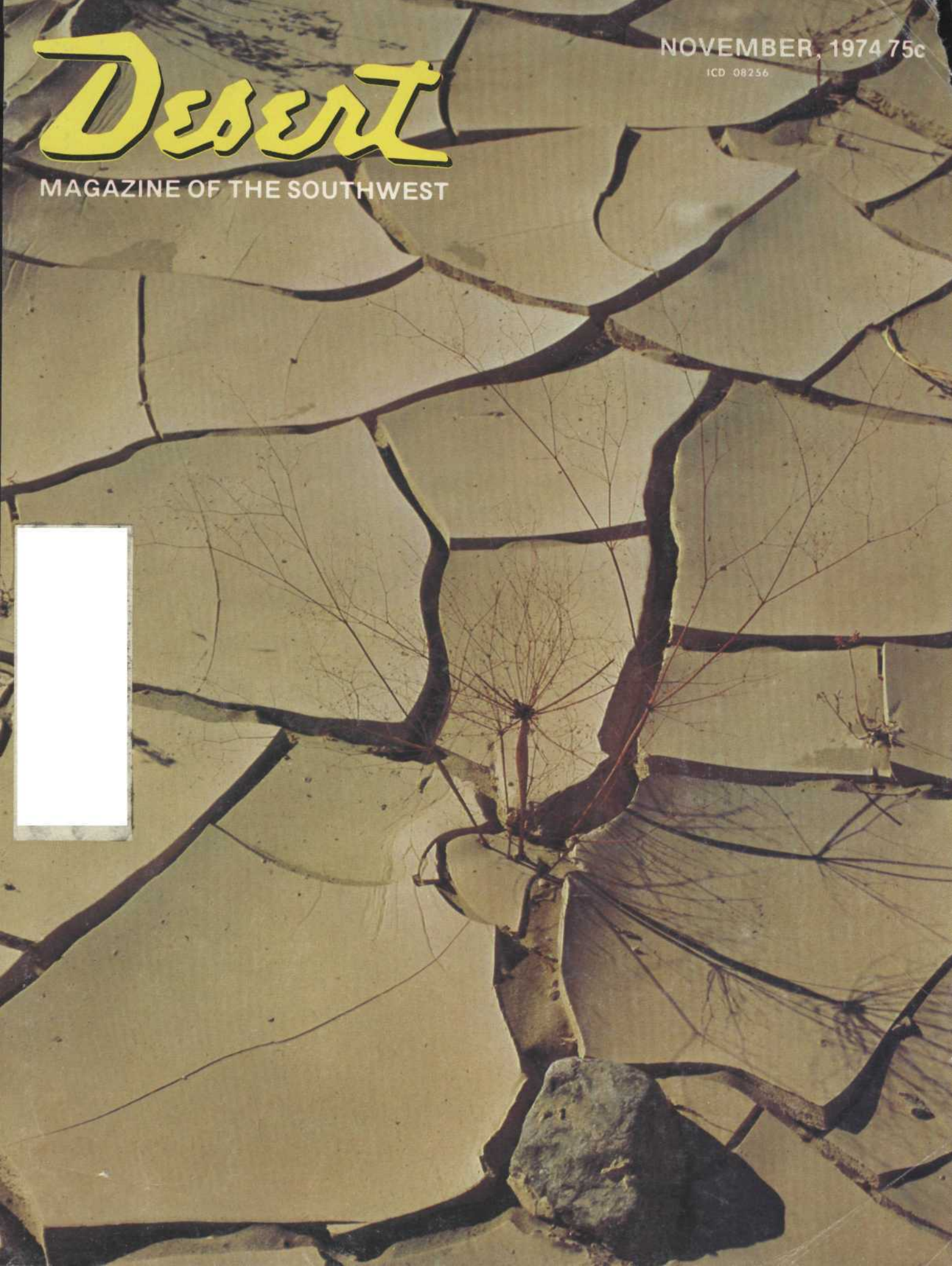


Desert

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Volume 37, Number 11

NOVEMBER 1974

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THE COVER:

Mud cakes and dried stalks present a seared scene in Death Valley National Monument, Calif. Photo by David Muench.

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A Peek in the Publisher's Poke

NOVEMBER IS always a special month here at the Magazine as it marks another anniversary of our existence since Randall Henderson began the publication back in 1937. Times have changed considerably since then, but the Magazine still has its faithful family of subscribers and continues to attract new readers each year.

November is also a special month for Death Valley fans as it marks the holding of the Death Valley '49ers Encampment which, this year, is being presented November 7th through the 10th. This is a

most popular event and literally thousands of people attend the varied programs offered. This issue is featuring Death Valley with articles depicting past and present conditions and an in-depth presentation on the pupfish of Devil's Hole. Phil Pister, Fishery Biologist for the California Department of Fish and Game and one of the biggest fighters to save the pupfish has this to say about the tiny creatures:

"We have here a unique natural resource which is facing extinction because of encroachment on the habitat by man for economic gain. This is essentially the basis of the world's environmental problems today. Hopefully in our quest to save the desert fishes we can set up guidelines and procedures which will be helpful in solving similar problems elsewhere. Man must begin, sooner or later to decide where the line must be drawn between environmental preservation and economic development. In many cases, if he is prudent, he can eat his cake and have it too. Perhaps we can help guide him."

November is a special month for noted author and *Desert Magazine* contributor Stanley W. Paher. Stan, the author of *Nevada Ghost Towns and Mining Camps*, *Death Valley Ghost Towns*, *Ponderosa*, etc., won the Republican nomination for Secretary of State for the state of Nevada and we wish him success in the upcoming elections.

November is also Thanksgiving month, and I would like to sincerely thank the many people who make *Desert Magazine* possible. First, the subscribers, many who have been with the Magazine for 38 years; secondly, the advertisers whose support is necessary in any publication; and finally, the scores of freelance writers and photographers who really are the Magazine. It has been a rewarding experience these past years as Publisher/Editor to be a part of a product as highly esteemed by so many. My heartfelt thanks to all of you.

Death Valley has something for everyone, and authors Chuck Gebhardt, Harold O. Weight and Howard Neal present a varied offering on the most famous of California's valleys. Rounding out the November issue is the concluding installment on Hiking an Old Mission Trail in Baja by George Leetch, and a visit to a great vacation spot in Arizona's "Bill Williams" Country, Alamo Lake State Park, by our Field Trip Editor, Mary Frances Strong.

Helen Walker tells us some interesting facts about mirages, and Buddy Mays covers an unusual game refuge in New Mexico.

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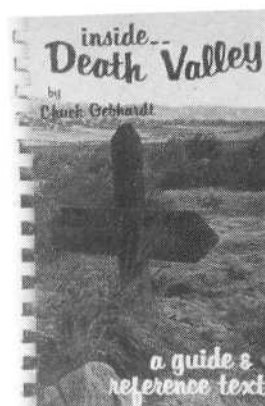
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INSIDE DEATH VALLEY

By Chuck Gebhardt

In addition to being a contributing author in this issue, we are pleased to review Chuck Gebhardt's guide and reference text of forever mysterious Death Valley.

An avid hiker, backpacker and rock-climber for 30 years, Chuck has backpacked the length and breadth of Death Valley unaided on several occasions, and spends most of his spare time exploring its little-known back-country areas.

This comprehensive guide contains over 80 photographs, some in beautiful four-color, of the most interesting aspects of the Valley. Included, also, are Entry Guides and a Place Name Index to provide the potential visitor the means to prepare his trip with economy, comfort and efficiency in mind. Once in Death Valley, the expansive text, with special drawings and maps, will lead the visitor through the maze of natural, geological and historical phenomena that characterize the Valley.

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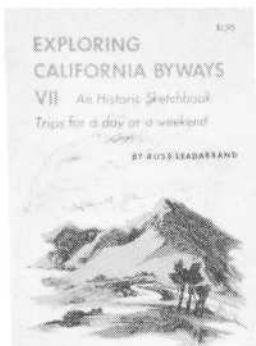
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informative chapters on the topography and temperature; flora, animal and reptilian life; Jeep roads and trails, backpacking, day hikes, summer hiking; accommodations and campgrounds; 12 of the main points of interest, plus one chapter devoted to other points of interest and including the Place Name Index for easy reference.

The author concludes this valuable guide with a chapter on the routes departing from the Valley. Whether your direction be north, south, east or west, he gives detailed descriptions of road conditions, accommodations, historical information and points of interest.

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In this volume, another of his "Let's

Explore a Byway" series, Russ returns to a remote area in the San Gabriel Mountains; discovers new areas in the Los Padres National Forest; visits an old adobe in San Luis Obispo that posed a puzzle; visits the Tehachapis and Montaña de Oro State Park; finds a new park in Ventura County and an unusual atmospheric condition on the Salton Sea.

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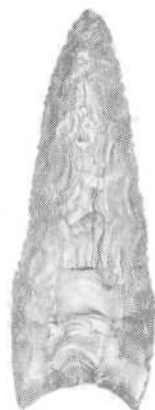
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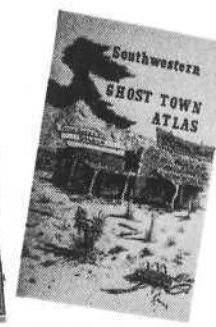
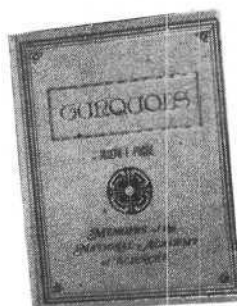
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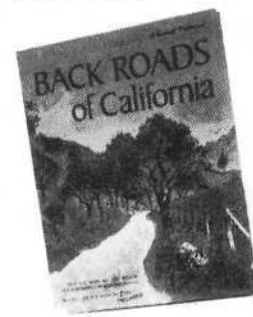
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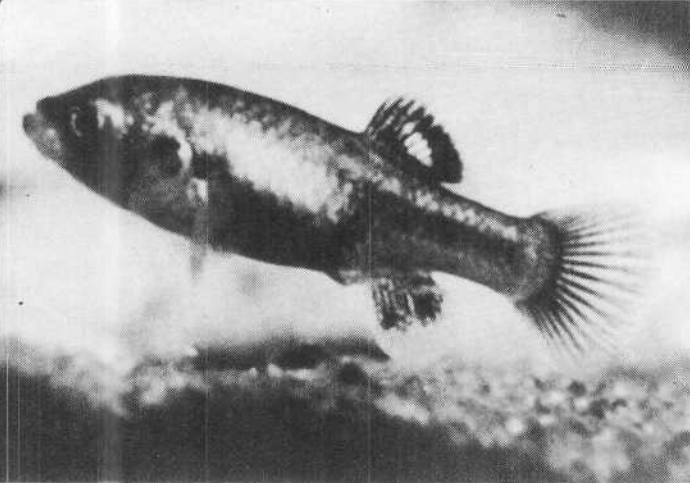
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Cyprinodon diabolis, the dwarf of Devil's Hole.

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Dwarfs of Devil's

DESERT LIVING would seem to be out of the question for any member of the finny brotherhood. Yet, Death Valley, one of the hottest and driest of all the deserts in the world, is home for an astonishing tribe of little fellows known as pupfish. True enough, these minnow-like fish are small, the largest reaching only about an inch-and-a-half in length, but they are making a big splash in the world today.

The tale of the pupfish is part of the age-old story of the Remaking of the Face of the Earth that has been going on for billions of years as the mighty forces of time, mountain upheaval, erosion work and climates change accordingly. The pupfish's part of it goes like this:

Parched and heat-ridden today, the Death Valley region of Nevada and California once was a land of lakes and rivers, for when the ice sheets covered much of North America during the early part of the glacial period, the Southwest was cool and moist. The Valley itself formed the sump for a vast drainage system. A body of water some 100 miles long and 600 feet deep, known to geologists as Lake Manly, covered much of it, fed by the overflow from the Owens River and by waters from the Amargosa and Mohave. Other lakes, some small, some large, were in the vicinity as well as streams and rivers and, dwelling throughout this connected water system, were the ancestors of today's pupfish.

As time wore on, the glaciers receded. Waters from the Owens River no longer reached Death Valley and the flow from the Mohave and Amargosa rivers greatly diminished. The lakes and streams began to go and Lake Manly itself disappeared. The climate became hotter and hotter. The land became drier and drier until all that is left now of the great river and lake system that once was are a few small spring and intermittent water courses spotted here and there in a vast and desolate desert. But pupfish are still around, descendants of the old ones who formerly ranged throughout the ancient river and lake system.

Now many of these springs and streams that became separated from each other when the water courses dried up remained isolated. This meant that the inhabitants of each one, being fish and unable to strike out across the dry desert to seek their fortunes elsewhere, were stuck in their particular watery homesite. Nor could their descendants change residence.

The pupfish evolved with time, and they differed from the ancestral type as could be expected. But more went on. Out of contact with other pupfish, the populations in the various isolated places evolved along different lines until today, some five distinct species and several subspecies exist.

Scientists view this situation with delight. Here in the desert—before their

very eyes—evolution is taking place. These relict pupfish, with their great ability to adapt to exceedingly hostile environmental conditions, show the changes that have occurred and *are still going on* due to the scarcity of water and isolation. In a way, each population of pupfish is a kind of natural experiment of evolution. As such, each offers a chance for brand new information in genetics, physiology and behavior. Pupfish are, in short, a scientific treasure.

Charmers, too, these mini-fish. True, most of the Death Valley region pupfish ladies dress rather plainly in brownish tones with dark vertical bars. But the gentlemen, in their courting attire, are something to behold in iridescent blues, purples with golden touches and perhaps dark fin edgings. The clan's small size and rather delicate appearance are foolers, for pupfish are really very tough little characters imbued with great vitality and a strong survival instinct. In fact, some species have lived for thousands of years in pools so small and poor in resources that they could only support a few hundred individuals.

Take the dwarfs of Devil's Hole, for example. Eclept *Cyprinodon diabolis*, this inch-long species of pupfish resides in a freshwater spring located in a craggy hole high on the side of a limestone mountain in the Ash Meadows vicinity. Fed by water drawn up from deep underground limestone caverns, the spring

Hole

been in residence here for a long, long time. In fact, pupfish probably moved into this spring back in the good old wet days when a lake covered Ash Meadows and flooded this hole, and they were left behind when the waters receded. Geologists think this all happened some 30,000 to 100,000 years ago which, while recent geologically speaking, isn't yesterday by any means. Completely isolated and cut off from connections with other populations of Death Valley pupfish for so long, *C. diabolis* is today the most highly evolved of them all.

While the food supply has been limited, and reproduction facilities cramped, the pupfish of Devil's Hole have one energy saver: the constant temperature of the spring's water. But what about other pupfish who dwell where conditions are anything but stable?

Cottonball Marsh, located below sea

level on the floor of Death Valley, is a fine example of instability. (Unless being a godforsaken spot the year around can be considered some form of stability.) Anyhow, fed by underground water seepage, the marsh is actually a barren crust of salt and gypsum with a few permanent pools. During the fall, winter and spring—the time of the most water—the crusty surface cracks open into narrow channels and the water spreads into additional shallow pools. Summertime, most of these dry up, those left being dotted here and there on the baked surface. Salt-encrusting algae grows at their edges, eventually practically roofing them over. So rugged are conditions here that only a few scattered clumps of pickleweed and salt grass can make it high on the alluvial fan where the water first seeps out. The lower fan is a lifeless place, the high salt content of

has no surface outlet. It is a thermal spring with an almost constant temperature of 92 degrees F., and while the main part is deep, there is a rocky shelf located at the hole's entrance which is covered with water. It is this shelf that has provided the two basic things that have kept these fish in business here so long: a shallow sunlit place for algae to grow which is their only source of food; and the only suitable place for spawning available.

Key to the whole thing is sufficient water on the shelf, and this depends entirely on what happens to the water level in the source caverns far below. Anything that causes the water level down there to drop immediately subtracts water from the vital shelf upstairs which, of course, is bad news for the fish. Under the very best of conditions, home sweet home in Devil's Hole has been a touch-and-go situation, for in winter, due to the rocky overhang, there is no direct sunlight on the shelf, the result being just enough food production to support some 200-500 fish.

Yet, the *C. diabolis* population has

With the lowering of underground water sources and shelf dry-out in Devil's Hole, C. diabolis is in real trouble. Biologists built an artificial shelf and installed electric lights to help stimulate algal growth in an effort to save the pupfish, but were met with little success.



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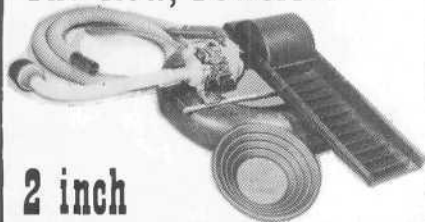
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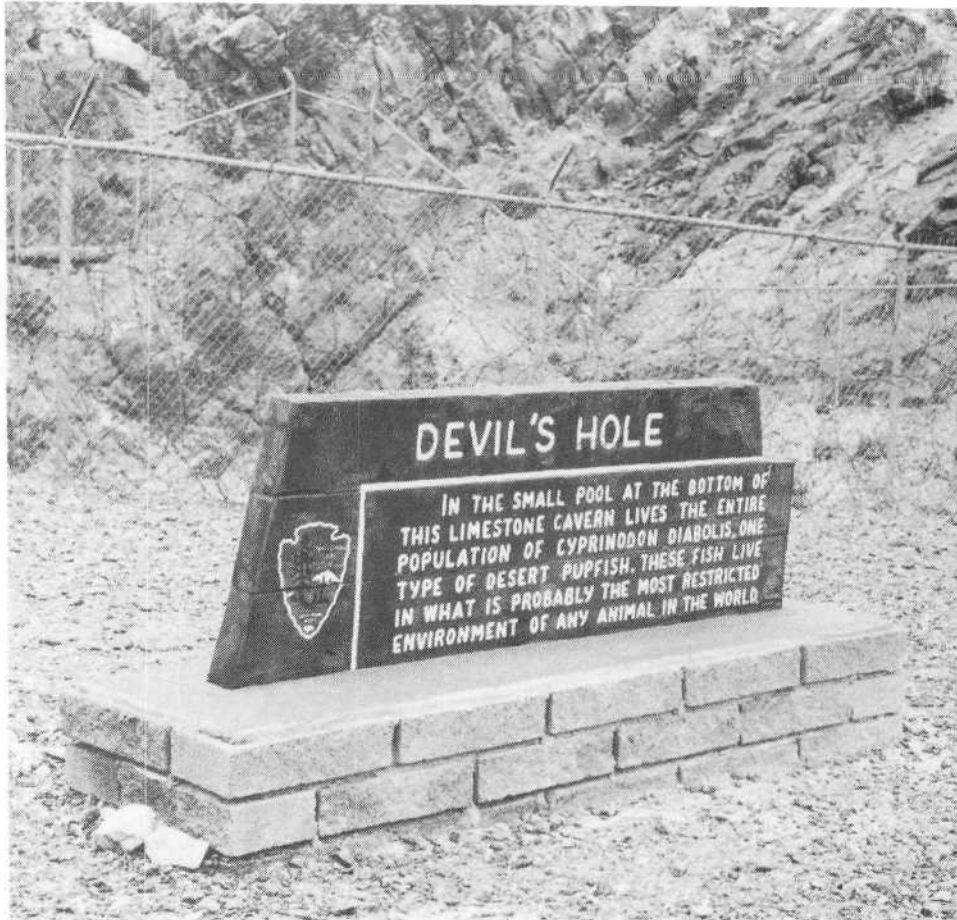
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Devil's Hole has long been a detached part of Death Valley National Monument.

the soil making it impossible for anything at all to grow. But here in the saline pools and channels of this desolate marsh—one of the most extreme fish habitats yet discovered—dwells a species of pupfish known as *Cyprinodon milleri*.

To a fish, the relation between the salt content of its blood and the salt content of the water outside is a matter of life or death, since it is the key to the proper water balance in its tissues. Fish gills and mouth membranes work like the old physics osmosis test where when a semi-permeable membrane separates two salt solutions of different strength, water passes through it from the weak solution to the strong as if to make the two sides equal. So any fish that lives in water saltier than its blood is in danger of losing too much body water unless physiological adjustments are made constantly to maintain the proper balance.

The team of biologists James La Bounty and James Deacon, out to see what the Cottonball Marsh pupfish were actually up against in regard to salinity, found that the salt content varied among the channels and pools. Pupfish were in all of them, even in pools where it ran as high as 160 p M—a matter of great surprise.

Now another kind of pupfish, *Cyprinodon salinus* by name, which lives in the very saline waters of Salt Creek, has long been known for its ability to stand heavy salt concentration. So naturally, La Bounty and Deacon had to put their new marsh dweller up against this champion. Both fish did O.K. at 67.3 p M salinity, but when the test water was increased to 78.5, the Salt Creek entry died, while the Cottonball Marsh dweller was still going strong when the test was ended five days later.

Geologists figure the time that Cottonball Marsh fish have been cut off from other pupfish to be only some 3600 years, or even perhaps as little as 300-400, when there might have been water connections on the floor of Death Valley. Pondering this, La Bounty and Deacon wondered about the differences in form between the Salt Creekers and the Cottonball Marshers that made them two distinct species and different from other pupfish. They concluded that saltiness of the water, of course, was a major factor, but what could be even more important here and, in fact, affect the evolution of other populations of pupfish throughout the Death Valley system, was the actual chemical content of the particular water where each lived. And,

too, maybe the variable seasonal temperatures had something to do with it.

Temperature, the three-man team of Robert Naiman, Shelby Gerking and Thomas Ratcliff, were betting had a big effect at Cottonball Marsh, since a summer scorcher at Furnace Creek, only a few miles away, can hit 132.8 degrees F. when it feels like it, and winter days can be below freezing. So they tested the water in the marsh, expecting to find it very hot in the summer. But the water is surprisingly cool, due to the fact that it runs underground for a considerable distance before emerging at the marsh. Evaporation helps in cooling, the salt dome formation over many pools helps with shade. An 89 degree F. registered in summer, for instance, is far below the lethal limit of 109.4 for this fish. So, actually, *C. milleri* does not suffer high temperature water stress even on hot summer days. But what does happen is that the temperature of the water fluctuates daily, a difference of some three degrees in the channels to as much as 25 degrees in the last shallow pool.

Fluctuation is rough on fishes. Since they are unable to maintain a constant temperature within themselves, their bodies simply adjust passively to that of the water around them. Rapid changes are the hardest to stand, for while there might be a chance for some fishes to handle unusual temperatures, they cannot adjust fast. Heat is picked up or unloaded mainly through the skin and large capillary areas in their gills and this takes time.

Cogitating on all this, Naiman, Gerking and Ratcliff concluded that while there is no big pressure evolutionarily speaking on the Cottonball Marsh to develop tolerance to high heat, there certainly is plenty of pressure for tolerance to wide temperature ranges. Individuals that could not stand fluctuation would be weeded out by natural selection.

C. milleri is a big thing to evolutionists for yet another reason: the population could not have been isolated for more than 3600 years at most, but due to the selective pressures imposed by the marsh, and because the generation turn-over is rapid (pupfish breed at an early age), species differentiation took place here in a very, very short time—maybe as little as 300-400 years?—an eyebrow raiser bound to revise some old thinking.

The dwarfs of Devil's Hole had their

turn at theory-upset, too. Since this *diabolis* bunch had been living in their 92 degree F. spring for 30,000 years, it was fully expected that they would have dropped off any ability to adjust to temperature changes just as cave dwellers have gradually lost their eyes through disuse—elimination by natural selection. So, biologists James Brown and Robert Feldmeth, testing the dwarfs against other pupfish who lived in an artesian well outflow and were accustomed to water temperature variance, were all set to show that *diabolis* couldn't take it.

They had a big surprise coming. The dwarfs, it seems, had not lost the ability at all, but could still stand a 66 degree range in water temperature as long as the change was not too sudden. Acclimated to 32 degrees cold, they could go to 102 O.K. Starting from a warmer 40 acclimation, they could make it easily to 108. This is a very big deal, evolutionarily speaking again, for it shows that, while eyes and the like might be lost under disuse and disadvantage, the old homeostatic systems basic to the running of the fish machine are highly resistant to evolutionary change. Furthermore, it showed that what an animal might be able to stand is not always so closely correlated only with what it is accustomed to, as was formerly thought.

So, with all these new angles coming to light, and with researchers privately betting more upsets in scientific thinking are bound to come, compliments of pupfish, it is obvious that EACH population of these invaluable little fish is exceedingly important. Not ONE of the strange isolated habitats should be upset.

Hence, the dismay and frantic efforts to preserve the Devil's Hole fish doomed by pumping operations in the vicinity that have lowered the underground water level and all but wrecked their food and spawning shelf. (This, in spite of the fact that the Hole has been a national monument for years.) Other populations are threatened throughout the Death Valley system by land development and its concurrent lowering of the underground water supply. Hence, too, bills before the House and Senate by Congressman Jerome R. Waldie and Senator Alan Cranston to establish a pupfish national wildlife refuge and monument in California and Nevada, are an effort to save these finny treasures before they are lost forever. □

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Buck mule deer



New Mexico's Bosque

by **BUDDY MAYS**

IF YOU'VE ever had a raging desire to see a "semipalmated plover," or a "marbled godwit," Bosque del Apache National Wildlife Refuge, in the southern part of New Mexico, is the place to go. Chances are that you might have to scour nearly 58,000 acres of marshy river bottom to find one of these bipedaled critters, but if you look hard enough, you're sure to triumph in the end.

On the other hand, if you're not especially interested in these two uncrowned kings of avian nomenclature (which, by the way, are birds), but still have a hankering to view nearly 400 other species of southwestern wildlife, Bosque del Apache is still the place. Snuggled in a wide, pastoral valley near the Rio Grande River, just 15 minutes south of Socorro, New Mexico, the refuge contains just about everything that walks, crawls, swims, runs or flies.

Established in 1939, the Department

of Interior originally designated Bosque as a protective breeding grounds for the Sandhill Crane—once almost extinct in the Southwest. Since then, the Sandhills have steadily increased their numbers until now, hopefully, they are out of danger. Each fall, the cranes migrate to the refuge by the thousands, feeding on wild and cultivated grain in the marshes. Along with them come flock upon flock of Canadian Geese on their way to a warmer habitat.

To the advantage of the modern visitor, though, Bosque del Apache has more than geese and cranes. A 15-mile automobile tour on well-graveled roads takes the visitor back in time to an era when wild animals roamed the country at will, unafraid of man or his machines. Such critters as the mule deer, bobcat, coyote and porcupine are common—sometimes almost abundant. These animals are not hunted on the refuge. Consequently, they have increased their numbers so much that it would be impossible to travel the tour route at all without seeing at least some of them.

At the check station, where visitors are asked to stop before entering the refuge, tourists can pick up a list of 284

birds which are found in Bosque. Some, like the Mississippi Kite, are extremely rare, but others—upland game birds like the ringneck pheasant, Gambel quail, and almost all species of ducks are so common that they can be approached easily.

Birds of prey such as the prairie falcon and the golden and bald eagles are in evidence, too. Watching them swoop and glide on the wind as they patiently hunt mice in the river bottom is an experience that shouldn't be missed.

One unusual addition to Bosque in recent years is the display pond near the entrance. At various times of the year, most species of waterfowl will feed in the pond, making it easy for photographers and bird watchers alike to view, at close range, their favorite subjects. A short way from the display pond, rangers have constructed a tower especially for photographers. Here, they can record the antics of huge flocks of white snow geese that call the refuge home during the winter months.

According to naturalists, Bosque is the major waterfowl wintering area in the middle Rio Grande Valley. Rangers estimate that the total population of the re-



Sandhill cranes



Snow-geese

Bosque del Apache WILDLIFE REFUGE

fuge stays at about 35,000 from October through March. During the fall, there is a short goose and quail season, but most of the year the birds are allowed to live in peace.

The written history of Bosque del Apache dates back to 1845, when the land was part of a huge land grant, but the story of Bosque began long before that. On the west side of the San Pasqual Mountains near the river, Indian ruins dating back to 1300 A.D. are common and, for the most part, undisturbed. The ruins were fortified with high stone and adobe walls, and the largest village contains about 50 rooms. Seven-hundred-year-old petroglyphs cover the rocks in many places, and high desert winds often uncover broken pots and arrowheads left by the area's ancient inhabitants.

When the land was originally purchased for the refuge, the thousands of acres of bottom land formed a marshy, grass-covered savanna, an enticing habitat for waterfowl, but of little use to mammals and other forms of wildlife. In 1941, however, severe flooding by the unpredictable Rio Grande covered the savanna with a deep layer of silt. The silt gave the Department of Interior the initiative

needed to turn the area into a preserve for all kinds of animals—not only cranes and ducks.

Bottom land fields were cleared and leveled, later to be planted with grain and corn. Irrigation canals were dug to allow water run-off to flow in an orderly fashion, thereby cutting down the possibility of future flooding. These canals were planted with largemouth bass, catfish and frogs. Nowadays, the waters of Bosque are filled with fish. Although no boats or other floating devices are allowed on the waters, the fish don't seem to notice. Most patient anglers can easily catch enough to fill even the largest frying pan.

Recently, New Mexico declared war on spot-lighting poachers who were taking enormous numbers of deer illegally. Consequently, the refuge is closed to all traffic from dusk till dawn. Campers, with hopes of staying inside the refuge overnight, sometimes find this a bit of a nuisance, but the rule is as much for the protection of the camper as it is for the animals. Since most of Bosque is still marsh, a hiker or driver could easily get lost at night, drop into some boggy hole, and never be heard from again. Luckily,

it hasn't happened yet, but there is always a first time. For those who wish to spend one night or several, camping areas have been set up in the surrounding area outside of the refuge.

The primary objective of the Bosque del Apache refuge, says the Department of Interior, "is to provide suitable wintering, feeding and resting habitat for migratory waterfowl of the Central Flyway, and to provide a safe refuge for other animals of the southwest." The Department adds, "Recreational use of the refuge is permitted *only* when activities do not interfere with wildlife objectives."

In this day and age, when the possibility exists that man may soon destroy his natural neighbors, Bosque stands as a milestone in the preservation of wild creatures. You may not see a "semipalmated plover" or a "marbled godwit" in Bosque, but don't be too disappointed if you miss them. You won't be the first. What you will see, though, if you take the time and trouble to look, is the serenity, the peace, and the beauty of nature at its finest. And in the words of that old song, "who could ask for anything more." □

Somewhere near Death Valley, Charles Breyfogle lost a golden bonanza. In the Amargosa Desert, a few miles from Death Valley, Shorty Harris and Ed Cross found one. Were they the same? Was it really Breyfogle gold that built the desert city of Rhyolite? Now the . . .

*The John S. Cook Bank Building
is the most imposing ruin
in the ghost town of Rhyolite.*

Ghost City of the Amargosa

by HOWARD NEAL

IT WAS spring, the spring of 1864. Yet, as the three men and their pack animals moved down toward the floor of Death Valley, they knew it was going to be hot. They were already tired. They had covered nearly 200 miles of desert since they had last seen any civilization.

As night was closing in, they decided to camp. The spot they selected was known as Mesquite Spring. They were about 30 miles north of Stovepipe Wells and the heart of Death Valley.

A stranger followed them into camp that night. He introduced himself and told them that he had been following them since they had left Geneva, Nevada. His name was Charles Breyfogle. The three men were not surprised by Breyfogle's appearance. They had known that they were being followed for some time. It was Breyfogle who was surprised. He had presumed they were

prospectors looking for the celebrated lost silver of Death Valley, the Lost Gunsight. He had hoped to join them. They were not prospectors at all. They were Southerners traveling home to join the Confederate Army.

In spite of his disappointment, Breyfogle asked if he could travel with them for a few days. He did not share his knowledge, but he had heard that the Death Valley party of 1849 had buried an iron chest containing some \$20,000 near Stovepipe Wells and, even though he could not prospect for the Lost Gunsight, he wanted to search for the treasure chest before returning to Nevada.

The Southerners may not have been enthusiastic, but they allowed Breyfogle to join them. For two days the group moved south into the great sink of Death Valley. When night fell that second night after their meeting, they camped near





Stovepipe Wells. Breyfogle, as he had done the two prior nights, spread his blanket some 200 yards away from the campfire. Perhaps he was being allowed to travel with the trio, but he was not a member of their party. Their attitude made that clear.

That night Breyfogle awoke to the terrifying screams of death. Indians were attacking. The pack animals had been driven off and the Southerners were being murdered. Breyfogle's forced habit of sleeping apart had saved his life. The Indians did not know he was there. Quietly, Breyfogle picked up his shoes and, barefoot, crept off into the night.

The next morning found him in the foothills of the Funeral Mountains. His future was, at best, in doubt. He found some brackish water. He drank, and filled his shoes for use as canteens. He then continued walking.

Upward he moved, into the mountains, through Boundary Canyon, toward Daylight Spring, the pass, the Amargosa Desert, and, perhaps, beyond. Who knows how many days he had traveled when he spotted the green of a tree against the side of a red-colored hill? The green meant water, and eagerly he moved toward it. He discovered there was no surface water, but the tree was a

mesquite, and he ate the green beans with relish.

While he was sitting there, resting in the shade, he spotted it. Quartz float, heavily laced with gold. He could not believe its weight. It must have been half gold! He looked around and quickly found the golden ledge. The amount of gold was fantastic. Bonanza! He had struck it rich!

Marking the spot well in his mind, he picked up several pieces of the float, wrapped them in his bandana and moved on. Breyfogle traveled north, almost as if by instinct, toward the parts of Nevada he knew, the Big Smokey Valley, Geneva and Austin.

One night he was again attacked by Indians. Struck on the head and left for dead, he was injured to the point of later having a faltering memory, but he did not die. And, the Indians did not get his gold.

On he walked. Incredibly, he walked for more than 100 miles until he was discovered by a rancher near Austin.

That spring and summer he recovered from his ordeal and, in the fall of 1864, he returned with friends to find his golden bonanza. The red hill could not be found. The mesquite tree could not be found. The gold could not be found. The

following spring, he and others returned. Again, no luck. For five years, until his death, Charles Breyfogle searched. He searched the Funeral Mountains, he searched Boundary Canyon, he searched the Amargosa Desert. He searched south beyond Death Valley, north into Nevada, and west as far as the Panamint Valley. His golden ledge remained lost. Others searched. And, perhaps, some are searching to this day. Still, it is said the Breyfogle gold is out there somewhere, waiting to be found.

So goes the legend of the Lost Breyfogle. Or, does it? Read any other account of the Lost Breyfogle and you will read at least a slightly different version. There are authors who say it was not Charles who lost the gold, but his brother, Jacob. It is said he was traveling south from Geneva, north from Los Angeles, or even west from Las Vegas. Was he with Southerners, with friends, or alone? How many Indian attacks were there, if any? From where, to where, was Breyfogle traveling when he found his fabulous gold? And on, and on go the questions about the Lost Breyfogle.

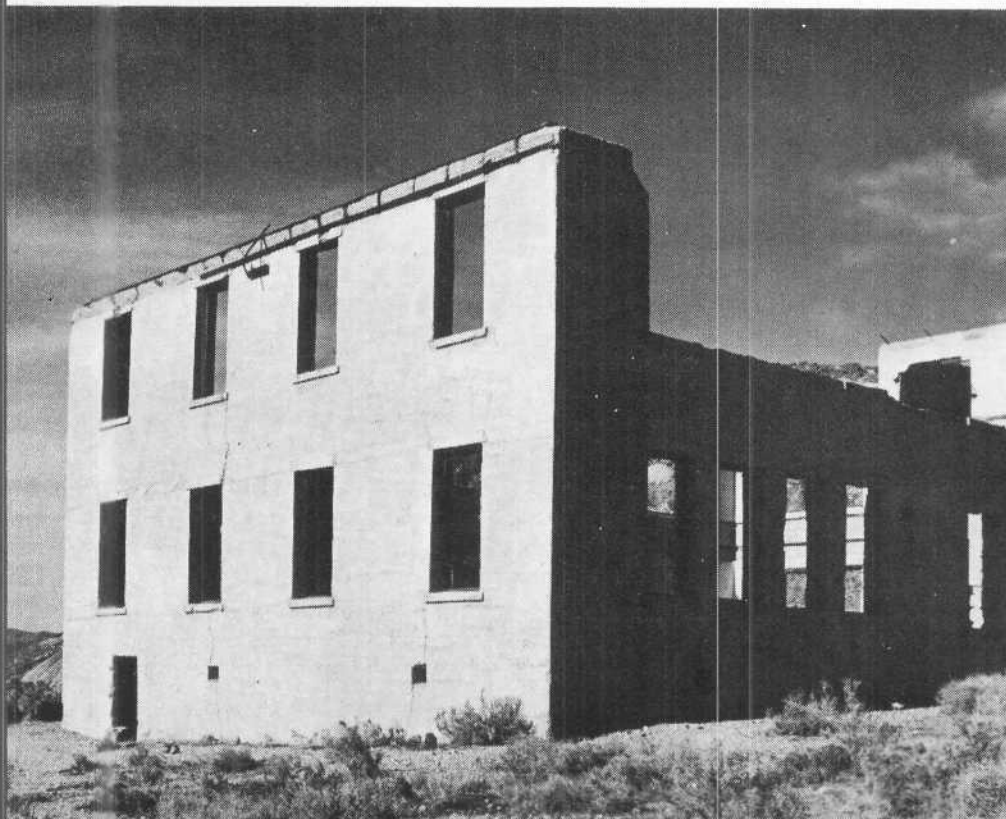
Of all the questions surrounding the Lost Breyfogle, though, one must stand out above the others. Has the gold been found?

Although most lost mine enthusiasts say that the Breyfogle has not been found (and what lost mine enthusiast would give up the Lost Breyfogle?) there are those who say it has. Various people have claimed that such Death Valley mines as the Keane Wonder or Chloride Cliff are really the Breyfogle. There have been claims made that the Johnnie strike, to the north, were really discoveries of the same gold found before by a man named Breyfogle.

And, there are those who say that in August of 1904, Frank (Shorty) Harris and Ed Cross found the Breyfogle in the hills, beyond Daylight Pass, at the northern end of the Amargosa Desert. In that month, and on that spot right in the middle of Breyfogle country, they made the gold discovery they called the Bullfrog, the strike that was to create a city on the edge of Death Valley, the city of Rhyolite.

In July of 1904, Shorty Harris celebrated his 47th birthday at the Keane Wonder Mine in the Funeral Mountains of Death Valley. More than 30 of his years had been spent as a full or part-time

A two-story concrete school building was completed in January of 1909 at a cost of \$20,000. Although designed for 400 students, it never housed more than 80.



prospector. Yet, he had had little success. He always seemed to reach the gold country a little too late. The story was the same when he reached the Keane Wonder that summer. The good claims were already gone.

He and his friend, Ed Cross, decided that they might as well return to Goldfield and do some prospecting along the way. With their pack animals, they made their way along the foothills of the Funeral, into the mountains through Boundary Canyon, past Daylight Spring and into the Amargosa Desert. According to Harris, the pair camped and he and Cross each went out prospecting. Harris found a quartz ledge and broke off a piece. He could not believe what he saw. The rock was heavily flecked with gold. He broke off more pieces of the quartz. Each was as full of gold as the first. Shorty Harris had made his strike!

Ed Cross later said that it was he who had made the initial discovery, but it does not matter. The two men put up a monument together and shared the claim. They did not even look around for a richer outcrop. One claim was enough! Quickly they loaded samples on their burros and moved on to Goldfield to have the ore assayed. They found out that the ore was worth more than \$600 per ton. It seemed that Bullfrog was to be a bonanza of major proportions.

Shorty Harris was not a quiet man. He enjoyed his liquid refreshment, and he enjoyed talking. It was not long until the word was out and the rush was on.

In 1904, Nevada had "Goldfield fever." Were those hills, now known as the Bullfrog Hills, to be the site of another Goldfield? Or even another Comstock? In the fall of 1904, the mining men (even the storekeepers and clerks) of Nevada did not wait to find out. It seemed as if half the people in the state were moving to the Amargosa. By the end of September, there were more than 100 campers on the desert between the original Bullfrog claim and the Beatty Ranch. Within six months, the population of the district was approaching 1,000.

The first to arrive were prospectors. More than 1,000 claim notices were scattered through the Bullfrog Hills. Names such as the Tramp Consolidated, the National Bank, the Senator Stewart and the Gibraltar became part of the mining legend of the northern Amargosa as claims



The Porter Brothers' Store was completed at a cost of nearly \$10,000 in 1906. The Porters brought their first load of merchandise from Randsburg in April of 1905.

became mines. Although the Original Bullfrog was probably the most famous mine in the area, the Montgomery-Shoshone was certainly the richest.

E. A. (Bob) Montgomery was one of the early prospectors on the scene in the Bullfrog Hills. He, and an Indian named Johnny, filed a number of claims. One of these, located on what is now called Montgomery Mountain, became the Montgomery-Shoshone. Bob Montgomery sold his interest to Pittsburgh steel tycoon, Charles M. Schwab, for a reported \$2,000,000. The mine, in turn, produced more than that amount for Schwab and the other stockholders.

Other mines, such as the Tramp Consolidated, on Bonanza Mountain did not produce much gold, but they were very profitable for their promoters. The Tramp was purchased for \$150,000. Then, stock in the mine was sold to the public for \$2,000,000. Little ore was taken from the Tramp. No dividend was ever paid. And the company quietly went out of business.

Neither Shorty Harris nor Ed Cross did nearly as well as Bob Montgomery did with his mine, nor as the stock promoters did with some of the other properties. Ed Cross sold his interest in the Original Bullfrog for a reported \$25,000.

Harris apparently had a few too many drinks one night and sold his interest for as little as \$500.

Mines brought miners to the district. Miners, in turn, brought families. Overnight, settlements sprang up on the desert. Some lasted just a few days, some much longer. Beatty is now a commercial center and is alive and well. Amargosa, Orion and Bonanza died quickly and went quietly into the history books. The demise of Bullfrog took a little longer. Another, in its day, grew to substantial stature only to suffer a painful death. Rhyolite was the boom town.

If hope for a bonanza brought people to the Bullfrog Hills, mine promotion sustained them. Rhyolite was a city which, in reality, was built on paper. The paper stock certificates of mine speculation. Yet, the people of Rhyolite believed the promoters and built a city to endure.

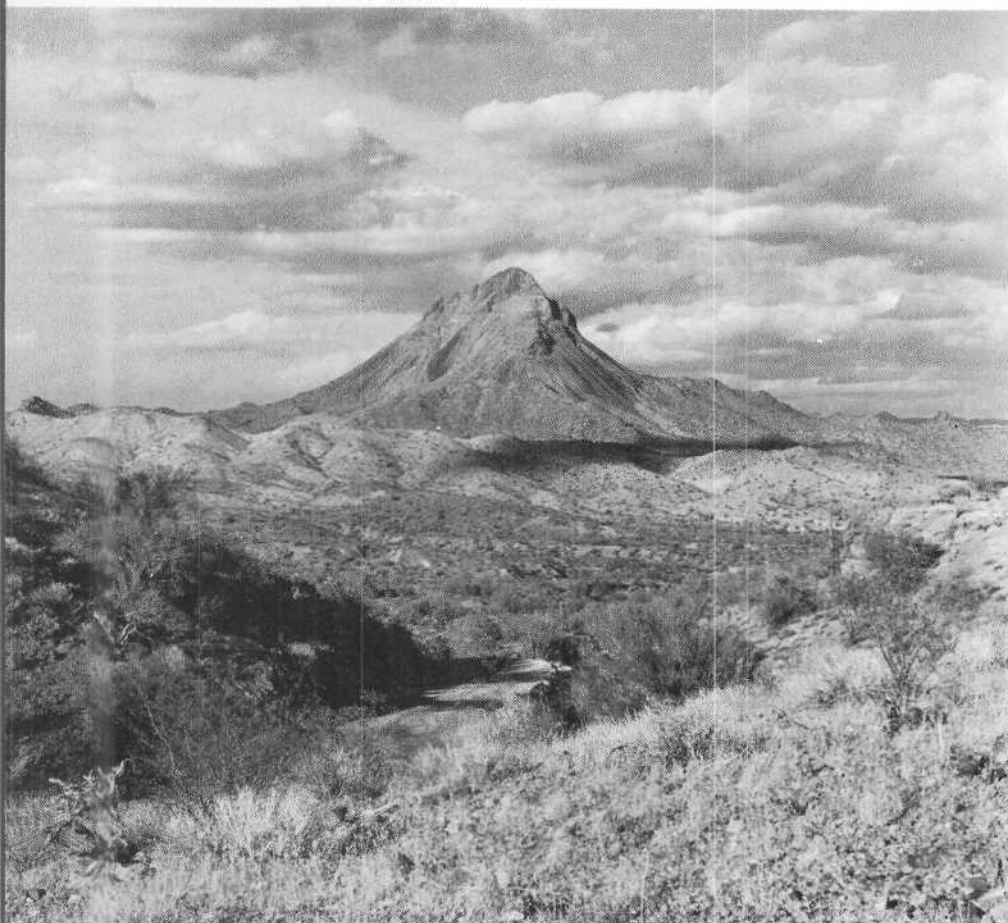
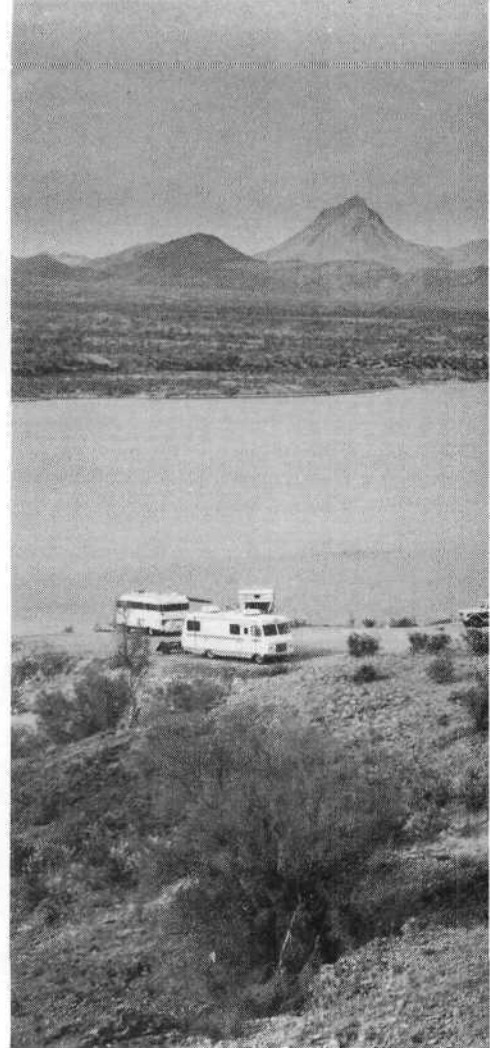
In January, 1905, the town was laid out along the slopes of the desert foothills, about half-way between the Original Bullfrog and the Montgomery-Shoshone. Business lots were then offered, free, to merchants in nearby settlements. Finally, lots were put up for sale.

Continued on Page 38

Head for the Alamo! (Arizona)

by MARY FRANCES STRONG

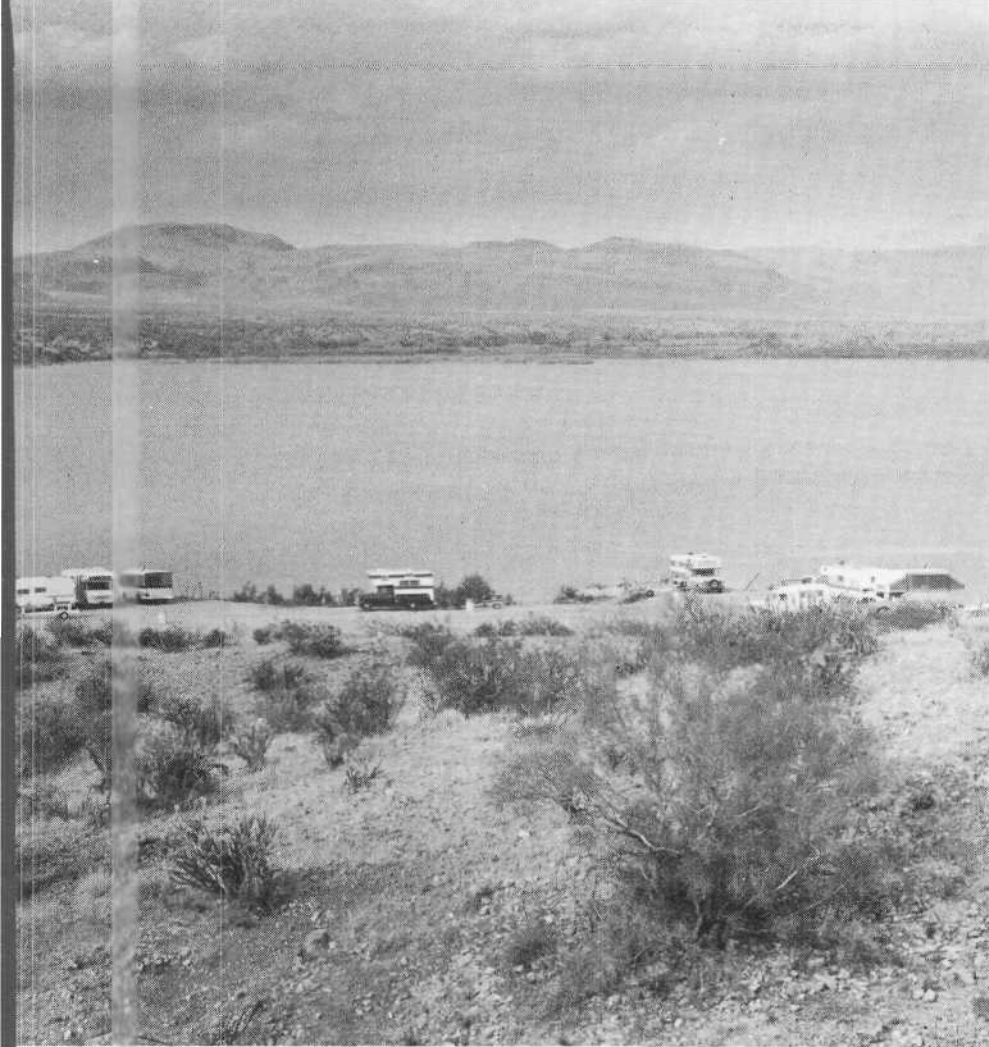
Photos by Jerry Strong



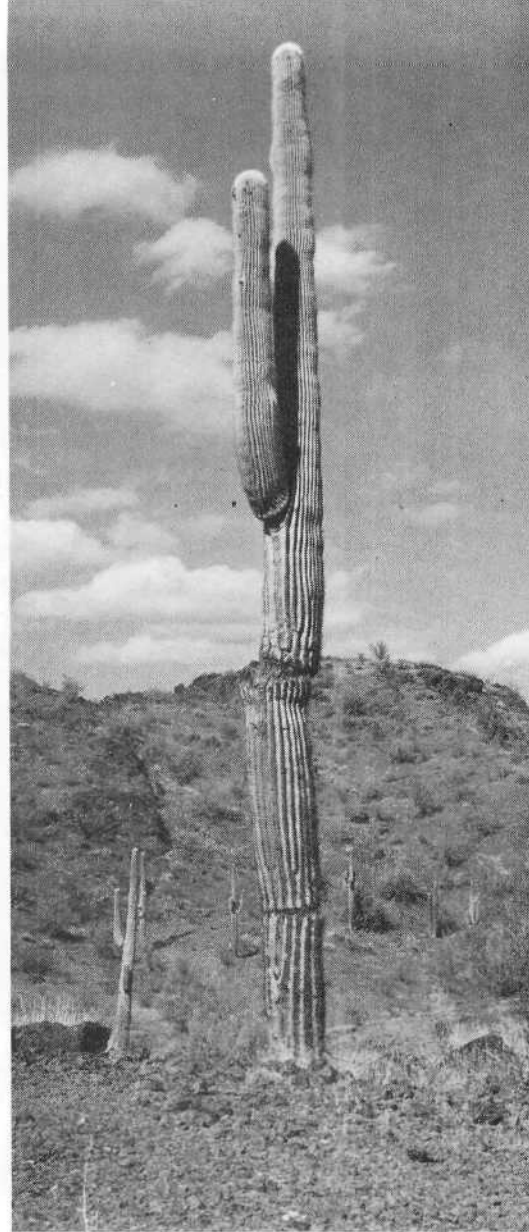
"**R**ENDEZVOUS AT ALAMO" was often the cry of early-day outlaws as they parted company to escape lawmen. Few of the latter would attempt to apprehend renegades once they entered the rugged Bill Williams Country in west-central Arizona. This vast, forbidding land was home to outlaws and prospectors for many years. A man's gun settled most disputes.

Its remoteness has protected the privacy of Bill Williams Country. In spite of mining activities since the 1870s and development of numerous cattle ranches, the region has remained little known. Six years ago, this all began to change. Today, more and more recreationists are saying, "Let's head for the Alamo—Arizona, that is!"

In the early days, Artillery Peak was the main landmark for refuge-seeking outlaws and prospectors searching for gold in the vast Bill Williams Country. From this summit, it is less than a mile north to a good jasp-agate and sagenite agate collecting area.



Above: Alamo Lake State Park offers several types of camping facilities including tent and picnic areas. Self-contained units may park along the lakeside. Full hook-ups and cement pads for trailers are provided on a terrace above the lake. Right: The Alamo Lake region offers the scenic beauty of a Sonoran Desert Zone. The saguaro assumes many interesting and diverse forms



Cutting across this section of Arizona from east to west, the Bill Williams River rushes to a junction with the Colorado River near Parker Dam. Fed by the Big Sandy and Santa Maria Rivers, plus numerous intermittent creeks, it is the main drainage channel through an extremely arid land. True to the tradition of desert rivers, it fluctuates with the season—a tiny stream during dry periods and a raging torrent following infrequent storms.

In 1968, the Army Corps of Engineers decided to dam the Big Williams River at Alamo in order to control heavy flood damage on the lower Colorado River. The result is an outstanding "water park" in the Arizona State Park System.

Alamo Lake State Park provides fine lakeside camping sites, plus full-hookup trailer pads in a nearly pristine desert setting. Behind the dam is a 500-acre lake where fishing, water sports and

swimming may be enjoyed. It also makes an excellent base camp from which to explore this remote and fascinating section of Arizona. Old mines, mill sites, ghost towns, 4WD trails, scenic drives and rock collecting make the Alamo Region an ideal winter vacation area for desert enthusiasts.

We arrived at Alamo Lake in mid-November. It had seemed almost sacrilegious to have followed a paved road along a route that had once been rough and sandy over most of its 35-mile length. After registering and selecting the luxury of full-hookups, we returned to Park Headquarters to study their several displays. Then, like most visitors, we drove up to the dam and enjoyed the view of the lake and surrounding country.

It had been a cloudy day, but as we sat down to dinner the clouds began lifting. Rays from the late-afternoon sun bathed

red-volcanic peaks in an almost ethereal, pinkish glow. Now quiet, the blue-green lake waters were polka-dotted with migrant visitors—ducks, geese, seagulls, coots, dowitchers and great blue herons. A variety of shorebirds were busily seeking food along the water's edge. Several boats were heading across the lake where stands of reed and cattail offered good fishing grounds.

Looking from our trailersite with a view, Artillery Peak seemed to ride high in the sky and blazed in the reflected light. It was easy to see why it had served as the main landmark for early travelers in this unmapped region. We hoped on the morrow it would serve us as well when we would try to locate a gem field, reportedly near its base.

Morning found us heading north. Broken cumulus clouds were spread across the sky and shafts of the sun's rays streaked through at every opportu-



Occasional pieces of petrified wood may be found as float scattered over this general area, two miles east of Alamo Road in Bill Williams Country.

ity. We jogged eastward, then once again turned north to ford the Bill Williams River at Brown's Crossing. Old Alamo Crossing is now under the lake. The wide river bed told of times less tranquil, but this day found a small stream of water floundering over sandy expanses on its way to the man-made lake.

Once across the river bed, our road quickly climbed into the hills. We stopped at an old mill site and looked over some manganese ore. During World War II, a great deal of this important element was mined in the Rawhide Mountains. Later, large quantities were stockpiled at Wenden for reserve use.

The road was gradually climbing as it led us through scenic back-country. Nearly five miles from the river we reached a summit affording a full view of Artillery Peak. Jerry was setting up his tripod on the opposite side of the road when he remarked, "Better look around over here. I see agate and jasper fragments on the ground. This might be the location we are looking for." I hastily shoved the cork back into the thermos. A

coffee break could wait. I scrambled up the hillside and found it covered with small pieces of beautiful jasp-agate in brilliant colors.

The specimens, however, were not large enough to cut, so we decided to travel a little farther north. "The collecting area is due west of Artillery Peak," we had been told. Less than a mile from the summit, agate rocks were spotted along the roadside. We parked in a convenient pull-out area and found ourselves in a gem field. A fire ring and castoff specimens told of earlier rockhound visitors.

This locale is reminiscent of many such deposits of jasp-agate on the Mojave Desert—plenty of material in float—some good color and quality—lots of junkite. Collecting has been minimal, and the major field of material seemed to be on the hillside west of the road. However, we did not explore all the potentials.

Walking up a small ravine, I picked up two nice chunks of sagenite agate. They were just dark rocks and I don't know why they caught my eye. Cutting reveal-

ed beautiful interiors of pastel blue and lavender agate with inclusions of white, beige and coral sagenite. The latter is dense and resembles material from the Owlhead Mountain deposit near Death Valley, California.

We had stopped and "browsed" so often along the way, the day had quickly passed. Plans to visit the ghost camps of Rawhide and Signal would have to wait a few days. Tomorrow, we would hunt for petrified wood.

Great billows of clouds roamed the skies over the Alamo Region all during our stay. We enjoyed watching their changing shape and the brief periods of sunshine they allowed. This was wild and wonderful country with wide and colorful skies.

Looking for wood, we took a trail leading east, just prior to Brown's Crossing. We drove along, stopping at each road fork to make a decision on which one to follow and to look over the float. Eventually, we ended up on a small hilltop overlooking the junction of the Big Sandy and Santa Maria Rivers with the Bill Williams. There were bits of agate and jasper scattered around and one chalcedony rose but, so far, no wood.

After lunch, we started back and stopped in a small valley where a side road headed northerly. Almost simultaneously, we each picked up a small, brown limb section. Scouting around disclosed many such specimens throughout the immediate area. I wouldn't say they were plentiful, but we could have easily filled our rocksacks. Sizes varied from two to five inches in length. They are a little difficult to see, as they blend well with the country rock.

The exteriors were of two types—deep iron-brown and very light tan, almost beige. While not too exciting on the surface, cutting disclosed the dark brown specimens showed good grain pattern in shades of brown, red and pink. The lighter specimens showed beautiful wood grain (reminiscent of the "fig wood" of Last Chance Canyon on the Mojave Desert). Quality of the material was excellent—very fine-grained. This was a bit of a surprise, since the exterior gave the impression of only specimen material. "You can't be sure until you cut it" is a good rule to follow.

We no longer collect more than a half-dozen, high-graded specimens from a location. One or two for our limb-section

collection and, when it is good cutting material, a few specimens for this purpose. After many years of collecting—location and quality, not quantity—are the most important considerations.

Returning to the pickup, I was walking along the roadside and idly kicked at a protruding, rounded rock. I darn near broke my toe when it didn't budge. I tried to pry it out—no luck, it was evidently of fair size. Jerry came to my rescue and in a few minutes we had exposed a large limb section weighing about 65 pounds!

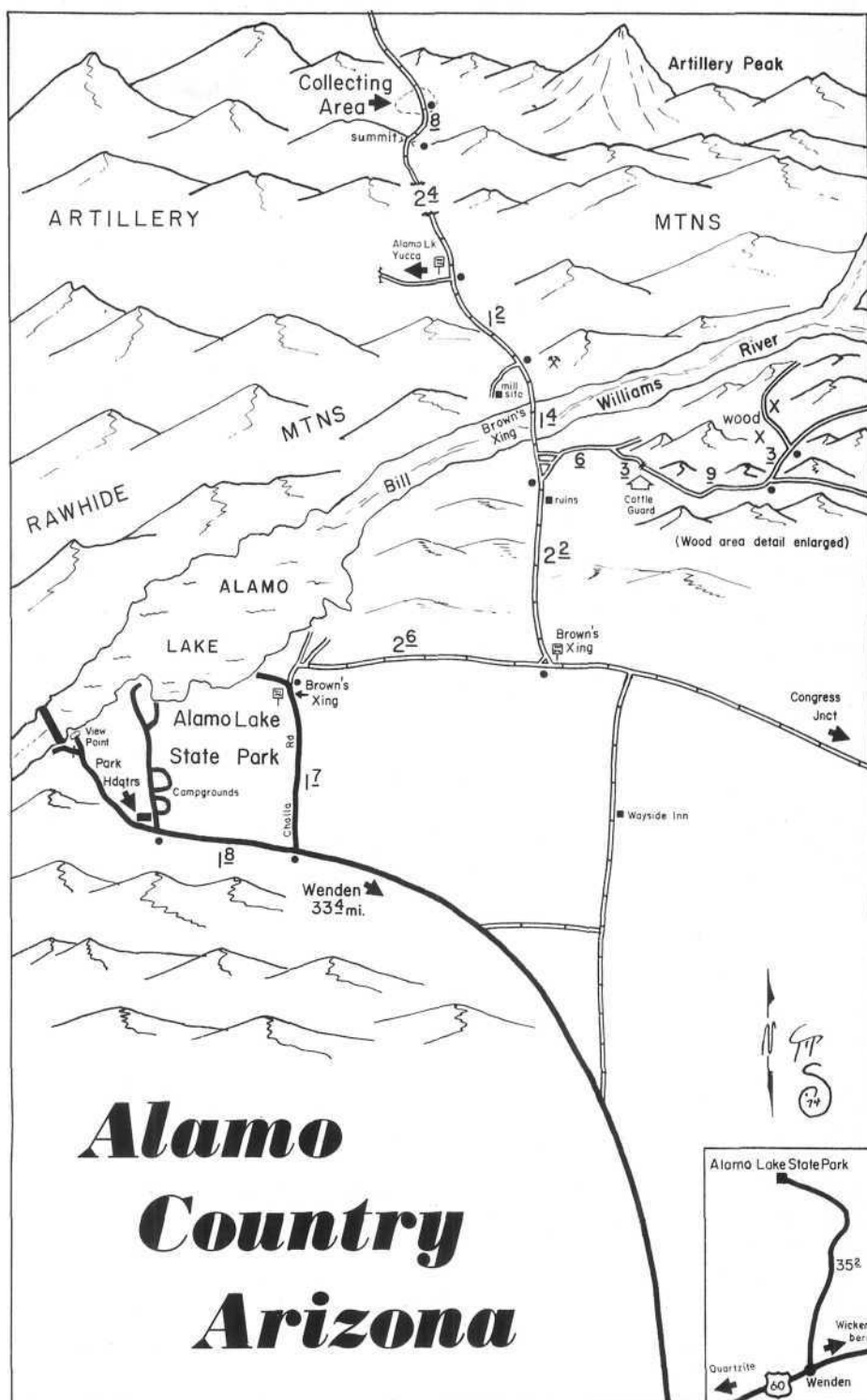
Rockhounds visiting this locale should find ample small specimens. Take only a few and leave some for other collectors to find. Keep in mind, there is a limit on the amount of petrified wood you are allowed to collect. No doubt further explorations will disclose other sizable specimens of petrified wood, as well as other gem fields in the Alamo area.

The intermittent use of what is now known as Bill Williams Country seems to have begun with the prehistoric Halchemas Indians. They planted crops in favorable sites along the river's flood plain. The Hualapais Indians, from the north, are also believed to have visited the region for the same purposes. Many potsherds and points of agate and chert, left by these early visitors, have been found. A few are on display at Alamo Park Headquarters.

The river was named after the famed "Mountain Man" William Shirley Williams. Originally from North Carolina, "Bill" Williams lived among the Indians for many years and accepted their customs and beliefs. Eventually, he drifted west where his expertise as a guide, hunter and trapper gained his fame. Bill is said to have also engaged in a little cattle rustling and scalp hunting. He met his demise at the hands of "Indian friends" in 1849.

The camp of Alamo served prospectors and miners following the discovery of gold and copper in 1868. It was the main river crossing along the old road from Wenden to Kingman until the late '50s when Highway 93 was completed.

Jim Rodger's Mill was built on a bluff above the little settlement and it processed ores from various properties for many years. Its last run was in 1941. A leisurely drive around the area will disclose the old sites and ruins of many early-day activities.



Today, Alamo provides the recreationist just about everything he will need for an outstanding desert vacation—water sports, fishing, rock collecting, bird watching, exploring old trails, hiking or just rest and relaxation in a Sonoran desert setting. October through May are the ideal months at Alamo. For those who do not mind heat, summer temperatures of 100-plus can always be countered by a pleasant swim in the lake.

This remote section of desert country is readily accessible, yet provides exciting recreation and exploration, plus the

quiet peacefulness of desert nights. Perhaps I had better amend the last statement. It is very quiet except for the raucous braying of wild burros who tour the campground all night. The sounds of nature are always pleasing to hear and we enjoyed being lulled to sleep by their off-key serenades.

The enjoyment of watching the antics of the wily little burros, who have made this region their home, was but one of the many reasons we were glad we had headed for the Alamo—Arizona, that is.

*Famous Scotty's Castle
is one of Death Valley's
great attractions.
Photo by Ed Cooper.*

Death Valley 1974

by CHUCK GEBHARDT

ALTHOUGH THE geological and natural phenomena of Death Valley are undetectably slow in their changing features, the man-made edifices and other inroads marking civilization's encroachment are rapidly varying.

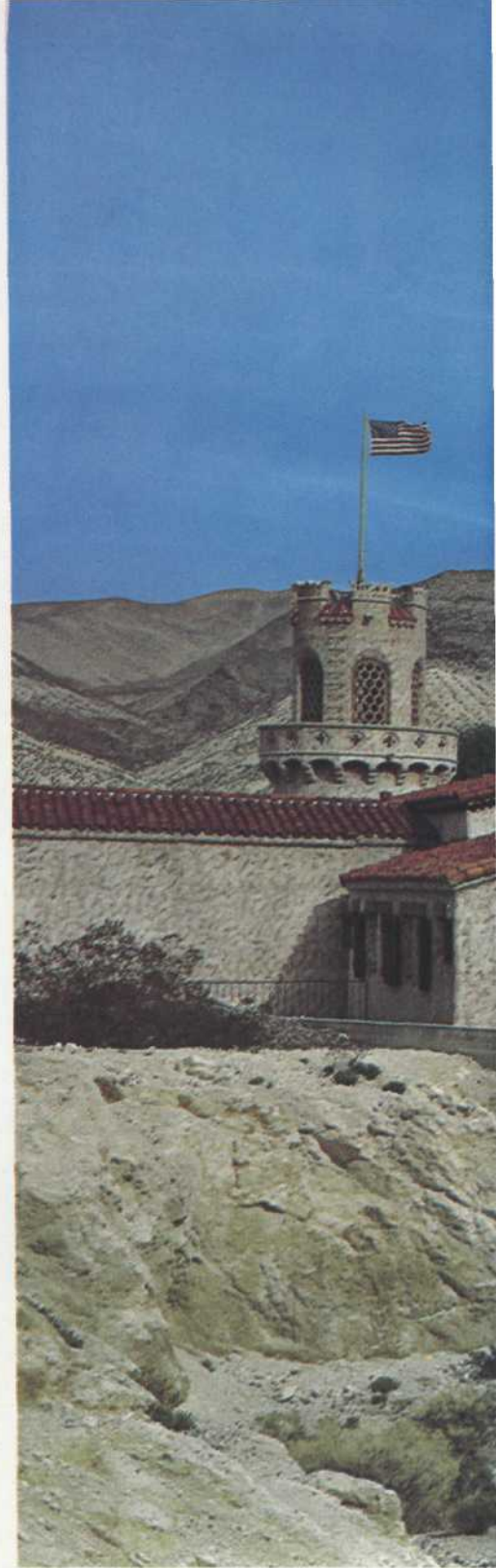
Amid budget cuts, manpower shortages and the energy crisis, the people that live and work in Death Valley have effected some changes to roads, buildings and services. In addition to these valid alterations, the visiting "pothunters" and "graffiti artists" have contributed their share to the modification of various historic and natural sites throughout the Valley.

Should you happen upon the time and gasoline to visit Death Valley, the very first noticeable change are the entrance signs at the Monument boundaries. The original signs were engraved, brass plaques set into native stone and now replaced by attractively engraved wood panels. The three-foot by eight-foot panels of green-grey with white lettering

rest upon a three-foot-high stone base. A mountain scenic, etched across the large panel, depicts the typical terrain encountered when entering the Monument from east or west. The signs on Greenwater Jeep Road, Big Pine Road and other four-wheel-drive entrances remain the same.

In the past year, the familiar emergency water tanks along the highway passes have put on a new coat. The striking international orange color has been changed to a dark green. Since these tanks are for emergency water and most often placed at the higher elevations where brushland is prominent, it is difficult to see the tanks with the almost-camouflage color.

Many visitors to the Valley might recall the corrugated roads that provided access to some of the more popular sights, and how that visitor in the passenger car wished his car was a Jeep. As of this year, you might just need a specially-sprung vehicle. The roads to Natural



Bridge, Desolation Canyon, Titus Canyon, Mosaic Canyon, Grotto Canyon and the West Side Road sport the new picture symbol signs. The signs depict a passenger car with a broad, red line through it and above is a picture of a Jeep. The broad, red line is the symbol representing "NO!" A good portion of these roads, at one time considered acceptable for passenger vehicles, have been reclassified as Jeep roads. This has



come about primarily because of budget and manpower reductions in the Park Service. Major road changes permit the Park Service to reduce or eliminate maintenance and patrols in these areas.

Despite the Jeep road designation, the 1974 Easter season saw a large number of passenger cars of all types successfully travel through Titus Canyon and the West Side Road. If you should entertain the idea of driving a passenger car along

these reclassified roads, it is strongly recommended that the Park Service be contacted for road conditions. As an example, the Natural Bridge road was once slightly corrugated, but now is extremely bumpy and severely ridged. Exaggerated corrugations along West Side Road from the Trail Canyon turnoff to Cinder Hill make it a risky trip for all but 4WD. The high crown of the road to Titus Canyon along the 12 miles of the Amar-

gosa Desert has not greatly improved, so you should notify someone of any intended trip along back-country roads.

There have been two changes at Scotty's Castle of minor consequence to the visitor. The Park Service now conducts the Castle tours for the same price and scheduled times as previous. What is different about the Service-conducted tours is the length of tour time and descriptive talk along the way. During a



A canyon [or wash!] in the beautiful foothills of the Black Mountains.

particular heavy visitor load at Easter Week '74, the average tour consumed 57 minutes. Prior to the Service-conducted tours, the average time was about 36 minutes.

Some of you might remember the personable young people a few years ago conducting the tours with dispatch and a descriptive talk almost in a monotone. The Service personnel talk with gusto and excitement, and make it seem as though the events of the past were happening at that moment. Their information is updated and relatively accurate.

On another note, the concessions at the Castle are now being operated by TWA Services. What once was the curio shop/snack bar is now a much larger curio shop handling Navajo rugs, Indian jewelry, books film and assorted gifts. The snack bar is located around the corner and above the curio shop. The Union 76 gas station is in operation for gas only, with no other automotive services available.

Depending on how long you have been away from the Valley, large changes have taken place in the campground areas. Texas Springs, Furnace Creek and Sunset Campgrounds are enlarged considerably. The exposed, open area of

Sunset Campground, primarily developed for trailers, motor homes and pickup campers, now has a capacity for about 1,000 vehicles. In fact, the 49er Encampment of 1973 saw 1,120 vehicles crammed into this rocky plain with others looking for space. A new road has been cut through the Furnace Creek Campground just north of the Visitor Center to reduce congestion of traffic in front of the museum. Texas Springs Campground has the upper level fully completed and both levels can now accommodate over 100 camping groups. Shade is still at a premium at all campsites. Stovepipe Wells Village Campground is a little larger, reportably holding up to 500 vehicles. Mesquite Springs Campground, about three miles south of Mesquite Junction, is expanded to almost 100 sites and extends up to the edge of Death Valley Wash. Campground fees are \$1.00 at Texas Springs, Furnace Creek, Sunset and Stovepipe Wells. Mesquite Springs Campground at the north end of the Valley has a \$2.00 camp fee.

Several campgrounds of considerable popularity have been closed to the public for years, and a few recently restricted for use. Completely closed are Midway

Well, Bennett's Well, Saratoga Springs and Sand Dunes Campgrounds. Most of all these areas were overused and closure was just a matter of time. Perhaps the saddest of all was the Midway Well shutdown, a 10-site campground on the northeast edge of Mesquite Flat and five miles south of Titus Canyon exit road. Low sandhills scattered about were decorated by spreading mesquite trees which shaded visitors from the gathering heat of the spring sun. The old-fashioned hand pump setting atop its cement platform served as a miniature community center as campers chatted while they pumped water for one another for supper cleanup.

In the spring of 1971, Midway Well had upwards of 200 campers fanned out well beyond the 10-site campground causing considerable environmental damage to the local sensitive terrain. The Park Service, unable to remove the excess campers, bladed over the entry road at the close of the season and removed all signs relating to the campground. One can still see the black well casing left behind and a few dilapidated picnic benches—but if you are not very familiar with its former location, Midway Well Campground is nonexistent.

Saratoga Springs Campground suffered a similar fate in addition to problems arising within, and because of its peculiar natural setting. This delicate area is the home of one of four species of the endemic pupfish, a migratory bird stop and the only place in the Valley with enough surface water to qualify as a lake. The air here is usually cooler due to the higher humidity, and the colorful Ibex Mountains make an attractive background to draw visitors.

Since campsites were not rigidly established, campers were free to park themselves and equipment where they chose. Some of the choices made by the campers were, unfortunately, in delicately-balanced natural terrain near the ponds or pupfish habitats. The surrounding hills were becoming scarred by many trails of man and machine. Soon, the campground area began to spread out of proportion to its intended capacity. Closing of the campground was inevitable.

The Tamarisk, or athel, trees in and around Saratoga Springs were introduced and cultivated by man and not natural to the area. Close observation of these athel trees reveals an unseemingly

massive leaf surface which transpires water at an alarming rate. The number of trees, coupled with their transpiration rate, have resulted in more water being lost than can be supplied by numerous springs and underground water systems. Consequently, the Park Service must remove all or part of the trees to conserve the natural water supply so depended upon by the pupfish and migratory birds. Saratoga Springs is now a restricted day use area and may be reached along a mild 4WD road six miles north of the Harry Wade exit from Highway 127.

Since the Spring '73 season, Furnace Creek Ranch has undergone a major facelifting. At the front driveway into the Ranch, the inconspicuous shack has been replaced by a conspicuous redwood building housing administration and reservation offices. On your left, as you enter the main gateway, the old Ranch had an auditorium, store, lobby, cafeteria and the Corkscrew Lounge. Now coming in the main entrance on your left is a small gazebo-style ice cream stand on the patio. Walking on through and looking left you will see the new store, restaurant, cafe, the old cafeteria and the Corkscrew Lounge now closed to the public. The restaurant has table and counter service, and also doubles as a coffee shop until 8:30 P.M. Past the restaurant and on the site of the old lobby is the cafe, complete with bar, tables and soft lights. Following the cafe is the cafeteria doing a landslide business, as usual. Even with the new restaurant, the breakfast and supper lines at the cafeteria in season have diminished only slightly.

Other changes that have taken place in and around the Valley are more subtle; none were solicited, paid for, or wanted. Check the salt pool at Badwater; see all those large rocks? Parents looked on while their three children hauled the rocks to the pool and gleefully threw them. When approached with this affront to a natural landmark, the father remarked, "What did it hurt?" How about the Dayton-Harris gravesite where there was a stone on either side of the monument, each stone with their name painted in white. Now there is only the Dayton stone—someone made off with Harris'. Remember the beautiful bronze plaque bolted to the cement table at Dante's View? It was whisked away a



One of the many branch canyons of the Black Mountain area which show evidence of flow path of some rushing stream of water.

couple of years ago. The Val Nolan headstone that you now see is the fourth since the original. The Park Service has replaced the last three that were stolen. Did you ever notice that all of the headstones were missing from the Skidoo graveyard? And what do you suppose the two men did with that three-foot salt pinnacle they had broken off at Devil's

Golfcourse and loaded into their pickup?

Well, people will be people and there are not enough rangers to go around. The bulk and complexity of the Valley works to dampen the punitive efforts of that man called Americanus boobus. Death Valley and its geological, historical and natural phenomena will remain unchanged—despite man. □



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Photos depict the group at various points along the route.

WE WALKED A

by GEORGE LEETCH

Synopsis: Last month the author told of the origination of the idea to follow an old mission trail in a remote portion of Baja California, including the preparations and aerial reconnaissance prior to making the hike. This month finds our six hardy backpackers ready for the challenge.

THE AIR flight had passed quickly and within four short hours after leaving the Borrego Desert we were circling over Loreto, the first capital of Baja California. The revving motor had announced our arrival to our friend Paula Davis for we could see her waving to us out in front of her Casa Casí.

She had prepared an exotic lunch of sea turtle steak, fresh clams and succulent papayas, and as we ate we talked

about our backpack adventure which was soon to begin.

That afternoon we would drive in Paula's truck to Ensenada Blanca, a bay 20 miles south of Loreto near the Liguí mission trail. Provision had been made at this point for two fishermen to meet us with their boat. The sea voyage part of our journey would take us down the gulf coast to Agua Verde. At that remote village we would shoulder our packs and commence the return trip along the ancient Liguí mission trail. If our estimates proved correct, we should arrive at Ensenada Blanca and Paula's pickup truck sometime on the third day out of Agua Verde.

We camped that night on the clean, sandy shore. Juan and Manuel Vialejo, the two fishermen who would carry us south, motored in with their boat later in the evening. The two brothers were agreeable, capable young men and it was a pleasure to have their company. They elected to spend the night aboard their boat anchored a few hundred feet out in the bay where the moon reflected

on the smooth surface of the water and the silence was broken occasionally by the splash of leaping fish.

We were up in the morning before the sun and fumbled through a hurried breakfast in the darkness. Our gear was packed and sleeping bags rolled, but dawn revealed our boat was still bobbing at anchor with no signs of our boatmen. We shouted and flashed our lights until Juan and Manuel paddled ashore. While we impatiently stowed the equipment they explained that it was much safer and easier to travel after daylight. The morning was made for such a trip as ours and I wouldn't have traded places with anyone in the world as we crossed the bay and headed down the coast.

The boat was a sturdy craft, 18 feet in length and broad of beam. At first, we were apprehensive that it wasn't big enough to safely carry eight of us along with the cargo of packs, food and water. Manuel assured us, however, that the boat was built for heavy loads and they often hauled over a ton of fish. The 40-horse-power motor seemed to push it



MISSION TRAIL PART II

easily through the water so we all sat back to relax and enjoy the scenery.

The towering cliffs were painted ochre by the early morning sun and their fortress-like appearance was broken occasionally by halfmoon bays, sandy beaches and rocky promontories. Once we passed a flotilla of a dozen or so large manta rays, their bodies indistinct and shadowy under the glassy surface of the water. As our boat approached, they flapped off like giant, aquatic bats. Several times we sighted the sickle-shaped fins of cruising sharks and frequently we could see churning white patches of water in the distance where fish sought to escape larger predators.

Always we watched for glimpses of the foot trail which we would soon be walking. From our previous reconnaissance flight, we had learned that there would be at least two steep climbs through the mountains and we studied these areas with special interest.

Three times we stopped along the coast to deposit plastic bottles of fresh water for our return hike. It was decided

that each person would need about one gallon of water per day for cooking and drinking so the caches were placed one day's journey apart. This would relieve us of the extra weight and assure us ample water each evening when we stopped for camp.

The green palm trees of Agua Verde were sighted shortly before noon and we beached the boat. On the other side of the palms we could see a few thatched houses, but there were no signs of life. Because of the lateness of the day we decided to take the boat back up the coast for two miles so that we could start the hike a little closer to the first water cache.

The last of our gear was finally unloaded and we must have appeared like stranded Robinson Crusoes as we stood on the beach and watched Juan and Manuel sail off in the direction of Loreto. I felt a keen sense of excitement sweep over me as we adjusted our packs and strapped on the water canteens. We were here! It was like stepping into Baja's past. The anticipation of hiking

for the next three days through this remote region, entirely dependent upon our own resources, was a good feeling and we were eager to get started.

The Ligui trail was just over a hundred feet in from the beach and, walking Indian file, we soon fell into an easy pace. The old footpath was unmarked save for the hoofprints of wild burros, but it was not difficult to follow. When there was some doubt because of divergent animal tracks, we simply chose the most accessible route which was headed in the right direction. On the left was the towering Sierra de la Giganta range. To our right was the shoreline of the Gulf of California. Rarely did the trail follow a straight line. Instead, as most trails do, it took the line of least resistance, skirting small bays and dipping in and out of rocky ravines and canyons.

It was in the afternoon of our first day of walking that we saw the only human footprints throughout the hike. Where they came from or where they went was a puzzle. They simply appeared and then, after we had followed them for sev-



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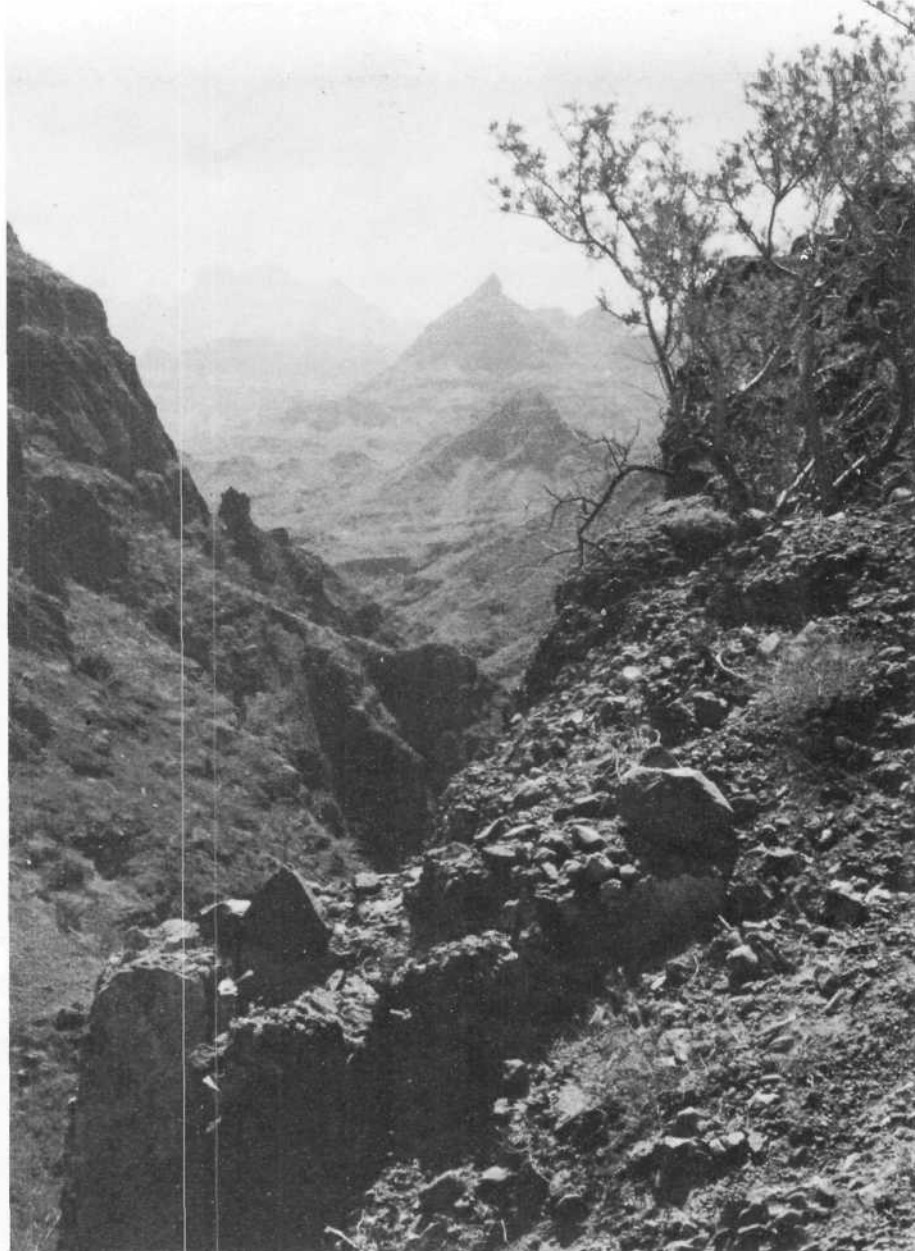
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Looking back down the trail.

eral hundred feet, the prints vanished.

The days passed with mercurial swift-
ness. Each turn in the trail brought a
changing vista. We gazed over glisten-
ing bays where sea birds dived and the
clear depths revealed rainbow-colored

fish. We stared up at mountains with
sheer sides which plunged down into
deep canyons. Always the trail pulled us
on. What thoughts, we wondered, did
the mission padres have as they trod this
very path over 200 years ago? Did they
enjoy the beauty and splendor of the
country, or was it only a further chal-
lenge to their life of dedication?

Our first camp was under a grove of
date palms which well could have been
planted by the early builders of the trail.
Nearby were the rustic ruins of a house
and corral constructed from the limbs of
the palo blanco tree and ribs of giant car-
don cactus. A small herd of wild burros
snorted and stampeded off as we ap-
proached. This was where we had stored
one of the water caches and we all drank
deeply now that the first day's march
was behind us.

Our meals consisted of easy to pre-

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San Juan Capistrano, California

pare, freeze-dried food, dried fruit, nuts and hard candy. Instant oatmeal and powdered milk was a favorite for breakfast and lunch was usually cheese, crackers and hard salami. Thanks to the resourcefulness and imagination of the girls, we dined well and, at times, even sumptuously. Indeed, when I weighed myself at the end of the trip, my treacherous bathroom scales insisted that I had gained five pounds.

Jean and Aletha both cooked with tiny, single-burner propane stoves. Thad and Paula preferred the more primitive but equally efficient open fire to fix their Tea Kettle dinners. There was an abundance of wood and a blazing bonfire was *de rigueur* each evening. It was then that we relived the events of the day's hike and sipped on medicinal cocktails which the good Doctor Jones had thoughtfully brought along.

Twice on the trip the trail veered inland from the coast and twisted up through steep, mountain passes. On these narrow, rocky ascents, the packs seemed to double their weight as we inched our way upward. For the most part, however, the trail was not difficult and we managed a comfortable seven or eight miles a day with lots of halts to inspect things of particular interest. Camps were made in mid-afternoon and after shedding our packs, the first thing on the agenda was a plunge into the refreshing gulf water.

Once we came upon shambled stone walls and a nearby Indian well where a dirt ramp led down to scummy green water. Pieces of clay pottery and several morteros gave evidence that this was at one time the habitat of early man.

On the last day of the hike we were up before dawn. As we huddled around the campfire drinking coffee, the sound of an outboard motor came from the dark waters of the gulf. A fishing launch appeared and three Mexicans stepped ashore to join us. We were pleased to learn that they had mistaken us for a group of Mexican fishermen. Paula, with her fluent Spanish, soon enlightened them as to our identity and reason for being here. I wasn't sure, but I thought I heard one of the men mutter something which sounded like "loco gringos."

That morning we made our final assault on the trail. As we gained the last ridge, we could see the bay of Ensenada Blanca down below us and on the far



shore was Paula's truck. Two more hours took us to the trail's end and our trek was over.

As we flew up the gulf and headed home to the Borrego Desert, I mused about the contrasts which we had experienced. In a few short hours we would be enjoying the pleasures of a hot shower and a soft bed. At the same time, I felt a wistful regret to be leaving that remote and beautiful region where we had walked through Baja California's historic past. □

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*The lower end of
the tramway at
the Keane Wonder Mine.
Photo by Howard Neal.*

Photo by Ed Neal.

Mining Gold in Death Valley

by HAROLD O. WEIGHT

THE OLD Keane Wonder mine roosts on a canyon pitch on the Death Valley slope of the Funeral Mountains, nearly 3000 feet above sea level. Because of water and transportation problems, its mill was built near the valley edge, 1300 feet below. An ore-bucket tramway connected the two, and on a late January day in 1911, John Keith, mine superintendent, climbed into an empty ore bucket for the mile-long ride up to the mine. That was his usual prac-





tice—but this time not the usual ride.

The tramway was one of the wonders of the Death Valley country. It was extolled to every visitor, and each was invited to try the ride. Many did—usually only once. If they rode up, they walked down, grateful for the rocky firmness of the trail beneath their feet.

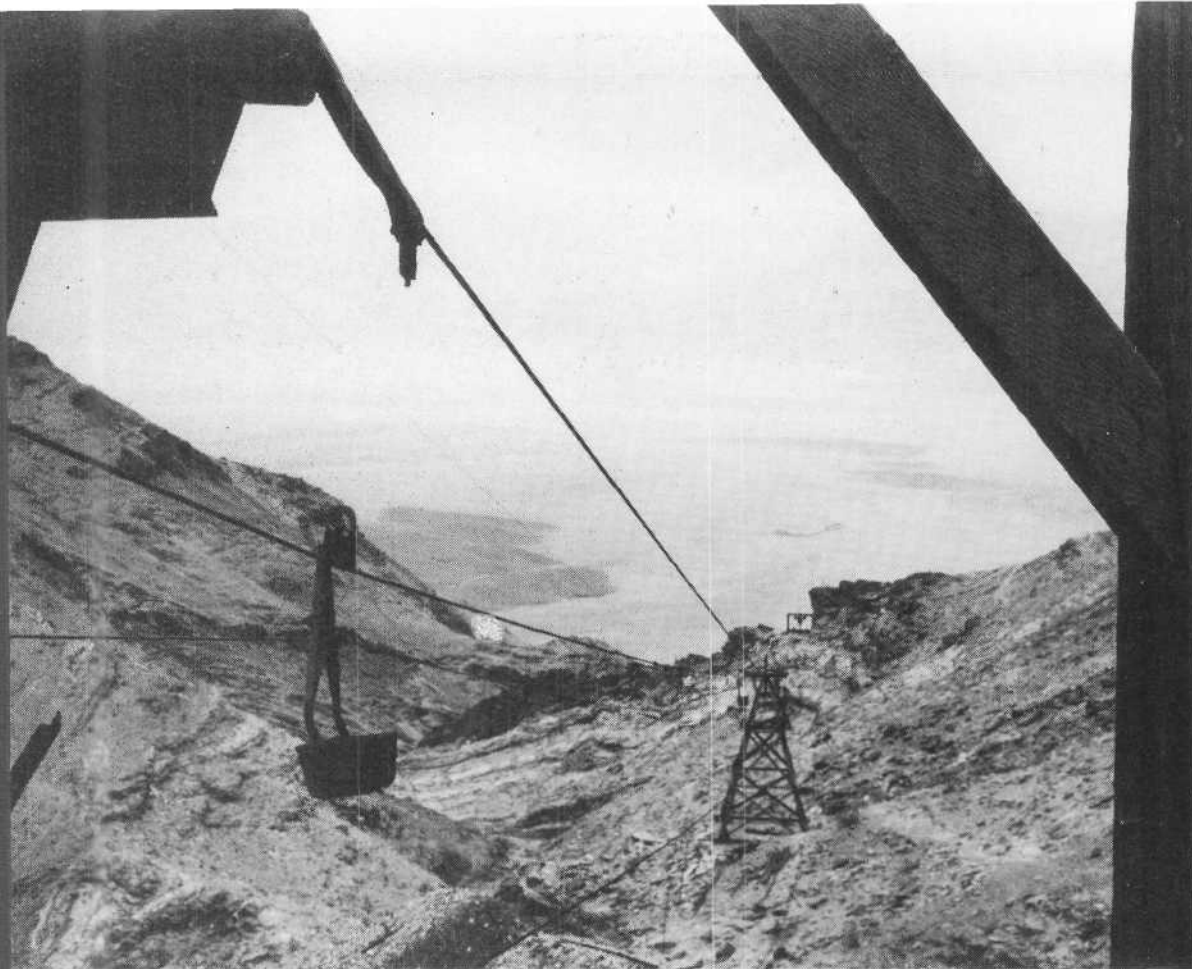
A reporter for the *Bullfrog-Beatty Miner*, in 1908, expressed it for them: "This tram is certainly no place for people with light heads or weak hearts. One of the spans is over 1200 feet long and crosses a canyon 500 feet deep. The passenger is seated on an iron bench which accommodates two people, with his feet dangling in a part of the yawning space between him and the rugged terra firma below, while he grasps with a death-like grip an iron bar at one side which seems to be the only thing between him and the fall that would mean the end of all trouble this side of the great divide."

Anyone who has slogged it up the steep and wearying Keane Wonder trail will understand the mine workers' preference for any sort of ride up. But most hikers who have looked out and down into the steep and jagged gashes over which rusting ore buckets still hang on their seemingly flimsy cable, probably also would conclude that regular use of that route would require a foolhardy or suicidal nature.

The tram ride was old hat to Superintendent Keith. It may even have been an appreciated lull in a very active day. This January morning, 63 years ago, any such feeling would have vanished abruptly as he crossed a breakover point, headed out on a long span—and saw a splice in the drive cable on the down side slowly pulling apart as it passed him.

Should the cable part, said the *Rhyolite Herald*, "every bucket on the two miles of cable would have dropped downward like a shot toward the mill, wrecking towers and cables, and causing the loss of many thousands of dollars. Further, Mr. Keith would doubtless have been killed.

"How long the cable would hold out before the crash came was food for thought. And Mr. Keith had plenty of time to think about it, for he had no opportunity of jumping off until the upper terminal was reached. He was suspended in mid-air, hundreds of feet above the precipitous canyons, slowly moving above the yawning chasms that might at



*Looking down
Keane Wonder tramway
from upper terminal.
Ore buckets,
left foreground,
carried as much as
600 pounds of ore
to the mill
at the base
of the mountains,
a mile away,
and often carried
passengers back up.
Photos from
Weight collection.*

any time claim him as a victim."

Watching helplessly, Keith was convinced he could see the drive cable sink as the splice slipped, but no crash came. At the upper terminal he leaped to the platform and raced to halt the tramway. Then, with a repair crew, he headed down the trail and located the failing splice. One half of it had given away completely. The other could have held only a few moments longer.

The superintendent remade the splice, checked the rest of the cable—and went back to riding the tramway. It was part of the job at the Keane Wonder. But he also made a vow that no other splice would ever be put into service without his inspection.

It is legend that the Keane Wonder's big rusty veins of iron-stained quartz were discovered while Jack Keane and Domingo Etcherran (the spelling varies) were hunting the Lost Breyfogle down below Chloride Cliff. Keane found some high grade spots there, and made the first location April 15, 1904. But on a broader sampling, the assay value ran only about \$50 a ton. That wasn't the kind of Breyfogle ore Keane had been hunting.

However, there would be a multitude of tons of \$50 ore in a vein 24 feet wide

and 400 long—and there were lots of veins. Keane, a good prospector and miner, was certain there was a mine to be made at the Keane Wonder. Trouble was it would cost a mint to bring it into profitable production. He and his partner did not have that kind of money.

His solution was to develop the veins sufficiently to show their value, while trying to interest a big company or wealthy operator. And within something over a year, without a cent of outside capital, Keane and Etcherran opened a thousand feet on the Keane Wonder claim and 600 feet on the adjoining Sunrise. They shortened the road to Rhyolite by four miles. They had on the dump, awaiting shipment, 400 sacks of sorted ore which, they said, assays showed would average \$900 a ton when hauled to Las Vegas, shipped to Salt Lake, and processed. That figure may have been a little high, but 15 tons they shipped from the Whipsaw claim, on the same contract, did net \$28,000, which furnished most of the development money for the Keane Wonder.

The Keane Wonder, with 20 claims (later increased to 26) was incorporated in 1906, under Arizona law, with Keane as president, Etcherran secretary, and John S. Cook—prominent Goldfield and

Rhyolite banker—treasurer. It was capitalized for \$1,500,000, with shares at a dollar par. The same year it was extensively examined and sampled by Homer Wilson, then bought by him and his associates.

Wilson, who had worked mainly in the Mother Lode country, knew mining and knew what he was getting into at the Keane Wonder. Everything that would be needed there, or used or produced, would have to be transported into or through an empty, deadly desert. Worse, the Keane Wonder was 26 miles by poor wagon road from Rhyolite, the nearest possible source of supplies—and Rhyolite did not yet have a railroad. Machinery, lumber, food—every necessity—would have to be hauled by team from as far as Las Vegas, 125 miles southeasterly of Rhyolite.

At the mine itself, water sufficient for a mill—the first mill in Death Valley—would have to be developed. Most difficult of all, a relatively low-grade ore would have to be brought down from its eyrie in the steep, almost trackless Funerals, and processed at a cost that would return a profit.

Road building up into those sheer-walled, twisting canyons would have been fantastically expensive, and the

heavy ore-freighting afterwards would remain costly. Building the mill right where the ore was mined would have solved some problems, but have created others almost impossible of solution—especially that of obtaining the volume of water the mill would demand.

A tramway seemed the only acceptable answer, and the Keane Wonder tramway was constructed in 1907. Building a tram in that terrain in a Death Valley summer—with temperatures averaging 118 degrees in the shade at noon and rising to 122 degrees in the sunblasted afternoons—was and remains something of an epic.

When completed, there were 85,000 feet of lumber and 50 tons of wire rope and terminal material in the tramway. All this and machinery and lumber for the mine had to be hauled up the mountain. So the trail between mill and mine was regraded and widened to five feet, requiring a lot more blasting powder and costing \$5000. Then wooden sleds were built and horse teams dragged two carloads of lumber and one of machinery up

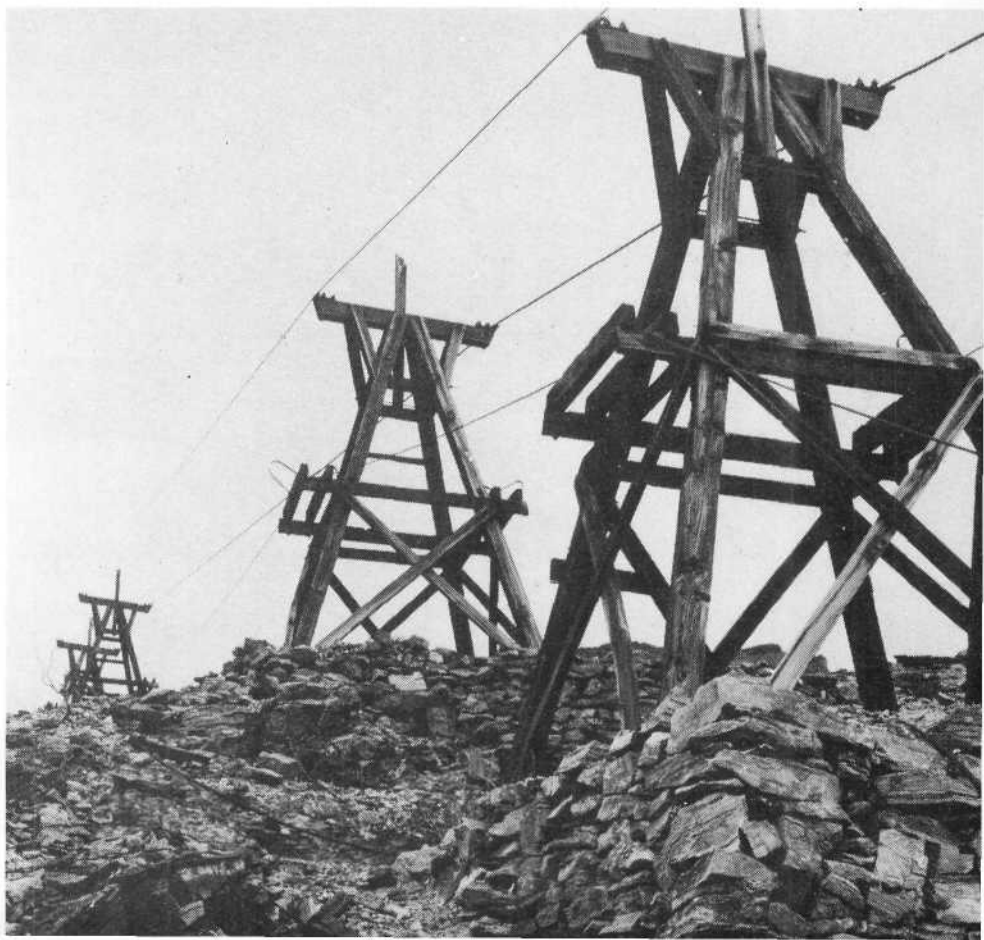
Tramway towers ranged in height from 30 to 18 feet. There were four long spans—the longest 1280 feet—passing from 300 to 500 feet above canyon bottoms. The buckets, carrying 600 pounds of ore each, were loaded automatically at the upper terminal and dumped automatically at the mill into a 200-ton bin. The endless tram generated its own operating power—through the weight of the loaded buckets going down—and also operated a Blake ore crusher at the upper terminal, which broke up the rock before it was loaded into the buckets. Additionally, a 13-horsepower engine at the upper terminal could operate both tram and crusher when necessary.

Grading for the Keane Wonder 20-stamp pioneer Death Valley mill was started in January 1907, and the mill was completed before the tramway. Steam equipment which could generate 126-horsepower lifted and dropped the mill's 1000-pound stamps a hundred times a minute. Water, always in short supply, was developed first through a hundred-foot shaft with several hundred feet of laterals, which was sunk about 300 feet from the mill. Used in the milling processes, it then carried the tailings to the tanks where about 75 percent was reclaimed and pumped back to be used

Continued on Page 46



Above: Upper terminal of the Keane Wonder tramway. Gold was mined, much by open cut quarrying, from light areas beyond structure. Below: Tramway towers located close together where the tram is brought over the rise just above the old mill.



DESERT

HOW OFTEN have you driven down the highway on a bright sunny day and suddenly noticed the roadway ahead of you appears to be submerged under water? Most of us have witnessed this phenomenon—what we have seen is a “mirage.”

Mirages can occur anywhere—but they are most often associated with the desert. Many a prospector, his throat parched and dry, has stumbled hopefully toward what appeared to be a cool lake, only to find he never reaches the shore. The lake he visioned remains a waste of sand—a mirage.

People have witnessed mirages since the beginning of time, but the explanation of their existence was not revealed until 1781. In this year, a man named Tobias Gruber made the discovery that

mirages were caused by the bending of light waves in the atmosphere.

There are two basic types of mirages, the inferior mirage, and the superior mirage. Combinations of these two types also appear, and they are capable of producing fantastic sights.

To understand how mirages occur, you must first become acquainted with two facts. First, light will travel through the normal density of air at the rate of 186,337 miles per second. Second, as light rays travel through a layer of air that is of normal density into a layer that is less dense, its speed is increased, and at the same time, it will bend forward. The bending of the light rays, as they contact different densities, is called a “refraction.”

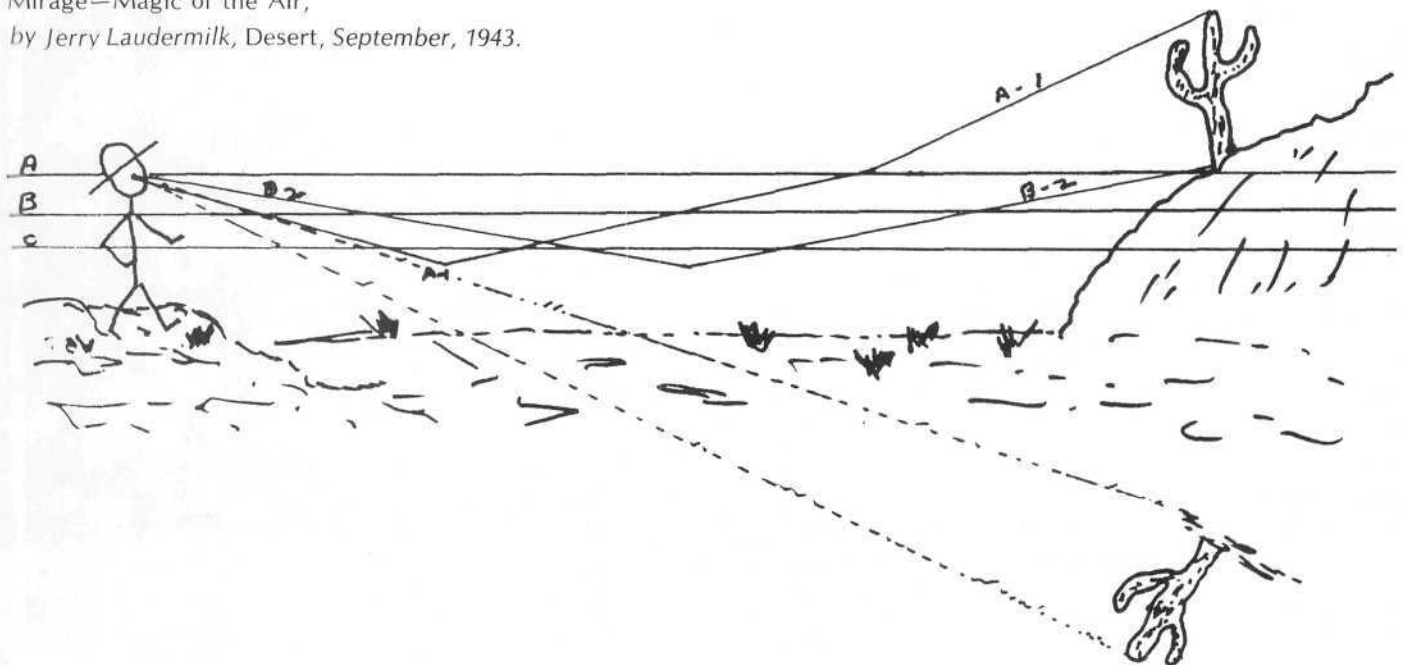
Of the different types of mirages, the

inferior mirage is the simplest. In this type of mirage, objects are reflected base to base—much the same as a mirror would reflect when placed at the base of an object—or reflection in water.

As light rays strike an object, they shoot out in all directions—some go straight, while others bend. The indirect or bent rays are called oblique rays. The straight rays are the horizontal. In observing an inferior mirage, we view an object by two sets of rays. We see the object in its true position with the horizontal rays. The oblique rays will bend as they come in contact with the heated layers. These oblique rays will travel forward and downward until they reach a point where they become totally reflected. The rays now begin an upward curve, similar to the original downward

INFERIOR MIRAGE: Man standing with eye level on, A, warm to hot layer of air. B and C are the cooler layers of air. A-1 and B-2 are oblique rays and travel downward into the warm refracting layers. When they reach total reflection, they bend upward and invert the object to a mirror image to the eye. Note: Distance from man to cactus would normally be a mile or more.

*Illustrations by author are adapted from article,
Mirage—Magic of the Air,
by Jerry Laudermilk, Desert, September, 1943.*



MIRAGE

by HELEN WALKER

curve, (see drawing).

When the oblique rays finally reach the level of the eyes of the observer, the reflected image will appear to be upside down. To have witnessed an inferior mirage, chances are you are located in a position with your eyes at about the level where warm to hot layers of air have dispersed into cooler layers of air.

The superior mirage is an inverted image, which appears above the object—top to top. A superior mirage is most likely to occur when the observer stands in a layer of cool air, and the air blends off into a warm to hot layer above his horizontal view. This situation places the oblique rays high above the horizontal sight of the viewer, and the total reflection layer is at the top.

There are now well defined layers of

air temperatures, as marked off in the drawings. As hot air rises, it becomes blended with other cooler layers and different densities.

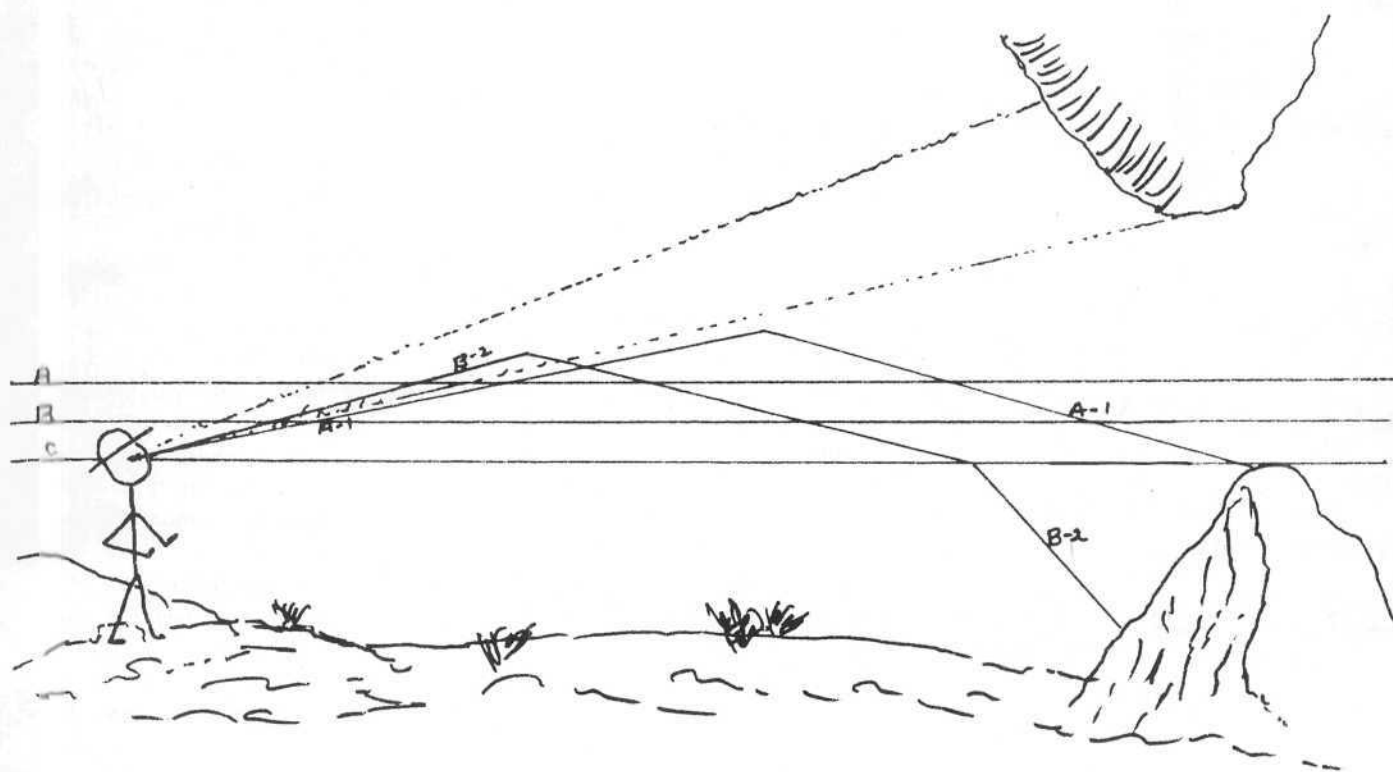
In an article in *Desert Magazine*, September, 1943, Jerry Laudermilk relates his excitement in viewing a mirage. Mr. Laudermilk tells of traveling on a road across California's Calico dry lake, directly west of Yermo. About half way across the lake bed, there appeared a beautiful lake with cottonwood trees, a water tank, houses, and a depot. All these objects were reflected in the form of an inferior mirage. The water on the reflected surface even seemed to ripple at times—a sight that would have deceived anyone not familiar with the area.

Always having had the desire to chase a mirage, he headed his car across the

dry lake bed, straight toward the lake. He never caught up with it—the lake always remained out of reach. Having finally reached the opposite shore of the dry lake bed, he stopped the car and looked beyond. The city of Yermo lay silently unaware of the spectacular mirage that had occurred to the east of its boundaries.

Mirages are a natural phenomena, and as such are capable of being photographed. This author never seems to get her camera and the sight of a mirage together at the same time. Nor have I been fortunate enough to witness a mirage such as Jerry Laudermilk did. However, now that you and I know what to look for, and how they occur—you bring your camera—in my excitement, I will probably forget mine! □

SUPERIOR MIRAGE: Man standing with eye level on C, cool layer of air. B and C are warmer layers of air. Rays bend as described in the inferior mirage illustration, but in the superior the reflection layer is at the top and the image is reversed. The man will see the butte image in the sky. Note: Distance from man to butte would normally be a mile or more.



Ghost City of the Amargosa

Continued from Page 19

By May, Rhyolite boasted a population of 1,500, and a full array of businesses.

During the next two years, the growth of Rhyolite was phenomenal. Not only did the population mushroom to nearly 8,000, but the canvas and wood structures along the main thoroughfare, Golden Street, were giving way to permanent buildings. The Porter brothers, who had arrived from Randsburg in April of 1905 with 18 wagonloads of merchandise, built a fancy store in 1906. Across Golden Street from the Porters, John T. Overbury raised a three-story stone office building. Less than a block north, the Cook Bank was building an imposing concrete structure, also three stories. And, as if to put frosting on the cake, the Las Vegas and Tonopah Railroad (one of three to serve Rhyolite) was starting construction of "the finest railroad station in the state."

Meanwhile, a man named Tom Kelly was building another kind of structure. In 1906, Kelly completed a house made from an estimated 50,000 bottles.

By 1907, there were two newspapers, two banks, water and electric systems, telephones, street lights and a stock exchange, as well as other businesses of every conceivable type. Rhyolite was the



The Bottle House was built in 1906 by Tom Kelly using some 50,000 bottles. The building was restored in 1925 for use in a motion picture and is now a curio shop.

largest city in southern Nevada, on its way to being the largest in the entire state.

On the 23rd of September, 1907, the voters of Rhyolite approved a \$20,000 bond issue to build a new, two-story school. The bonds were to be paid in full in 1927. The people of Rhyolite planned to stay. Yet, a little more than a year later, when the new school opened to 80 students, instead of an anticipated 400, but the fate of Rhyolite seemed to have been written by the desert wind.

By 1909, the Cook Bank building had been finished for nearly a year. Construction of the new railroad station had been completed, and a much-needed jail was in operation. But, the combined effect of the 1906 San Francisco earthquake and the national financial panic of 1907 had stopped the necessary influx of capital needed to keep the mines and the mine speculation going. The money was running out and, although the town was still alive, it was not well.

Within a year, the doom in store for

Rhyolite was understood by most of its citizens. By May of 1910, there were no street lights, the water company had closed, and the banks were gone. With the population down to below 1,000, the Porter Store had a final sale and closed its doors for good. In March of 1911, the last mine and mill shut down and the final death notice for the largest city in southern Nevada had been posted.

Some \$3,000,000 worth of gold had been extracted from the mines. Tens of millions had been extracted from speculators. But, when the ore pinched out, and the speculators' money quit coming it became quite obvious that the Bullfrog strike had not been another Comstock, nor even another Goldfield. It was rags, to riches, to rags, in few more than five years.

The population dropped to 14 by 1920, to one by 1922, and the town became a true ghost by 1924. The concrete and stone buildings remained, but, with few exceptions, the canvas, wood and adobe structures were either hauled away or re-

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verted to the desert dust.

Today, Rhyolite is "booming" again. The population is up to 11. And, a visit to the ghost city of the Amargosa is fascinating.

It is only a 45-minute automobile ride to Rhyolite from either Furnace Creek or Stovepipe Wells. For the visitor to Death Valley, the journey is well worth the time.

As you travel past Breyfogle Buttes, through Boundary Canyon and over Daylight Pass, you follow a route similar to that followed by Shorty Harris and Ed Cross in 1904. And, perhaps, similar to the one followed by Charles Breyfogle in 1864. Coming down into the Amargosa Desert onto Nevada Highway 58, you can see the bleached white ruins of Rhyolite in the distance against the hills to the northeast. Follow the signs, and turn north on the paved road about four miles beyond the national monument boundary marker, some two miles before you would reach Beatty.

To your left, you will see the dirt road to Bullfrog and, beyond, the Original Bullfrog mine. In the town of Bullfrog, itself, you can see the melting adobe walls of several old buildings, including the Bullfrog Jail.

Back on the Rhyolite road, and moving north toward Golden Street and the ruins of Rhyolite, you first pass the Rock Shop, on your left, and the old Bottle House, on your right. Each is worth a visit.

The Bottle House fell into ruin, along with the other buildings in Rhyolite, but it was restored for a movie by Paramount Pictures in 1925. When the motion picture was completed, the house was given to the Beatty Improvement Association, and it has been maintained as a museum and relic shop ever since. Today, it is operated by Evan W. Thompson III, his wife, Kathleen, and his grandfather, "Tommy" Thompson. The senior Thompson is a spry 88 and, with his grandson, came to Rhyolite in 1954.

As you leave the Bottle House and continue your drive up Golden Street, you next see the \$20,000 concrete school building on your left. On your right is the Porter Store, and several blocks down the hills behind it, the old Rhyolite Jail. Across Golden from Porter's is the Overbury block, which today is mostly rubble. One block beyond you see the most photographed ruin of Rhyolite, the Cook Bank. As you look at the facade, you



The Las Vegas & Tonapah Railroad Station was, in 1908, hailed as the finest in Nevada. The building now houses a museum, memento shop and coffee shop.

must think of the day that Rhyolite, with its three railroads, two banks and thousands of people thought of itself as a city of the future.

Reaching the end of Golden Street, you find the old L. V. & T. station which has been operated as a museum, curio shop and coffee shop for more than 20 years by Mrs. Fredrica Heisler. The building was restored by Mrs. Heisler's brother, N. C. Westmoreland, in 1936, and converted into a casino and museum. The casino is gone, but the museum is still intact.

We know that some wealthy and famous people trod these streets and explored these hills. Nevada Senator William Stewart made Bullfrog his home. Charles Schwab came in a chauffeur-driven limousine to see his holdings. Death Valley Scotty came to look around, and have a drink. And, in the hills, a few miles away, Shorty Harris and Ed Cross found their bonanza. But, what about Charles Breyfogle? Did he, too, find his bonanza in the Bullfrog Hills?

Shorty Harris, the man who, perhaps, spent more years looking for the Lost Breyfogle than any other, can tell us his view. He said he saw the Breyfogle ore. "It was a chocolate quartz . . . it was the richest ore I ever saw." Of the Bullfrog ore, he said: "That rock just lays in my

hand and squints at me like a green bullfrog." "Chocloate" . . . "green" . . . they were not the same.

And, actions speak louder than words. Shorty Harris spent much of the remaining 30 years of his life, after the Bullfrog discovery, as he had the 10 years before. Looking for the Lost Breyfogle. □

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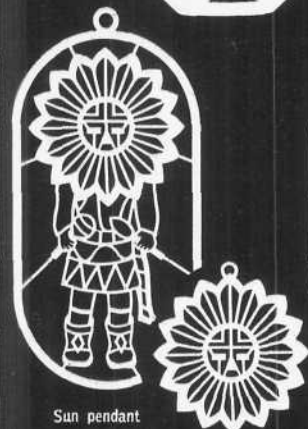
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Calendar of Events

OCTOBER 19 & 20, L.A. County Bottle Show & Sale presented by South Bay Antique Bottle Club and Los Angeles Historical Bottle Club, Hawthorne Memorial Center, 3901 El Segundo Blvd., Hawthorne, Calif. For information: P. O. Box 60672 Terminal Annex, Los Angeles, Calif. 90060.

OCTOBER 19-20, Special Desert Meeting sponsored by the World-of-Rockhounds Association, Clay Mine Road near Boron, Calif. Field trips. Contact Mrs. Carol Mahr, 27419 Fawnskin Dr., Palos Verdes, Calif. 90274.

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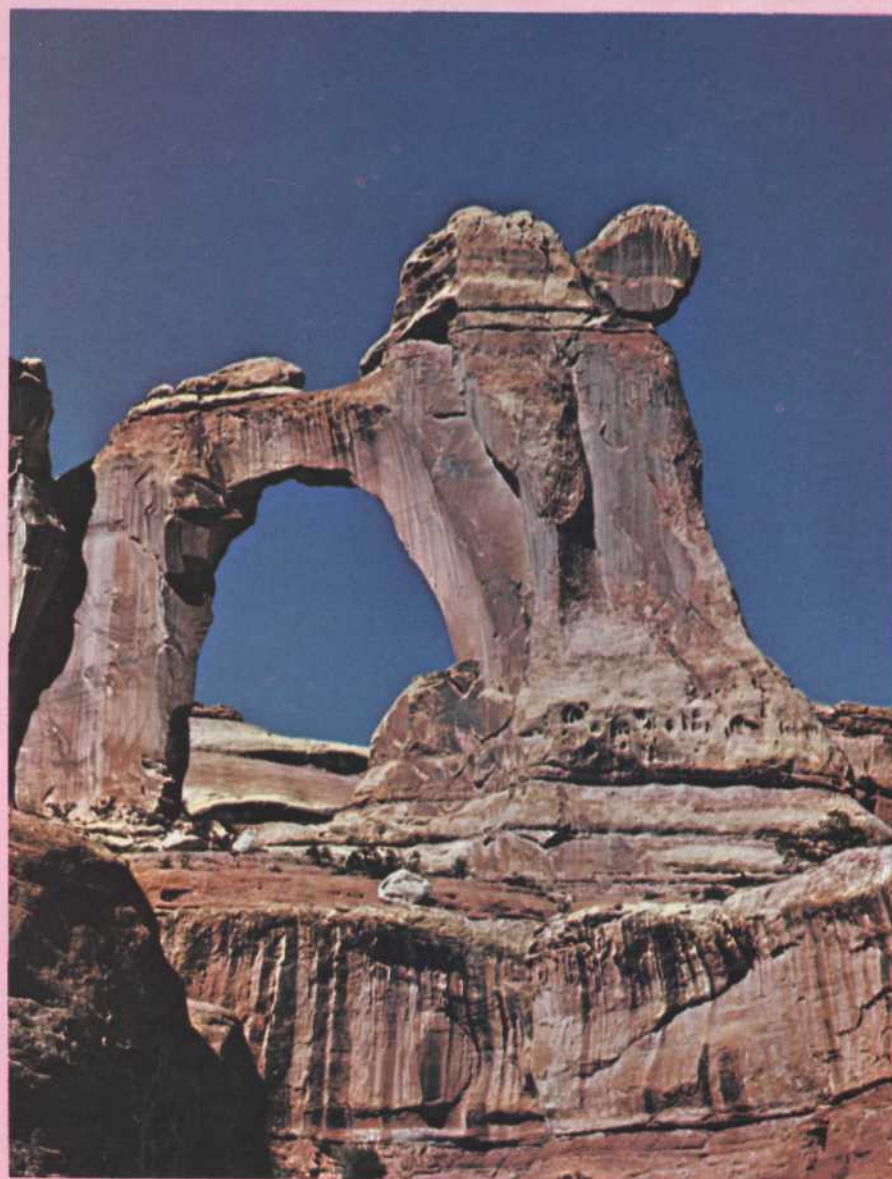
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Rambling on Rocks

by
Glenn and
Martha Vargas

QUARTZ: Number 7 in hardness

IN OUR last column, we remarked that we felt it unfortunate that orthoclase feldspar had not been chosen as the number 6 hardness standard. In the case of quartz, for number 7, we feel exactly the opposite; the choice was fortunate, indeed.

Quartz has a hardness that never varies from specimen to specimen. This is not always true of some of the other standards. There is no cleavage exhibit-

ed by quartz, thus no plane of weakness (which is the basis of cleavage) to possibly have a lower hardness. Finally, quartz is our most common mineral, thus a specimen is easy to obtain.

Up to this point in this series concerning the Mohs scale of hardness, we have not discussed the use of a hardness set. This was deliberate, as we felt that it was first necessary to discuss the greatest number of hardness standards. There are only three standards that are harder than quartz, of which the next, topaz, is the only one that is reasonably common. Number 9, corundum, and number 10, diamond, are not easy to obtain. Thus, it now appears that this is the time to discuss the hardness kit.

These kits are available at many rock shops and mineral suppliers, usually in a set of nine, diamond excluded. As diamond is the only mineral with a hardness greater than 9, if 9 will not scratch it, it must be diamond! (We dare you to find one.)

Most kits are simply nice pieces of reasonably pure mineral, each bearing the appropriate number. Some of the kits are in the form of pencil-like tools, with the mineral embedded in the end. This more elaborate pencil is easier to use, but is no more accurate than a chunk.

Most collectors soon find that the complete kit, regardless of how simple or elaborate, is a nuisance to carry. Also, the various pieces have a disconcerting habit of becoming misplaced. Worst of all, the softer indicators quickly become worn down or broken by trying them against specimens of greater hardness.

As the collector gains more experience, he soon discovers that most specimens he finds are usually in the vicinity of 7 in hardness, varying only slightly above or below, and usually below. One thing leads to another, and soon the collector finds that quartz is the most often used.

We know many mineralogists that carry only a quartz crystal in order to determine the hardness of an unknown. We do not take exception to this method, but feel that for the beginner, it is possible for him to add two or three common items that will give him a greater spread of hardness.

A knife is about 6 in hardness. There is certainly a variation in hardness of the types of steel used for knives, but this is no worse than feldspar which we

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discussed last month. Regardless of whether there is a variation among knives, none that we know of remotely approach 7, and very few, if any, come close to 6½. Thus a knife (after a try with quartz) will indicate whether or not the unknown is just slightly softer than quartz, or greatly so. If the knife easily scratches the mineral, NOT leaving a grey line of steel, then a softer indicator might be needed.

An ordinary copper penny is 3 in hardness. Even in our present penny shortage, nearly everyone has at least one in his change pocket. This is an excellent indicator for number 3. It has a reasonably sharp edge that will produce a narrow scratch, and if the mineral being tested is over 3, the penny will leave a red line of copper. (If our government decides to discontinue minting copper pennies, you can discard this idea.)

The fingernail of the average person is almost exactly 2½ in hardness. Here is an indicator that is with us always. We will admit that this could be a bit hard on a new manicure, but our experience has shown that most collectors are not habitués of manicure salons.

We must admit that a new collector will experience some difficulty in judging the hardness of those slightly above or below quartz. He will also experience difficulty with hardnesses of 4 to 5 using a knife or penny, but if he is careful and sure that he is or is not getting a scratch, it is possible to know that the mineral is in that range. We have observed a large number of people having difficulty in determining hardness when they had a complete set of the nine standards at their disposal. It is doubtful if the difficulties using the coin, knife and pieces of quartz are any greater.

To go back to the mineralogists that use only a quartz crystal, we like to suggest that collectors try to confine most of their field tests using only the quartz crystal, and relying on the other three items only when there is doubt. The method of using quartz for the bulk of the determinations is actually simple, but calls for experience.

It should be obvious that a mineral of 6 will be scratched by quartz only with considerable difficulty. A sharp point of the quartz, and some pressure is needed to make a scratch.

At this point we must insert an admonition. Be certain that you have

scratched the mineral in question, and not have pulverized the indicator. The pulverizing of the indicator leaves a line of powder that looks exactly the same as the powder forced out of a scratch. Wipe off the powder, then look carefully to be sure there is a scratch on the surface of the unknown mineral. If in doubt, clean the mineral (in spite of sanitation, etc., saliva is excellent). Allow a few moments for the piece to dry, then look for the scratch. If a scratch is discernible, your unknown is probably softer.

If the scratch is barely discernible, it is possible that the mineral is the same hardness as the quartz. Turn things around—scratch the indicator with the mineral. If you now get a barely discernible scratch on the quartz, they are the same hardness. If there is no scratch, then your mineral is just under the hardness of the quartz.

Here is where we feel the kit of chunks is superior to the pencil-like kit; the small tips of the pencils are virtually impossible to attempt to scratch.

If a scratch is easily seen, but not excessively deep (use a magnifier), the unknown is about one hardness below. If the mineral scratched easily, but definite pressure was needed, it is about two hardnesses below. If light pressure creates a deep scratch, three hardnesses below can be assumed. The individual collector can easily work out a scale based on how much work he must apply in order to get a scratch of a certain depth. We will grant that this is a rule of thumb, but it works. Actually, the Mohs scale was never offered as a highly accurate method, and at best is bordering on rule of thumb.

Obviously, any minerals that are in doubt can be checked later with a full

hardness set. As stated previously, only a few minerals above 7 can be expected to be encountered. These nearly all are of interest, with a specimen justifiably being retained. With minerals below 7, quartz is ideal as it will not break off in chips or flakes, which could confuse a determination. All that is needed is to determine how easily numbers 6, 5, 4 and 3 will scratch with a quartz crystal. When a mineral appears to be very soft, try the fingernail!

On the basis of what was written in our last six columns, we suspect that many readers expected this column to discuss quartz as a mineral rather than as a hardness standard. Certainly, quartz could be discussed further, but we have run out of space. As a result, we refer you to two of our past columns. The issues of August and September of 1973 looked at quartz from a chemical and molecular standpoint as well as crystals and gems. □



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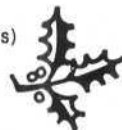
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Mining Gold in Death Valley

Continued from Page 35

again. And again. Later, larger quantities, some from a nearby spring, were developed and brought to the mill, and pumped up to the mine through a pipeline following the trail.

The Keane Wonder mill was in shake-down operation in September, 1907. Twelve days' operation in November resulted in a \$7500 gold brick, shipped to the Carson City mint. In December, the thundering stamps were dropping around the clock, and the mill neared its capacity of 70 to 75 tons per day.

The camp was becoming civilized, too. The second phone in Death Valley (the first was at Stovepipe Wells on the Skidoo line) was installed by May, 1907. By December, E. C. Kimball announced twice-weekly stage service to Rhyolite. There were two boarding houses: one at the mill, one up at the mine.

Transportation remained the problem during the more than eight years of mine's continuous operation. An attempt to solve that problem, in 1909, brought one of today's best known mining relics into Death Valley—Old Dinah, the steam

tractor now squatting forlornly outside the gateway of Furnace Creek Ranch. At the time, the Porter Brothers, of Rhyolite, were doing the freighting with big teams, and the summer months were desperately hard on the animals. Heat shouldn't both a tractor.

J. R. Lane, well-known merchant and mining man, particularly active at Calico, bought the tractor from Pacific Coast Borax Company. It arrived in Rhyolite, to make test runs, in June, 1909. It was a monster with 30-inch treads, burning crude oil to make steam, and with a hauling capacity of 50 tons.

"The ease with which the engine pulled the load indicates 25 tons can be transported with but little more cost for fuel," the *Rhyolite Herald* bragged.

Success was short-lived. First, one of the tubes of the boiler was ruptured and then next the crown sheet gave way. The troubles were considered due to two causes: the character of the water and the age of the machinery. The engine was deemed of no further use.

There is no record of any other attempt to supply the Keane Wonder by tractor. And Old Dinah lay there beside the Daylight pass road for more than 20 years, gradually stripped of anything us-

able. In 1932, as Harry Gower, of the Pacific Coast Borax Company, tells the story, he and company mechanic, Ed Grimes dug the ancient wheels out of the rock and sand and hauled the rusting monster down to the company's ranch at Furnace Creek—over the fierce protests of H. W. Eichbaum. Eichbaum then owned Stovepipe Wells Hotel, and wanted the tractor to remain as a local attraction beside the road between his place and Beatty.

The great Keane Wonder tramway did have one major failure, and that was in February, 1912, just a year after Superintendent Keith's nerve-wracking ride. The main cable snapped, halting operation of mine and mill.

With a new cable, the Keane Wonder produced again. Operations finally were suspended in May, 1916, with announcement that the ore bodies were worked out. At that time, the main shaft was 200 feet deep, with more than 5000 feet of underground workings, besides large open-cut quarries. Between 1908 and 1916, almost 74,000 tons of ore had been carried in those tramway buckets, with a mill recovery of \$682,209. Total production, including work by later leasers, has been estimated at \$1,100,000.

Men are still seeking the fabulous richness of the Lost Breyfogle ore. But the Keane Wonder, one of Death Valley's most successful gold mines, operated more than eight years on ore that averaged only \$9.22 per ton. It paid because 93 percent of the assay value was recovered, and because mining and milling cost only \$4.00 per ton.

The Keane Wonder has been a ghost for a long time, now. Many years ago, Harvey J. Darroch, who worked there in 1910 while Will Farish was superintendent, wrote to me recalling a return visit he and Farish made to the mine in 1928.

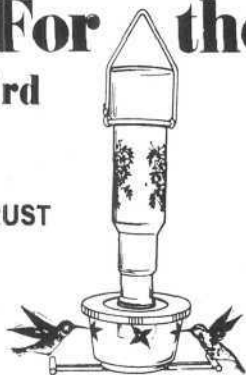
"Farish and I tramped across to the hot spring along the line of the old pipe line and bathed in the abundant stream still flowing from the tunnel that had been run so long ago to develop more water. How precious every drop of it had been when the mill was running—in fact, the conservation of every drop was one of the big headaches of all who lived there.

"But now, the water was flowing out freely onto the sands where it promptly sank and disappeared, with no one to care or think of waste." □

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Letters to the Editor

Letters requesting answers must
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Trap-door Spider . . .

Your August 1974 issue carried an interesting article on the trap-door spider. Mr. Branning, however, states that "Once paralyzed, death is certain, and the spider's carcass becomes . . ."

All the literature or citings I have found state that the spider is not killed, only immobilized. Upon hatching the larvae of the wasp feeds on the spider. This is when the spider dies.

Mr. Branning may very well be correct. I would just like to know where I can find such documentation.

ROBERT DeLACY,
29 Palms, Calif.

A New Fan . . .

We were given a big stack of *Desert* back issues, and couldn't stop reading until we had read every one. My husband and I are amateur nothings, as far as rocks and minerals are concerned, but now that we are both retired and have our camper, we are enthused and anxious to explore our land.

Even if we find nothing but scenery, we will have gained much through your articles and suggestions.

MRS. R. N. ANDREWS,
Fresno, California.

Wiley Wells Puzzler . . .

About one-half mile south of Wiley Well and only about 300 yards west of Palo Verde Rd., at the base of a large hill, are some rock walls and rock circles.

Some of the circles are built as an integral part of the wall, and some are separate. The walls and circles average about two feet in height. Some of the circles appear to have doorways in them as you can see in one picture. These walls blend into the hill so well that I would guess that 90 percent of the people using Palo Verde Road never see them.

Perhaps one of your subscribers could tell me who built them? Why? When?

OTTO J. BAUM,
San Diego, California.

Summerhayes Update . . .

I've just finished reading Jack Pepper's article, "Quartzsite" in the October issue, and have concluded that whoever compiled *Arizona Place Names* either didn't know his Arizona history very well or had never read "Vanished Arizona" by Martha Summerhayes, wife of 2nd Lt. Jack Summerhayes, 8th U.S. Infantry. Lt. Summerhayes was ordered from his post at Ft. Russell, Wyoming to Ft. Apache, Arizona Territory and made the journey by rail, ship, steamboat and ambulance (and afoot).

The book mentioned was written in 1908 and well worth reading.

H. B. (HANK) PENNELL,
Santa Barbara, Calif.

Martha Summerhayes was a New England girl who married 2nd Lt. John W. Summerhayes of the Fifth Cavalry. In the summer of 1874, they moved from Fort Russel, Wyoming Territory, to Camp Apache, Arizona, by steamer "Newbern" via San Francisco, up the Gulf of California to Port Isabel, thence up the Colorado River to Yuma by steamer "Cocopah." Thence by sternwheeler "Gila," Captain "Jack" Mellon, to Camp Mohave, 11 days.

"A quick trip," said Captain Mellon. Thirty-five days from San Francisco. Thence overland by Dougherty wagon, "ambulance" in Army lingo, six-mule locomotion, to Camp Apache. Sept. 10 to October 7.

"Sometimes Major Worth or Jack (hus-

band) would come and drive along a few miles in the ambulance with me to cheer me up, and they allowed me to abuse the country to my heart's content. It seemed to do me much good." Quote from *Vanished Arizona, Recollections of My Army Life* by Martha Summerhayes, J. B. Lippincott Co., Philadelphia 1908.

ROY VANDERGROOT,
Culver City, Calif.

I've just finished reading the article on Quartzsite, Arizona, in the October edition. Mr. Pepper mentions "a Martha Summerhayes" who visited the area in 1875, and wonders who she was.

Martha Summerhayes was the wife of an Army supply officer, and as such, lived and traveled widely in Arizona in its frontier days. She later recounted her adventures in a book titled "Vanished Arizona," which is considered by many as one of the true classics of Southwestern literature. Happily, this charming and historically valuable work was republished by Rio Grande Press in 1970 after being out of print for many years.

The citizens of Quartzsite should be pleased to know that the unfavorable description of it from which Mr. Pepper quotes in his article, was actually applied by Mrs. Summerhayes not to Quartzsite itself, but to a run-down ranch in the area where the Summerhayes party camped on its way to Ehrenberg.

JIM FEINER,
Long Beach, California.





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