

Arizona Sketches

Joseph A. Munk

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CHAPTER I. A ROMANTIC LAND

A stranger on first entering Arizona is impressed with the newness and wildness that surrounds him. Indeed, the change is so great that it seems like going to sleep and waking up in a new world. Everything that he sees is different from the familiar objects of his home, and he is filled with wonder and amazement at the many curious things that are brought to his notice. Judging the country by what is common back east, the average man is disappointed and prejudiced against what he sees; but, estimated on its merits, it is found to be a land of many attractions and great possibilities.

A hasty trip through the country by rail gives no adequate idea of its intrinsic value, as such a limited view only affords a superficial glimpse of what should be leisurely and carefully examined to be properly understood or appreciated. At the first glance it presents the appearance of a desert, but to one who is acquainted with its peculiarities it is by no means desolate. It furnishes a strong contrast to the rolling woodlands of the far east, and to the boundless prairies of the middle west; and, though it may never develop on the plan of the older states, like California, it has an individuality and charm of its own; and its endowment of natural wealth and beauty requires no borrowing from neighbors to give it character or success.

It has grand scenery, a salubrious climate, productive soil, rich mineral deposits and rare archaeological remains. It also has a diversified fauna and flora. The peccary, Gila monster, tarantula, centipede, scorpion and horned toad are specimens of its strange animal life; and, the numerous species of cacti, yucca, maguay, palo verde and mistletoe are samples of its curious vegetation. It is, indeed, the scientist's Paradise where much valuable material can be found to enrich almost every branch of natural science.

Hitherto its growth has been greatly retarded by its remote position in Uncle Sam's domain; but, with the comparatively recent advent of the railroad, the influx of capital and population, and the suppression of the once

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dreaded and troublesome Apache, a new life has been awakened that is destined to redeem the country from its ancient lethargy and make it a land of promise to many home seekers and settlers.

When the Spaniards under Coronado first entered the land more than three hundred and fifty years ago in search of the seven cities of Cibola, they found upon the desert sufficient evidence of an extinct race to prove that the land was once densely populated by an agricultural and prosperous people. When or how the inhabitants disappeared is unknown and may never be known. It is even in doubt who they were, but, presumably, they were of the Aztec or Toltec race; or, perhaps, of some civilization even more remote.

The Pueblo Indians are supposed to be their descendants, but, if so, they were, when first found, as ignorant of their ancestors as they were of their discoverers. When questioned as to the past they could give no intelligent answer as to their antecedents, but claimed that what the white man saw was the work of Montezuma. All that is known of this ancient people is what the ruins show, as they left no written record or even tradition of their life, unless it be some inscriptions consisting of various hieroglyphics and pictographs that are found painted upon the rocks, which undoubtedly have a meaning, but for lack of interpretation remain a sealed book. The deep mystery in which they are shrouded makes their history all the more interesting and gives unlimited scope for speculation.

Arizona is a land that is full of history as well as mystery and invites investigation. It has a fascination that every one feels who crosses its border. Paradoxical as it may seem it is both the oldest and newest portion of our country the oldest in ancient occupation and civilization and the newest in modern progress. In natural wonders it boasts of the Grand Canon of Arizona, the painted desert, petrified forest, meteorite mountain, natural bridge, Montezuma's well and many other marvels of nature. There are also ruins galore, the cave and cliff dwellings, crumbled pueblos, extensive acequias, painted rocks, the casa grande and old Spanish missions. Anyone who is in search of the old and curious, need not go to foreign lands, but can find right here at home in Arizona and the southwest, a greater number and variety of curiosities than can be found in the same space anywhere else upon the globe.

Arizona is a land of strong contrasts and constant surprises, where unusual conditions prevail and the unexpected frequently happens.

From the high Colorado plateau of northern Arizona the land slopes toward the southwest to the Gulf of California. Across this long slope of several hundred miles in width, numerous mountain ranges stretch from the northwest to the southeast. Through the middle of the Territory from east to west, flows the Gila river to its confluence with the Colorado. This stream marks the dividing line between the mountains which descend from the north and those that extend south, which increase in altitude and extent until they culminate in the grand Sierra Madres of Mexico.

The traveler in passing through the country never gets entirely out of the sight of mountains. They rise up all about him and bound the horizon near and far in every direction. In riding along he always seems to be approaching some distant mountain barrier that ever recedes before him as he advances. He is never clear of the encircling mountains for, as often as he passes out of one enclosure through a gap in the mountains, he finds himself hemmed in again by a new one. The peculiarity of always being in the midst of mountains and yet never completely surrounded, is due to an arrangement of dovetailing or overlapping in their formation. His winding way leads him across barren wastes, through fertile valleys, among rolling hills and into sheltered parks, which combine an endless variety of attractive scenery.

An Arizona landscape, though mostly of a desert type, is yet full of interest to the lover of nature. It presents a strangely fascinating view, that once seen, will never be forgotten. It stirs a rapture in the soul that only nature can inspire.

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Looking out from some commanding eminence, a wide spreading and diversified landscape is presented to view. Though hard and rugged, the picture, as seen at a distance, looks soft and smooth and its details of form and color make an absorbing study.

The eye is quick to note the different hues that appear in the field of vision and readily selects five predominating colors, namely, gray, green, brown, purple and blue, which mingle harmoniously in various combinations with almost every other color that is known. The most brilliant lights, sombre shadows, exquisite tints and delicate tones are seen which, if put on canvas and judged by the ordinary, would be pronounced exaggerated and impossible by those unfamiliar with the original.

The prevailing color is gray, made by the dry grass and sandy soil, and extends in every direction to the limit of vision. The gramma grass of the region grows quickly and turns gray instead of brown, as grasses usually do when they mature. It gives to the landscape a subdued and quiet color, which is pleasing to the eye and makes the ideal background in a picture.

Into this warp of gray is woven a woof of green, spreading in irregular patches in all directions. It is made by the chaparral, which is composed of a variety of desert plants that are native to the soil and can live on very little water. It consists of live oak, pinion, mesquite, desert willow, greasewood, sage brush, palmilla, maguey, yucca and cacti and is mostly evergreen.

The admixture of gray and green prevails throughout the year except during the summer rainy season, when, if the rains are abundant, the gray disappears almost entirely, and the young grass springs up as by magic, covering the whole country with a carpet of living green. In the midst of the billowy grass myriads of wild flowers bloom, and stand single or shoulder to shoulder in masses of solid color by the acre.

Upon the far mountains is seen the sombre brown in the bare rocks. The whole region was at one time violently disturbed by seismic force and the glow of its quenched fires has even yet scarcely faded away. Large masses of igneous rocks and broad streams of vitrified lava bear mute testimony of the change, when, by some mighty subterranean force, the tumultuous sea was rolled back from its pristine bed and, in its stead, lofty mountains lifted their bald beads above the surrounding desolation, and stand to-day as they have stood in massive grandeur ever since the ancient days of their upheaval. Rugged and bleak they tower high, or take the form of pillar, spire and dome, in some seemingly well-constructed edifice erected by the hand of man. But the mountains are not all barren. Vast areas of fertile soil flank the bare rocks where vegetation has taken root, and large fields of forage and extensive forests of oak and pine add value and beauty to the land.

The atmosphere is a striking feature of the country that is as pleasing to the eye as it is invigorating to the body. Over all the landscape hangs a veil of soft, purple haze that is bewitching. It gives to the scene a mysterious, subtle something that is exquisite and holds the senses in a magic spell of enchantment.

Distance also is deceptive and cannot be estimated as under other skies. The far-off mountains are brought near and made to glow in a halo of mellow light. Manifold ocular illusions appear in the mirage and deceive the uninitiated. An indefinable dreamy something steals over the senses and enthralls the soul.

Arching heaven's high dome is a sky of intense blue that looks so wonderfully clear and deep that even far-famed Italy cannot surpass it. The nights are invariably clear and the moon and stars appear unusually bright. The air is so pure that the stars seem to be advanced in magnitude and can be seen quite low down upon the horizon.

The changing lights that flash in the sky transform both the sunrise and sunset into marvels of beauty. In the mellow afterglow of the sunset, on the western sky, stream long banners of light, and fleecy clouds of gold melt away and fade in the twilight.

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At midday in the hazy distance, moving slowly down the valley, can be seen spiral columns of dust that resemble pillars of smoke. They ascend perpendicularly, incline like Pisa's leaning tower, or are bent at various angles, but always retaining the columnar form. They rise to great heights and vanish in space. These spectral forms are caused by small local whirlwinds when the air is otherwise calm, and are, apparently, without purpose, unless they are intended merely to amuse the casual observer.

A cloudy day is rare and does not necessarily signify rain. Usually the clouds are of the cumulus variety and roll leisurely by in billowy masses. Being in a droughty land the clouds always attract attention viewed either from an artistic or utilitarian standpoint. When out on parade they float lazily across the sky, casting their moving shadows below. The figures resemble a mammoth pattern of crazy patchwork in a state of evolution spread out for inspection.

The impression that is made while looking out upon such a scene is that of deep silence. Everything is hushed and still; but, by listening attentively, the number of faint sounds that reach the ear in an undertone is surprising. The soft sighing of the wind in the trees; the gentle rustle of the grass as it is swayed by the passing breeze; the musical ripple of water as it gurgles from the spring; the piping of the quail as it calls to its mate; the twitter of little birds flitting from bush to bough; the chirp of the cricket and drone of the beetle are among the sounds that are heard and fall soothingly upon the ear.

The trees growing upon the hillside bear a striking resemblance to an old orchard and are a reminder of home where in childhood the hand delighted to pluck luscious fruit from drooping boughs. A walk among the trees makes it easy to imagine that you are in some such familiar but neglected haunt, and instinctively you look about expecting to see the old house that was once called home and hear the welcome voice and footfall of cherished memory. It is no little disappointment to be roused from such a reverie to find the resemblance only a delusion and the spot deserted. Forsaken as it has been for many years by the native savage Indians and prowling wild beasts, the land waits in silence and patience the coming of the husbandman.

CHAPTER II. MY FIRST TRIP TO ARIZONA

I recall with vivid distinctness my first trip to Arizona and introduction to ranch life in the spring of 1884. The experience made a deep impression and has led me to repeat the visit many times since then, with increased interest and pleasure.

During the previous year my brother located a cattle ranch for us in Railroad Pass in southeastern Arizona. The gap is one of a series of natural depressions in a succession of mountain chains on the thirty-second parallel route, all the way from New Orleans to San Francisco over a distance of nearly twenty-five hundred miles. The Southern Pacific Railroad is built upon this route and has the easiest grade of any transcontinental line.

Railroad Pass is a wide break between two mountain ranges and is a fine grazing section. It is handsomely bounded and presents a magnificent view. To the north are the Pinaleno mountains, with towering Mt. Graham in their midst, that are nearly eleven thousand feet high and lie dark in the shadows of their dense pine forests. Far to the south rise the rugged Chiricahuas, and nearby stands bald Dos Cabezas, whose giant double head of granite can be seen as a conspicuous landmark over a wide scope of country. The distance across the Pass as the crow flies is, perhaps, fifty miles. Beyond these peaks other mountains rise in majestic grandeur and bound the horizon in every direction. At the time that the ranch was located the Pass country was considered uninhabitable because of the scarcity of water and the presence of hostile Indians. No permanent spring nor stream of water was known to exist in that whole region, but fine gramma grass grew everywhere. Its suitability as a cattle range was recognized and caused it to be thoroughly prospected for water, which resulted in the discovery of several hidden springs. All of the springs found, but one, were insignificant and either soon went dry or fluctuated with the seasons; but the big spring, known as Pinaleno, was worth finding, and flows a constant stream of pure, soft water

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that fills a four-inch iron pipe.

When the spring was discovered not a drop of water was visible upon the surface, and a patch of willows was the only indication of concealed moisture. By sinking a shallow well only a few feet deep among the willows, water was struck as it flowed through coarse gravel over a buried ledge of rock that forced the water up nearly to the surface only to sink again in the sand without being seen. A ditch was dug to the well from below and an iron pipe laid in the trench, through which the water is conducted into a reservoir that supplies the water troughs.

Again, when the ranch was opened the Indians were bad in the vicinity and had been actively hostile for some time. The ranch is on a part of the old Chiricahua reservation that was once the home and hunting grounds of the tribe of Chiricahua Apaches, the most bold and warlike of all the southwest Indians. Cochise was their greatest warrior, but he was only one among many able Apache chieftains. He was at one time the friend of the white man, but treachery aroused his hatred and caused him to seek revenge on every white man that crossed his path.

His favorite haunt was Apache Pass, a convenient spot that was favorable for concealment, where he lay in wait for weary travelers who passed that way in search of water and a pleasant camp ground. If attacked by a superior force, as sometimes happened, he invariably retreated across the Sulphur Spring valley into his stronghold in the Dragoon mountains.

Because of the many atrocities that were committed by the Indians, white men were afraid to go into that country to settle. Even as late as in the early eighties when that prince of rascals, the wily Geronimo, made his bloody raids through southern Arizona, the men who did venture in and located ranch and mining claims, lived in daily peril of their lives which, in not a few instances, were paid as a forfeit to their daring.

The Butterfield stage and all other overland travel to California by the southern route before the railroads were built, went through Apache Pass. Although it was the worst Indian infested section in the southwest, travelers chose that dangerous route in preference to any other for the sake of the water that they knew could always be found there.

The reputation of Apache Pass, finally became so notoriously bad because of the many murders committed that the Government, late in the sixties, built and garrisoned Ft. Bowie for the protection of travelers and settlers. The troops stationed at the post endured much hardship and fought many bloody battles before the Indians were conquered. Many soldiers were killed and buried in a little graveyard near the fort. When the fort was abandoned a few years ago, their bodies were disinterred and removed to the National cemetery at Washington.

Railroad Pass is naturally a better wagon road than Apache Pass, but is without water. It was named by Lieut. J. G. Parke in 1855 while engaged in surveying for the Pacific Railroad, because of its easy grade and facility for railroad construction.

I timed my visit to correspond with the arrival at Bowie station on the Southern Pacific Railroad, of a consignment of ranch goods that had been shipped from St. Louis. I was met at the depot by the ranch force, who immediately proceeded to initiate me as a tenderfoot. I inquired of one of the cowboys how far it was to a near-by mountain. He gave a quien sabe shrug of the shoulder and answered me in Yankee fashion by asking how far I thought it was. Estimating the distance as in a prairie country I replied, "Oh, about a mile." He laughed and said that the mountain was fully five miles distant by actual measurement. I had unwittingly taken my first lesson in plainscraft and prudently refrained thereafter from making another sure guess.

The deception was due to the rarefied atmosphere, which is peculiar to the arid region. It not only deceives the eye as to distance, but also as to motion. If the eye is steadily fixed upon some distant inanimate object, it seems to move in the tremulous light as if possessed of life, and it is not always easy to be convinced to the contrary. However, by putting the object under inspection in line with some further object, it can readily be determined

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whether the object is animate or still by its remaining on or moving off the line.

Another peculiarity of the country is that objects do not always seem to stand square with the world. In approaching a mountain and moving on an up grade the plane of incline is suddenly reversed and gives the appearance and sensation of going downhill. In some inexplicable manner sense and reason seem to conflict and the discovery of the disturbed relation of things is startling. You know very well that the mountain ahead is above you, but it has the appearance of standing below you in a hollow; and the water in the brook at your feet, which runs down the mountain into the valley, seems to be running uphill. By turning squarely about and looking backwards, the misplaced objects become righted, and produces much the same sensation that a man feels who is lost and suddenly finds himself again.

We immediately prepared to drive out to the ranch, which was ten miles distant and reached by a road that skirted the Dos Cabezas mountains. The new wagon was set up and put in running order and lightly loaded with supplies. All of the preliminaries being completed, the horses were harnessed and hooked to the wagon. The driver mounted his seat, drew rein and cracked his whip, but we didn't go. The horses were only accustomed to the saddle and knew nothing about pulling in harness. Sam was a condemned cavalry horse and Box was a native bronco, and being hitched to a wagon was a new experience to both. The start was unpropitious, but, acting on the old adage that "necessity is the mother of invention," which truth is nowhere better exemplified than on the frontier where conveniences are few and the most must be made of everything, after some delay and considerable maneuvering we finally got started.

The road for some distance out was level and smooth and our progress satisfactory. As we drove leisurely along I improved the opportunity to look about and see the sights. It was a perfect day in April and there never was a brighter sky nor balmier air than beamed and breathed upon us. The air was soft and tremulous with a magical light that produced startling phantasmagoric effects.

It was my first sight of a mirage and it naturally excited my curiosity. It seemed as if a forest had suddenly sprung up in the San Simon valley where just before had appeared only bare ground. With every change in the angle of vision as we journeyed on, there occurred a corresponding change in the scene before us that produced a charming kaleidoscopic effect. The rough mountain was transformed into a symmetrical city and the dry valley into a lake of sparkling water, all seeming to be the work of magic in some fairyland of enchantment.

In a ledge of granite rock by the wayside were cut a number of round holes which the Indians had made and used as mills for grinding their corn and seeds into meal. Nearby also, were some mescal pits used for baking the agave, a native plant that is in great demand as food by the Indians. The spot was evidently an old rendezvous where the marauding Apaches were accustomed to meet in council to plan their bloody raids, and to feast on mescal and pinole in honor of some successful foray or victory over an enemy.

We next crossed several well-worn Indian trails which the Apaches had made by many years of travel to and fro between their rancherias in the Mogollon mountains and Mexico. The sight of these trails brought us back to real life and a conscious sense of danger, for were we not in an enemy's country and in the midst of hostile Indians? Nearly every mile of road traveled had been at some time in the past the scene of a bloody tragedy enacted by a savage foe. Even at that very time the Apaches were out on the warpath murdering people, but fortunately we did not meet them and escaped unmolested.

The road now crossed a low hill, which was the signal for more trouble. The team started bravely up the incline, but soon stopped and then balked and all urging with whip and voice failed to make any impression. After several ineffectual attempts to proceed it was decided not to waste any more time in futile efforts. The horses were unhitched and the wagon partly unloaded, when all hands by a united pull and push succeeded in getting the wagon up the hill. After reloading no difficulty was experienced in making a fresh start on a down grade, but a little farther on a second and larger hill was encountered, when the failure to scale its summit was even greater

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than the first. No amount of coaxing or urging budged the horses an inch. They simply were stubborn and would not pull.

Night was approaching and camp was yet some distance ahead. The driver suggested that the best thing to do under the circumstances was for the rest of us to take the led horses and ride on to camp, while he would remain with the wagon and, if necessary, camp out all night. We reluctantly took his advice, mounted our horses and finished our journey in the twilight. Aaron, who was housekeeper at the ranch, gave us a hearty welcome and invited us to sit down to a bountiful supper which he had prepared in anticipation of our coming. Feeling weary after our ride we retired early and were soon sound asleep. The only thing that disturbed our slumbers during the night was a coyote concert which, as a "concord of sweet sounds was a dismal failure" but as a medley of discordant sounds was a decided success. The bark of the coyote is particularly shrill and sharp and a single coyote when in full cry sounds like a chorus of howling curs.

We were all up and out early the next morning to witness the birth of a new day. The sunrise was glorious, and bright colors in many hues flashed across the sky. The valley echoed with the cheerful notes of the mocking bird and the soft air was filled with the fragrance of wild flowers. The scene was grandly inspiring and sent a thrill of pleasure through every nerve.

While thus absorbed by the beauties of nature we heard an halloo, and looking down the road in the direction of the driver's bivouac we saw him coming swinging his hat in the air and driving at a rapid pace that soon brought him to the ranch house. In answer to our inquiries as to how he had spent the night he reported that the horses stood quietly in their tracks all night long, while he slept comfortably in the wagon. In the morning the horses started without undue urging as if tired of inaction and glad to go in the direction of provender. They were completely broken by their fast and after that gave no further trouble.

After a stay of four weeks, learning something of the ways of ranch life and experiencing not a few exciting adventures, I returned home feeling well pleased with my first trip to the ranch.

CHAPTER III. THE OPEN RANGE

Arizona is in the arid belt and well adapted to the range cattle industry. Its mild climate and limited water supply make it the ideal range country. Indeed, to the single factor of its limited water supply, perhaps, more than anything else is its value due as an open range. If water was abundant there could be no open range as then the land would all be farmed and fenced.

Arizona is sometimes spoken of as belonging to the plains, but it is not a prairie country. Mountains are everywhere, but are separated in many places by wide valleys. The mountains not only make fine scenery, but are natural boundaries for the ranches and give shade and shelter to the cattle.

There are no severe storms nor blizzard swept plains where cattle drift and perish from cold. The weather is never extremely cold, the mercury seldom falling to more than a few degrees below freezing, except upon the high plateaus and mountains of northern Arizona. If it freezes during the night the frost usually disappears the next day; and, if snow flies, it lies only on the mountains, but melts as fast as it falls in the valleys. There are but few cloudy or stormy days in the year and bright, warm sunshine generally prevails. There has never been any loss of cattle from cold, but many have died from drought as a result of overstocking the range.

The pastures consist of valley, mesa and mountain lands which, in a normal season, are covered by a variety of nutritious grasses. Of all the native forage plants the gramma grass is the most abundant and best. It grows only in the summer rainy season when, if the rains are copious, the gray desert is converted into a vast green meadow.

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The annual rainfall is comparatively light and insufficient to grow and mature with certainty any of the cereal crops. When the summer rains begin to fall the rancher is "jubilant" and the "old cow smiles." Rain means even more to the ranchman than it does to the farmer. In an agricultural country it is expected that rain or snow will fall during every month of the year, but on the range rain is expected only in certain months and, if it fails to fall then, it means failure, in a measure, for the entire year.

Rain is very uncertain in Arizona. July and August are the rain months during which time the gramma grass grows. Unless the rain falls daily after it begins it does but little good, as frequent showers are required to keep the grass growing after it once starts. A settled rain of one or more days' duration is of rare occurrence. During the rainy season and, in fact, at all times, the mornings are usually clear. In the forenoon the clouds begin to gather and pile up in dark billowy masses that end in showers during the afternoon and evening. But not every rain cloud brings rain. Clouds of this character often look very threatening, but all their display of thunder and lightning is only bluff and bluster and ends in a fizzle with no rain. After such a demonstration the clouds either bring wind and a disagreeable dust storm, or, if a little rain starts to fall, the air is so dry that it evaporates in mid air, and none of it ever reaches the earth. In this fashion the clouds often threaten to do great things, only to break their promise; and the anxious rancher stands and gazes at the sky with longing eyes, only to be disappointed again and again.

As a rule water is scarce. A long procession of cloudless days merge into weeks of dry weather; and the weeks glide into months during which time the brazen sky refuses to yield one drop of moisture either of dew or rain to the parched and thirsty earth. Even the rainy season is not altogether reliable, but varies considerably one year with another in the time of its appearance and continuance.

The soil is sandy and porous and readily absorbs water, except where the earth is tramped and packed hard by the cattle. One peculiarity of the country as found marked upon the maps, and that exists in fact, is the diminution and often complete disappearance of a stream after it leaves the mountains. If not wholly lost upon entering the valley the water soon sinks out of sight in the sand and disappears and reappears at irregular intervals, until it loses itself entirely in some underground channel and is seen no more.

Many a pleasant valley in the range country is made desolate by being destitute of any surface spring or running brook, or water that can be found at any depth. Occasionally a hidden fountain is struck by digging, but it is only by the merest chance. Wells have been dug to great depths in perfectly dry ground in an eager search for water without finding it, and such an experience is usually equivalent to a failure and the making of a useless bill of expense.

A never-failing spring of good water in sufficient quantity to supply the needs of a ranch in the range country is of rare occurrence, considering the large territory to be supplied. Only here and there at long intervals is such a spring found, and it is always a desirable and valuable property. It makes an oasis in the desert that is an agreeable change from the surrounding barrenness, and furnishes its owner, if properly utilized, a comfortable subsistence for himself and herds. His fields produce without fail and the increase of his flocks and herds is sure.

The isolated rancher who is well located is independent. He is in no danger of being crowded by his neighbors nor his range becoming over stocked with stray cattle. His water right gives him undisputed control of the adjacent range, even though he does not own all the land, which is an unwritten law of the range and respected by all cattlemen.

Because of the scarcity of water the range country is sparsely settled and always will be until more water is provided by artificial means for irrigation. Even then a large portion of the land will be worthless for any other purpose than grazing, and stock-growing on the open range in Arizona will continue to be a staple industry in the future as it has been in the past.

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The range is practically all occupied and, in many places, is already over stocked. Where more cattle are run on a range than its grass and water can support there is bound to be some loss. In stocking a range an estimate should be made of its carrying capacity in a bad year rather than in a good one, as no range can safely carry more cattle than it can support in the poorest year; like a chain, it is no stronger than its weakest link.

A good range is sometimes destroyed by the prairie dog. Wherever he establishes a colony the grass soon disappears. He burrows in the ground and a group of such holes is called a dog town. Like the jack-rabbit he can live without water and is thus able to keep his hold on the desert. The only way to get rid of him is to kill him, which is usually done by the wholesale with poison. His flesh is fine eating, which the Navajo knows if the white man does not. The Navajo considers him a dainty morsel which is particularly relished by the sick. If a patient can afford the price, he can usually procure a prairie dog in exchange for two sheep.

The Navajo is an adept at capturing this little animal. The hunter places a small looking-glass near the hole and, in concealment near by, he patiently awaits developments. When the prairie dog comes out of his hole to take an airing he immediately sees his reflection in the glass and takes it

for an intruder. In an instant he is ready for a fight and pounces upon his supposed enemy to kill or drive him away. While the prairie dog is thus engaged wrestling with his shadow or reflection the hunter shoots him at close range with his bow and arrow never with a gun, for if wounded by a bullet he is sure to drop into his hole and is lost, but the arrow transfixes his body and prevents him from getting away. He has been hunted so much in the Navajo country that he has become very scarce.[1]

[1] This statement is made on the authority of Mr. F. W. Volz, who lives at Canon Diablo, and is familiar with the customs of the Navajos.

Much of the ranch country in southern Arizona is destitute of trees, and shade, therefore, is scarce. Upon the high mountains and plateaus of northern Arizona there are great forests of pine and plenty of shade. But few cattle range there in comparison to the large numbers that graze on the lower levels further south. What little tree growth there is on the desert is stunted and supplies but scant shade. In the canons some large cottonwood, sycamore and walnut trees can be found; upon the foot hills the live oak and still higher up the mountain the pine. Cattle always seek the shade and if there are no trees they will lie down in the shade of a bush or anything that casts a shadow. The cattle are so eager for shade that if they can find nothing better they will crowd into the narrow ribbon of shade that is cast by a columnar cactus or telegraph pole and seem to be satisfied with ever so little if only shade is touched.

Twenty years ago before there were many cattle on the southwestern range, the gramma grass stood knee high everywhere all over that country and seemed to be an inexhaustible supply of feed for an unlimited number of cattle during an indefinite term of years. It was not many years, however, after the large herds were turned loose on the range until the grass was all gone and the ground, except in a few favored spots, left nearly as bare of grass as the traveled road. At the present time whatever grass there is must grow each year which, even in a favorable year, is never heavy. If the summer rains fail, no grass whatever can grow and the cattle are without feed. The grass about the springs and water holes is first to disappear and then the cattle must go farther and farther from water to find any grass. When cattle are compelled to travel over long distances in going from grass to water, they naturally grow thin from insufficient food and are worn out by the repeated long journeys. A cow that is thin and weak will postpone making the trip as long as possible two, three and even four days in the hottest weather she will wait before attempting the trip. At last, when the poor creature reaches water, she is so famished from thirst that she drinks too much. In her feeble condition she is unable to carry the enormous load of water which she drinks and lies down by the side of the friendly water trough to die from exhaustion.

If cattle are turned loose upon a new range they act strange and are inclined to scatter. Until they become accustomed to the change they should be close herded, but after they are once located they are not liable to stray

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very far.

As they are only worked by men on horseback they are not frightened at the sight of a horse and rider; but let a stranger approach them on foot, in a moment after he is sighted every head is raised in surprise and alarm and the pedestrian is, indeed, fortunate if the herd turns tail and scampers off instead of running him down and tramping him under foot in a wild stampede.

Nowhere else can be found a finer sight than is witnessed in the range country. In every direction broad meadows stretch away to the horizon where numberless cattle roam and are the embodiment of bovine happiness and contentment. Scattered about in irregular groups they are seen at ease lying down or feeding, and frisking about in an overflow of exuberant life. Cow paths or trails converge from every point of the compass, that lead to springs and water holes, on which the cattle travel.

It is an interesting sight to watch the cattle maneuver as they form in line, single file, ready for the march. They move forward in an easy, deliberate walk one behind the other and may be seen coming and going in every direction. They make their trips with great regularity back and forth from grass to water, and vice versa, going to water in the morning and back to the feeding grounds at night.

Cows have a curious fashion, sometimes, of hiding out their calves. When a cow with a young calf starts for water she invariably hides her calf in a bunch of grass or clump of bushes in some secluded spot, where it lies down and remains perfectly quiet until the mother returns. I have many times while riding the range found calves thus secreted that could scarcely be aroused or frightened away, which behavior was so different from their usual habit of being shy and running off at the slightest provocation. The calf under such circumstances seems to understand that it is "not at home," and cannot be seen.

At another time a lot of calves are left in charge of a young cow or heifer that seems to understand her responsibility and guards her charge carefully. The young calves are too weak to make the long trip to water and thus, through the maternal instinct of the mother cow, she provides for the care of her offspring almost as if she were human.

After viewing such a large pasture as the open range presents, which is limitless in extent, the small fenced field or pasture lot of a few acres on the old home farm back east, that looked so large to boyish eyes in years gone by, dwindles by comparison into insignificance and can never again be restored to its former greatness.

CHAPTER IV. RANCH LIFE

Ranch life on the open range may be somewhat wild and lonely, but it is as free and independent to the rancher as it is to his unfettered cattle that roam at will over a thousand hills. As a place of residence for a family of women and children it is undesirable because of its isolation and lack of social and educational privileges; but for a man who cares to "rough it" it has a rare fascination. Its freedom may mean lonesomeness and its independence monotony, yet it is very enjoyable for a season. Like anything else it may become wearing and wearisome if continued too long without a change, but its novelty has a charm that is irresistible.

Ranch life is untrammelled by social conventionalities and is not burdened by business cares, but is an easy, natural life that is free from all kinds of pressure. It relieves the tension of an artificial existence, and worry and vexation are forgotten. Time loses its rapid flight and once more jogs on at an easy pace; and its complete isolation and quiet gives nature a chance to rest and recuperate

"Away from the dwellings of careworn men."

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The environment of ranch life is highly conducive to good health. The scenery is delightful, the air pure and bracing, the food wholesome and nutritious, the couch comfortable and the sleep refreshing. Walking and riding furnish the necessary exercise that nature demands. Indeed, there is no better exercise to be found than riding horseback to stimulate sluggish organs, or excite to healthy action the bodily functions. It stirs the liver, causes deep breathing, strengthens the heart and circulation, tones the nerves and makes an appetite that waits on good digestion. An outdoor life is often better than medicine and is a panacea for the "ills that human flesh is heir to."

The ranchman, if he is in tune with his surroundings, finds a never-failing spring of pleasure. If he is company for himself he is well entertained and if he is a lover of nature he finds interesting subjects for study upon every hand. His wants are few and simple and the free life that he lives develops in him a strong and sturdy manhood. He is the picture of health and is happy and contented as the day is long.

However, such a life does not suit everyone, as individual tastes differ. Prejudice also exerts an influence and is apt to estimate all western life as crude and undesirable, being in a transition state of change from savagery to civilization. Be it even so; for, if the savage had never existed to furnish the ancestry that civilized man boasts, civilization would not have been possible. It is only natural that this should be so as, in the order of nature, evolution begins at the bottom and works up.

There is perhaps no condition in life that can be called perfect, yet of the two extremes we choose to believe that civilization is preferable to barbarism; but an intermediate state has the advantage over both extremes by avoiding native crudeness upon the one hand and excessive refinement upon the other, both being equally undesirable.

Happiness, which we all profess to seek, exists in some degree everywhere but we are always striving to acquire something more. In our constant struggle for improvement, progress undoubtedly is made in the right direction. With refinement comes increased sensibility and an enlarged capacity for enjoyment. But, such a state in itself is not one of unalloyed bliss, as might be supposed, since it is marred by its antithesis, an increased amount of sickness and suffering, which is the inevitable penalty of civilization. In such a progression the pleasures of life become more, but the acuteness of suffering is also increased. The mistake lies in the fact that in our eager pursuit after the artificial we forget nature and not until we acquire a surfeit of that which is artificial and grow weary of the shams and deceits of the world do we stop and think or turn again to nature to find the truth.

In the early days the frontier was the rendezvous for rough and lawless characters of every description. That time has gone by never to return in the history of the nation, as the rustlers have either reformed and become good citizens or long ago left the country by the lead or hemp routes. The change in the times has been such that never again will it be possible to return to the conditions that existed in the early settlement of the west which gave to desperadoes a safe hiding place.

The people now living on what is left of the frontier will, as a class, compare favorably with those of any other community. There may be small surface polish, as the world goes, but there is much genuine gold of true character that needs only a little rubbing to make it shine.

The population being sparse there is comparatively little opportunity or inclination for wrongdoing. Whatever anybody does is noticed at once and everything that happens is immediately found out. The favorite haunt of vice and crime is not in a sparsely settled community, public opinion to the contrary notwithstanding, but in the centers of population, in, our large cities where temptation to do evil is strong and dark deeds find ready concealment in the mingling and confusion of the throng.

The ranchman deserves to be correctly judged by his true character and not by any false standard that is artfully designed to misrepresent him or to unjustly bring him into contempt. He may have a rough exterior, not intending to pose in a model fashion plate, but in real life where he is tried there is found under his coarse garb a heart that is honest and true which responds with sympathy and kindness for anyone in distress; and his generosity and

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hospitality are proverbial and stand without a rival. Men from every position in life, including college graduates and professional men, are engaged in ranching and whoever takes them to be a lot of toughs and ignoramuses is egregiously mistaken.

The strength, virtue and intelligence of the nation is found in its large middle class of laboring people that is largely composed of farmers and mechanics, men who work with their hands and live natural lives and are so busy in some useful occupation that they have no time to think of mischief. In this favored land of freedom all of our great men have been of the common people and struggled up from some humble position. A life of toil may seem to be hard, but it conforms to nature and natural laws and favors the development of the best that is in man; and he who shirks toil misses his opportunity. Whatever tends to wean men from work only weakens them. Luxury and indolence travel on the downward road of degeneracy. They may make pleasant temporary indulgence, but are fatal to ultimate success.

Locomotion on a ranch consists almost entirely of horseback riding as walking is too slow and tiresome and wheeled conveyance is often inconvenient or impossible for cross-country driving. When the ranchman mounts his horse in the morning to make his daily rounds he has a clear field before him. He is "monarch of all he surveys" and practically owns the earth, since his neighbors live many miles away and his road leads in any direction clear to the horizon.

The average ranch is not intended to furnish luxuries, but to serve the best interests of the business in hand, that of growing cattle. It is usually a "stag camp" composed entirely of men who occupy a rude cabin near some convenient spring or stream of water, where they keep house in ranch style and live after a fashion. No money is ever expended in unnecessary improvements, but every dollar spent in repairs is put where it will do the most good. The house furnishings are all of the plainest kind and intended to meet only present necessities. The larder is not supplied with luxuries nor is the cuisine prolific of dainties, but there is always on hand a supply of the necessities of life.

Every man has his particular work to perform, but unless it be on some large ranch where the force of men employed is sufficiently large to require the services of a chef, he is also expected to assist in keeping house. It is an unwritten law of the ranch that everybody on the place must share in this work and if anyone shirks his duty he must either promptly mend his ways or else quit his job. It is seldom, however, that this rule has to be enforced, as the necessities of the case require that every man shall be able to prepare a meal as he is liable to be left alone for days or weeks at a time when he must either cook or starve.

The equipment of the cowboy is his horse and reata. They are his constant companions and serve his every purpose. His work includes much hard riding, which he greatly enjoys if no accident befalls him. But dashing on in heedless speed while rounding up cattle he is ever liable to mishaps, as his horse, although sure footed, may at any time step into a prairie dog's hole or stumble on a loose rock that is liable to throw both horse and rider to the ground in a heap. He is, indeed, fortunate if he escapes unhurt, or only receives a few bruises and not a fractured bone or broken neck.

His work consists in riding over the range and marking the condition of the cattle; line riding to prevent the stock from straying; looking after the springs and water holes and keeping them clean; branding calves, gathering steers for market and assisting in the general work of the round-up. Every day has its duty and every season its particular work, yet there are times of considerable leisure during the year. After his day's work is done he repairs to the ranch house, or to some outlying camp, whichever happens to be nearest when night overtakes him, for every large ranch has one or more such camps posted at some convenient point that furnishes temporary shelter and refreshment, where he rests and eats his frugal meal with a relish that only health and rough riding can give.

If he is at the home ranch in winter he spends the long evenings before an open hearth fire of blazing logs and by the light of the fire and the doubtful aid of a tallow dip lounges the hours away in reading and cogitation; or, if in

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the company of congenial companions, engages in conversation and pleasantries or any amusement that the party may select. At an early hour he turns in for the night and after a sound and refreshing sleep is up and out with the dawn. After breakfast he mounts his horse and in his striking and characteristic costume of broad sombrero, blue flannel shirt, fringed chaperejos and jingling spurs he rides forth to his work a perfect type of the gallant caballero.

CHAPTER V. THE ROUND-UP

In the range cattle business it is important for every owner of live stock to have some mark by which he can tell his own cattle. It is impossible for any man to remember and recognize by natural marks every animal in a large herd. On the open range there are no fenced pastures to hold the cattle, but all are permitted to run free and mix promiscuously. To distinguish the cattle of different owners a system of earmarks and brands has been devised by which each ranchman can identify and claim his own stock.

The branding is usually done during a round-up when every calf found is caught and branded in the brand of its mother. If a calf remains unbranded until after it is weaned and quits its mother, it becomes a maverick and is liable to be lost to its owner. A calf, if left to itself, will follow its mother for several months and then leave her to seek its own living. Occasionally a calf does not become weaned when it should be, but continues the baby habit indefinitely. If a yearling is found unweaned it is caught and "blabbed" which is done by fitting a peculiarly shaped piece of wood into its nose that prevents it from sucking but does not interfere with feeding.

If a calf loses its mother while very young it is called a "leppy." Such an orphan calf is, indeed, a forlorn and forsaken little creature. Having no one to care for it, it has a hard time to make a living. If it is smart enough to share the lacteal ration of some more fortunate calf it does very well, but if it cannot do so and has to depend entirely on grazing for a living its life becomes precarious and is apt to be sacrificed in the "struggle for the survival of the fittest."

If it survives the ordeal and lives it bears the same relation to the herd as the maverick and has no lawful owner until it is branded. If an unbranded calf has left or lost its mother it has lost its identity as well and finds it again only after being branded, although it may have swapped owners in the process. Theoretically, a maverick belongs to the owner of the range on which it runs, but, practically, it becomes the property of the man who first finds and brands it.

Although the branding is supposed to be done only during a round-up there is nevertheless some branding done in every month of the year. The ranchman is compelled to do so to save his calves from being stolen. Therefore early branding is generally practiced as it has been found to be the best safeguard against theft. Either the spring or fall is considered a good time to brand, but the only best time to brand a calf is when you find it.

Dishonest men are found in the cattle business the same as in other occupations and every year a large number of cattle are misappropriated and stolen from the range. Cattle have been stolen by the wholesale and large herds run off and illegally sold before the owner discovered his loss. Calf stealing, however, happens more frequently than the stealing of grown cattle and many ingenious devices have been invented to make such stealing a success. A common practice is to "sleeper" a calf by a partial earmark and a shallow brand that only singes the hair but does not burn deep enough to leave a permanent scar. If the calf is not discovered as an imperfect or irregular brand and becomes a maverick, it is kept under surveillance by the thief until he considers it safe to finish the job when he catches it again and brands it with his own iron.

Different methods are employed to win a calf and fit it for unlawful branding. Sometimes the calf is caught and staked out in some secluded spot where it is not liable to be found and away from its mother until it is nearly starved when it is branded by the thief and turned loose; or, the calf's tongue is split so that it cannot suck and by

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the time that the wounded tongue has healed the calf has lost its mother, and the thief brands it for himself. Again, the mother cow is shot and killed, when the orphan calf is branded in perfect safety as "the dead tell no tales."

The owner of cattle on the open range must be constantly on his guard against losses by theft. Usually the thief is a dishonest neighbor or one of his own cowboys who becomes thrifty at his employer's expense. Many a herd of cattle was begun without a single cow, but was started by branding surreptitiously other people's property. It is not an easy matter to detect such a thief or to convict on evidence when he is arrested and brought to trial. A cattle thief seldom works alone, but associates himself with others of his kind who will perjure themselves to swear each other clear.

The cow ponies that are used in range work are small but active and possessed of great power of endurance. They are the descendants of the horses that were brought into Mexico by the Spaniards, some of which escaped into the wilderness and their increase became the wild horses of the plains. They are known by the various names of mustang, bronco and cayuse according to the local vernacular of the country in which they roam. They are wild and hard to conquer and are sometimes never fully broken even under the severest treatment. Bucking and pitching are their peculiar tricks for throwing a rider and such an experience invariably ends in discomfort if not discomfiture, for if the rider is not unhorsed he at least receives a severe shaking up in the saddle.

The native cattle, like the horses, are small and wild, but are hardy and make good rustlers. The native stock has been greatly improved in recent years by cross breeding with thoroughbred Durham and Hereford bulls. Grade cattle are better suited for the open range than are pure bred animals, which are more tender and fare better in fenced pastures. By cross breeding the quality of range cattle has steadily improved until the scrub element has been almost bred out.

As a breeding ground Arizona is unsurpassed, but for maturing beef cattle the northern country is preferable. Thousands of young cattle are shipped out annually to stock the ranges of Wyoming and Montana and to fill the feed lots of Kansas, Missouri and other feeding states. A dash of native blood in range cattle is desirable as it enables them to endure hardships without injury and find subsistence in seasons of drought and scant forage.

The general round-up occurs in the fall, just after the summer rains, when there is plenty of grass and the horses and cattle are in good condition. The ranchmen of a neighborhood meet at an appointed time and place and organize for systematic work. A captain is chosen who is in command of the round-up and must be obeyed. Each cowboy has his own string of horses, but all of the horses of the round-up not in use are turned out to graze and herd together. A mess wagon and team of horses in charge of a driver, who is also the cook, hauls the outfit of pots, provisions and bedding.

The round-up moves from ranch to ranch rounding up and marking the cattle as it goes and is out from four to six weeks, according to the number of ranches that are included in the circuit.

When camp is made and everything ready for work the cowboys ride out in different directions and drive in all the cattle they can find. After the cattle are all gathered the calves are branded and the cattle of the several owners are cut into separate herds and held until the round-up is finished when they are driven home.

Every unbranded calf is caught and branded in its mother's brand. In a mix-up of cattle as occurs at a round-up, a calf sometimes gets separated from its mother so that when caught its identity is uncertain. To avoid making a mistake the calf is only slightly marked, just enough to hurt it a little, and is then turned loose. A calf when it is hurt is very much like a child, in that it cries and wants its mamma. As quick as it is let go it immediately hunts its mother and never fails to find her. When cow and calf have come together the calf is again caught and the branding finished.

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The pain produced by the hot branding iron makes the calf bawl lustily and struggle to free itself. The mother cow sometimes resents the punishment of her offspring by charging and chasing the men who are doing the branding; or, if she is of a less fiery disposition, shows her displeasure by a look of reproach as much as to say, "You bad men, what have you done to hurt my little darling?"

A peculiarity of brands is that they do not all grow alike. Sometimes a brand, after it is healed, remains unchanged during the life of the animal. At other times it enlarges to several times its original size. Various reasons are assigned to account for this difference. Some claim that the brand only grows with the calf; others assert that it is due to deep branding; and, again, it is ascribed to lunar influence. But, as to the real cause of the difference, no explanation has been given that really explains the phenomenon.

The cowboy's work is nearly all done in the saddle and calls for much hard riding. He rides like a Centaur, but is clumsy on his feet. Being so much in the saddle his walking muscles become weakened, and his legs pressing against the body of his horse, in time, makes him bowlegged. In addition he wears high-heeled Mexican boots which throw him on his toes when he walks and makes his already shambling gait even more awkward.

A cowboy's life has little in it to inspire him with high ideals or arouse his ambition to achieve greatness. He leads a hard life among rough men and receives only coarse fare and rougher treatment. His life is narrow and he works in a rut that prevents him from taking a broad view of life. All that he has is his monthly wages, and, possibly, a hope that at some future day he may have a herd of cattle of his own.

Managing a herd of range cattle successfully is an art that can only be acquired by long practice, and it is surprising how expert men can become at that business. All the work done among cattle is on horseback, which includes herding, driving, cutting and roping. The trained cow pony seemingly knows as much about a round-up as his master, and the two, together, form a combination that is invincible in a herd of wild cattle. The cow or steer that is selected to be roped or cut out rarely escapes. While the horse is in hot pursuit the rider dexterously whirls his reata above his head until, at a favorable moment, it leaves his hand, uncoiling as it flies through the air, and, if the throw is successful, the noose falls over the animal's head. Suddenly the horse comes to a full stop and braces himself for the shock. When the animal caught reaches the end of the rope it is brought to an abrupt halt and tumbled in a heap on the ground. The horse stands braced pulling on the rope which has been made fast to the horn of the saddle by a few skillful turns. The cowboy is out of the saddle and on his feet in a jiffy. He grasps the prostrate animal by the tail and a hind leg, throws it on its side, and ties its four feet together, so that it is helpless and ready for branding or inspection. The cowboys have tying contests in which a steer is sometimes caught and tied in less time than a minute.

It is a comical sight to see an unhorsed cowboy chase his runaway horse on foot as he is almost sure to do if caught in such a predicament. He ought to know that he cannot outrun his fleet steed in such a race, but seems to be impelled by some strange impulse to make the attempt. After he has run himself out of breath he is liable to realize the folly of his zeal and adopt a more sensible method for capturing his horse.

The cowboy who works on the southwestern range has good cause to fear the malodorous hydrophobia skunk. At a round-up all of the cowboys sleep on the ground. During the night, while they are asleep, the little black and white cat-like animal forages through the camp for something to eat. Without provocation the skunk will attack the sleeper and fasten its sharp teeth in some exposed portion of his anatomy, either the nose or a finger or toe and will not let go until it is killed or forcibly removed. The wound thus made usually heals quickly and the incident is, perhaps, soon forgotten; but after several weeks or months hydrophobia suddenly develops and proves fatal in a short time.

The only known cure for the bite of the skunk is the Pasteur treatment and, since its discovery, as soon as anyone is bitten, he is immediately sent to the Pasteur Institute in Chicago for treatment.

CHAPTER VI. RANCH HAPPENINGS

Ranch life is often full of thrilling incidents and adventures. The cowboy in his travels about the country looking after cattle, hunting wild game or, in turn, being hunted by yet wilder Indians, finds plenty of novelty and excitement to break any fancied monotony which might be considered as belonging to ranch life. In a number of visits to the range country during the past twenty years, the writer has had an opportunity to observe life on a ranch, and experience some of its exciting adventures.

One day in the summer of 1891, Dave Drew, our foreman, Tedrow, one of the cowboys, and myself, made a trip into East Canon in the Dos Cabezas mountains, in search of some large unbranded calves which had been seen running there. We rode leisurely along for some time and passed several small bunches of cattle without finding what we were looking for. As we neared a bend in the canon, Dave, who rode in advance, saw some cattle lying in the shade of a grove of live oak trees. Instantly he spurred his horse into a run and chased after the cattle at full speed, at the same time looking back and shouting that he saw two mavericks and for us to hurry up and help catch them. It was a bad piece of ground to cover and we found it difficult to make progress or to even keep each other in sight. Tedrow hurried up as fast as he could while I brought up the rear.

In trying to get through in the direction that Dave had gone, we tried to make a short cut in order to gain time, but soon found our way completely blocked by immense boulders and dense thickets of cat-claw bushes, which is a variety of mesquite covered with strong, sharp, curved thorns. We turned back to find a better road and after some time spent in hunting an opening we discovered a dim trail which soon led us into a natural park of level ground hidden among the foothills. Here we found Dave who alone had caught and tied down both the calves and was preparing to start a fire to heat the branding irons. What he had done seemed like magic and was entirely incomprehensible to an inexperienced tenderfoot.

Dave explained afterwards that to be successful in such a race much depended on taking the cattle by surprise, and then by a quick, bold dash start them running up the mountain, when it was possible to overtake and rope them; but if once started to running down hill it was not only unsafe to follow on horseback but in any event the cattle were certain to escape. Taking them by surprise seemed to bewilder them and before they could collect their scattered senses, so to speak, and scamper off, the work of capture was done.

Another adventure, which did not end so fortunately for me happened in the fall of 1887 when the country was yet comparatively new to the cattle business. I rode out one day in company with a cowboy to look after strays and, incidentally, to watch for any game that might chance to cross our path. We rode through seemingly endless meadows of fine gramma grass and saw the sleek cattle feeding on plenty and enjoying perfect contentment. Game, also, seemed to be abundant but very shy and as we were not particularly hunting that kind of stock, we forebore giving chase or firing at long range.

After riding about among the hills back of the Pinaleno ranch and not finding anything we concluded to return home. On starting back we separated and took different routes, going by two parallel ravines in order to cover more ground in our search. I had not gone far until I found the cattle we were looking for going to water on the home trail. Jogging on slowly after them and enjoying the beauty of the landscape, I unexpectedly caught a glimpse of a deer lying down under a mesquite tree on the brow of a distant hill. I was in plain sight of the deer, which was either asleep or heedless of danger as it paid no attention whatever to my presence.

Deer and antelope soon become accustomed to horses and cattle and often mix and feed familiarly with the stock grazing on the open range. The deer did not change its position as I quietly rode by and out of sight behind the hill. There I dismounted and stalked the quarry on foot, cautiously making my way up the side of the hill to a point where I would be within easy shooting distance. As I stood up to locate the deer it jumped to its feet and was ready to make off, but before it could start a shot from my Winchester put a bullet through its head, and it

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scarcely moved after it fell. The deer was in good condition and replenished our depleted ranch larder with some choice venison steaks. The head, also, was a fine one the horns being just out of velvet and each antler five pointed, was saved and mounted.

The shot and my lusty halloo soon brought my cowboy friend to the spot. Together we eviscerated the animal and prepared to pack it to camp on my horse. As we were lifting it upon his back the bronco gave a vicious kick which hit me in the left knee and knocked me down. The blow, though severe, glanced off so that no bone was broken. What made the horse kick was a mystery as he was considered safe and had carried deer on other occasions. But a bronco, like a mule, is never altogether reliable, particularly as to the action of its heels. With some delay in getting started and in somewhat of a demoralized condition we mounted and rode home.

Soon after the accident I had a chill which was followed by a fever and there was much pain and swelling in the knee that was hit. A ranch house, if it happens to be a "stag camp" as ours was, is a cheerless place in which to be sick, but everything considered, I was fortunate in that it was not worse. By the liberal use of hot water and such other simples as the place afforded I was soon better; but not until after several months' treatment at home did the injured knee fully recover its normal condition.

The excitement of running cattle or hunting game on the open range in those days was mild in comparison to the panicky feeling which prevailed during every Indian outbreak. The experience of many years had taught the people of Arizona what to expect at such a time and the utter diabolical wickedness of the Apaches when out on the warpath. During the early eighties many such raids occurred which were accompanied by all the usual horrors of brutality and outrage of which the Apaches are capable.

When it became known in the fall of 1885 that Geronimo was again off the reservation and out on another one of his bloody raids the people became panic-stricken. Some left the Territory until such time when the Indian question would be settled and the Government could guarantee freedom from Indian depredations. Those who remained either fled to some near town or fort for protection, or prepared to defend themselves in their own homes as best they could.

What else could the settlers in a new country do? They had everything invested in either mines or cattle and could not afford to leave their property without making some effort to save it even if it had to be done at the risk of their own lives. They had no means of knowing when or where the stealthy Apaches would strike and could only wait for the time in uncertainty and suspense. Many who were in this uncomfortable predicament managed to escape any harm, but others fell victims to savage hatred whose death knell was sounded in the crack of the deadly rifle.

Some personal experiences may help to illustrate this feeling of panic, as I happened to be at the ranch during the time and know how it was myself.

One day in the month of October, 1885, while Geronimo was making his raid through southern Arizona, my brother and I rode through Railroad Pass from Pinaleno ranch to the Lorentz Place, a distance of fifteen miles. It was about four o'clock in the afternoon that we ascended to the top of a hill to take observations and see if anything was happening out of the ordinary. We saw nothing unusual until we were about to leave when we noticed somewhat of a commotion on the old Willcox and Bowie wagon road which parallels the Southern Pacific track. The distance was too great to see distinctly with the naked eye, but looking through our field glasses, which we always carried when out riding, we could plainly see three loaded wagons standing in the road. The drivers had evidently unhitched their teams and, mounted upon the horses' backs, were riding furiously in a cloud of dust down the road towards Bowie.

I asked the judge, who was a resident and supposed to be familiar with the customs of the country while I was only a tenderfoot, what their actions meant. He admitted that he did not understand their conduct unless it was that they had concluded that they could not make Willcox on that day and were returning to some favorable camp

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ground which they had passed on their way up, to spend the night; but the manner of their going was certainly peculiar. After watching them disappear down the road we rode on and reached our destination in safety.

The incident was forgotten until a few days later when we were in Willcox a friend inquired what had become of the Indians which had lately been seen on our range. We replied that we had not seen any Indians nor known of any that had been there. He then related to us how only a few days before three freighters had seen two Indians ride upon a hill and halt. The sight of Indians was enough and their only care after that was to get away from them. They quickly unhitched their horses from the wagons and rode ten miles to Bowie where they gave the alarm and spent the night. The next morning, having heard nothing more from the Indians during the night, they took fresh courage and ventured to return to their wagons, which they found as they had left them unmolested, when they continued their journey. When the freighters were asked why they did not stand off the Indians they said that they only had one gun and not knowing how many more redskins there might be decided that to retreat was the better part of valor. It was my brother and I whom they had seen and mistaken for Indians.

A few days after this event I had a similar scare of my own and after it was over I could sympathize with the poor, frightened freighters. I was alone at the ranch house packing up and preparing to leave for home. While thus occupied I chanced to go to the open door and looking out, to my dismay, I saw Indians. "My heart jumped into my mouth" and for a moment I felt that my time had surely come. Two men were seen riding horseback over the foot hills followed by a pack animal. As I stood watching them and took time to think, it occurred to me that I might be mistaken, and that the men were not Indians after all. As they drew nearer I saw that they were dressed like white men and, therefore, could not be Indians; but my scare while it lasted was painfully real. The men proved to be two neighboring ranchmen who were out looking for lost cattle.

In this raid, the Apaches, after leaving their reservation in the White mountains, traveled south along the Arizona and New Mexico line, killing people as they went, until they reached Stein's Pass. From there they turned west, crossed the San Simon valley and disappeared in the Chiricahua mountains. When next seen they had crossed over the mountains and attacked Riggs' ranch in Pinery canon, where they wounded a woman, but were driven off.

The next place that they visited was the Sulphur Spring ranch of the Chiricahua Cattle Company, where they stole a bunch of horses. The cowboys at the ranch had received warning that there were Indians about and had brought in the horse herd from the range and locked them in the corral. The Apaches came in the night and with their usual adroitness and cunning stole the corral empty. The first intimation which the inmates had that the ranch had been robbed was when the cowboys went in the morning to get their horses they found them gone.

From the Sulphur Spring ranch they crossed the Sulphur Spring valley in the direction of Cochise's stronghold in the Dragoon mountains. Before reaching the mountains they passed Mike Noonan's ranch where they shot its owner, who was a lone rancher and had lived alone in the valley many years. He was found dead in his door yard with a bullet hole in the back of his head. He evidently did not know that the Indians were near and was seemingly unconscious of any danger when he was killed.

The Indians were not seen again after entering the stronghold until they crossed the line into Mexico, where they were pursued by United States soldiers. After a long, stern chase Geronimo surrendered himself and followers to General Miles, who brought them back to Arizona. As prisoners they were all loaded into cars at Bowie and taken to Florida. The general in command thought it best to take them clear out of the country in order to put an effectual stop to their marauding. Later they were removed to the Indian Territory where they now live.

The rest of the Apaches remain in Arizona and live on the San Carlos reservation on the Gila river where they are being inducted into civilization. Since the disturbing element among them has been removed there has been no more trouble. They seem to have settled down with a sincere purpose to learn the white man's way and are quiet and peaceable. They are laborers, farmers and stockmen and are making rapid progress in their new life.

CHAPTER VII. A MODEL RANCH

Any one who has been in Arizona and failed to visit the Sierra Bonita ranch missed seeing a model ranch. Henry C. Hooker, the owner of this splendid property, was born in New England and is a typical Yankee, who early emigrated west and has spent most of his life on the frontier.

He went to Arizona at the close of the Civil War and engaged in contracting for the Government and furnishing supplies to the army. It was before the days of railroads when all merchandise was hauled overland in wagons and cattle were driven through on foot. He outfitted at points in Texas and on the Rio Grande and drove his cattle and wagons over hundreds of miles of desert road through a country that was infested by hostile Indians.

Such a wild life was naturally full of adventures and involved much hardship and danger. The venture, however, prospered and proved a financial success, notwithstanding some losses in men killed, wagons pillaged and cattle driven off and lost by bands of marauding Apaches.

In his travels he saw the advantages that Arizona offered as a grazing country, which decided him to locate a ranch and engage in the range cattle business.

The ranch derives its name from the Graham or Pinaleno mountains which the Indians called the Sierra Bonita because of the many beautiful wild flowers that grow there. It is twenty miles north of Willcox, a thriving village on the Southern Pacific Railroad, and ten miles south of Ft. Grant, that nestles in a grove of cotton trees at the foot of Mt. Graham, the noblest mountain in southern Arizona.

The Sierra Bonita ranch is situated in the famous Sulphur Spring valley in Cochise County, Arizona, which is, perhaps, the only all grass valley in the Territory. The valley is about twenty miles wide and more than one hundred miles long and extends into Mexico. Its waters drain in opposite directions, part flowing south into the Yaqui river, and part running north through the Aravaipa Canon into the Gila and Colorado rivers, all to meet and mingle again in the Gulf of California.

Fine gramma grass covers the entire valley and an underground river furnishes an inexhaustible supply of good water. In the early days of overland travel before the country was protected or any of its resources were known, immigrants, who were bound for California by the Southern route and ignorant of the near presence of water, nearly perished from thirst while crossing the valley.

The water rises to within a few feet of the surface and, since its discovery, numerous wells have been dug and windmills and ranch houses dot the landscape in all directions; while thousands of cattle feed and fatten on the nutritious gramma grass. Its altitude is about four thousand feet above the sea and the climate is exceptionally fine.

The Sierra Bonita ranch is located on a natural cienega of moist land that has been considerably enlarged by artificial means. In an average year the natural water supply of the ranch is sufficient for all purposes but, to guard against any possible shortage in a dry year, water is brought from the mountains in ditches that have been constructed at great labor and expense and is stored in reservoirs, to be used as needed for watering the cattle and irrigating the fields. The effect of water upon the desert soil is almost magical and even though the rains fail and the earth be parched, on the moist land of the cienega the fields of waving grass and grain are perennially green.

The owner has acquired by location and purchase, title to several thousand acres of land, that is all fenced and much of it highly cultivated. It consists of a strip of land one mile wide and ten miles long, which is doubly valuable because of its productiveness and as the key that controls a fine open range.

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The original herd of cattle that pastured on the Sierra Bonita ranch thirty years ago was composed of native scrub stock from Texas and Sonora. This undesirable stock was sold at the first opportunity, and the range re-stocked by an improved grade of Durham cattle. The change was a long stride in the direction of improvement, but, later on, another change was made to Herefords, and during recent years only whitefaces have been bred upon the ranch.

Col. Hooker has a strong personality, holds decided opinions and believes in progress and improvement. He has spent much time and money in experimental work, and his success has demonstrated the wisdom of his course. Just such men are needed in every new country to develop its resources and prove its worth.

He saw that the primitive methods of ranching then in vogue must be improved, and began to prepare for the change which was coming. What he predicted came to pass, and the days of large herds on the open range are numbered.

Many of them have already been sold or divided up, and it is a question of only a short time when the rest will meet the same fate.

When this is done there may be no fewer cattle than there are now but they will be bunched in smaller herds and better cared for. Scrubs of any kind are always undesirable, since it has been proved that quality is more profitable than quantity. A small herd is more easily handled, and there is less danger of loss from straying or stealing.

The common method of running cattle on the open range is reckless and wasteful in the extreme and entirely inexcusable. The cattle are simply turned loose to rustle for themselves. No provision whatever is made for their welfare, except that they are given the freedom of the range to find water, if they can, and grass that often affords them only scant picking.

Under the new regime the cattle are carefully fed and watered, if need be in a fenced enclosure, that not only gives the cattle humane treatment but also makes money for the owner. The men are instructed to bring in every sick or weak animal found on the range and put it into a corral or pasture, where it is nursed back to life. If an orphan calf is found that is in danger of starving it is picked up, carried home and fed. On the average ranch foundlings and weaklings get no attention whatever, but are left in their misery to pine away and perish from neglect. The profit of caring for the weak and sick animals on the Sierra Bonita ranch amounts to a large sum every year, which the owner thinks is worth saving.

Another peculiarity of ranch life is that where there are hundreds or, perhaps, thousands of cows in a herd, not a single cow is milked, nor is a cup of milk or pound of butter ever seen upon the ranch table. It is altogether different on Hooker's ranch. There is a separate herd of milch cows in charge of a man whose duty it is to keep the table supplied with plenty of fresh milk and butter. No milk ever goes to waste. If there is a surplus it is fed to the calves, pigs and poultry.

During the branding season the work of the round-up is all done in corrals instead of, as formerly, out upon the open range. Each calf after it is branded, if it is old and strong enough to wean, is taken from the cow and turned into a separate pasture. It prevents the weak mother cow from being dragged to death by a strong sucking calf and saves the pampered calf from dying of blackleg by a timely change of diet.

Instead of classing the cattle out on the open range as is the usual custom, by an original system of corrals, gates and chutes the cattle are much more easily and quickly classified without any cruelty or injury inflicted upon either man or beast. Classing cattle at a round-up by the old method is a hard and often cruel process, that requires a small army of both men and horses and is always rough and severe on the men, horses and cattle.

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Besides the herds of sleek cattle, there are also horses galore, enough to do all of the work on the ranch as well as for pleasure riding and driving. There is likewise a kennel of fine greyhounds that are the Colonel's special pride. His cattle, horses and dogs are all of the best, as he believes in thoroughbreds and has no use whatever for scrubs of either the human or brute kind.

The dogs are fond of their master and lavish their caresses on him with almost human affection. In the morning when they meet him at the door Ketchum pokes his nose into one of his master's half open hands and Killum performs the same act with the other hand. Blackie nips him playfully on the leg while Dash and the rest of the pack race about like mad, trying to express the exuberance of their joy.

In the bunch is little Bob, the fox terrier, who tries hard but is not always able to keep up with the hounds in a race. He is active and gets over the ground lively for a small dog, but in a long chase is completely distanced and outclassed to his apparent disgust. Aside from the fine sport that the dogs afford, they are useful in keeping the place clear of all kinds of "varmints" such as coyotes, skunks and wild cats.

How much Col. Hooker appreciates his dogs is best illustrated by an incident. One morning after greeting the dogs at the door, he was heard to remark sotto voce.

"Well, if everybody on the ranch is cross, my dogs always greet me with a smile."

There appears to be much in the dog as well as in the horse that is human, and the trio are capable of forming attachments for each other that only death can part.

The ranch house is a one-story adobe structure built in the Spanish style of a rectangle, with all the doors opening upon a central court. It is large and commodious, is elegantly furnished and supplied with every modern convenience. It affords every needed comfort for a family and is in striking contrast with the common ranch house of the range that is minus every luxury and often barely furnishes the necessaries of life.

CHAPTER VIII. SOME DESERT PLANTS

Much of the vegetation that is indigenous to the southwest is unique and can only be seen at its best in the Gila valley in southern Arizona. The locality indicated is in the arid zone and is extremely hot and dry. Under such conditions it is but natural to suppose that all plant life must necessarily be scant and dwarfed, but such is not the fact. Upon the contrary many of the plants that are native to the soil and adapted to the climate grow luxuriantly, are remarkably succulent and perennially green.

How they manage to acquire so much sap amidst the surrounding siccidity is inexplicable, unless it is that they possess the function of absorbing and condensing moisture by an unusual and unknown method. It is, however, a beneficent provision of nature as a protection against famine in a droughty land by furnishing in an acceptable form, refreshing juice and nutritious pulp to supply the pressing wants of hungry and thirsty man and beast in time of need.

Another peculiarity of these plants is that they are acanaceous; covered all over with sharp thorns and needles. Spikes of all sorts and sizes bristle everywhere and admonish the tenderfoot to beware. Guarded by an impenetrable armor of prickly mail they defy encroachment and successfully repel all attempts at undue familiarity. To be torn by a cat-claw thorn or impaled on a stout dagger leaf of one of these plants would not only mean painful laceration but, perhaps, serious or even fatal injury. Notwithstanding their formidable and forbidding appearance they are nevertheless attractive and possess some value either medicinal, commercial or ornamental.

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The maguey, or American aloe, is the most abundant and widely distributed of the native plants. It is commonly known as mescal, but is also called the century plant from a mistaken notion that it blossoms only once in a hundred years. Its average life, under normal conditions, is about ten years and it dies immediately after blossoming.

It attains its greatest perfection in the interior of Mexico where it is extensively cultivated. It yields a large quantity of sap which is, by a simple process of fermentation, converted into a liquor called pulque that tastes best while it is new and is consumed in large quantities by the populace. Pulque trains are run daily from the mescal plantations, where the pulque is made, into the large cities to supply the bibulous inhabitants with their customary beverage. In strength and effect it resembles lager beer, and is the popular drink with all classes throughout Mexico where it has been in vogue for centuries and is esteemed as "the only drink fit for thirsty angels and men."

The agave is capable of being applied to many domestic uses. Under the old dispensation of Indian supremacy it supplied the natives their principal means of support. Its sap was variously prepared and served as milk, honey, vinegar, beer and brandy. From its tough fiber were made thread, rope, cloth, shoes and paper. The strong flower stalk was used in building houses and the broad leaves for covering them.

The heart of the maguey is saccharine and rich in nutriment. It is prepared by roasting it in a mescal pit and, when done, tastes much like baked squash. It is highly prized by the Indians, who use it as their daily bread. Before the Apaches were conquered and herded on reservations a mescal bake was an important event with them. It meant the gathering of the clans and was made the occasion of much feasting and festivity. Old mescal pits can yet be found in some of the secluded corners of the Apache country that were once the scenes of noisy activity, but have been forsaken and silent for many years.

The fiery mescal, a distilled liquor that is known to the trade as aguardiente, or Mexican brandy, is much stronger than pulque, but less used. Both liquors are said to be medicinal, and are reputed to possess diuretic, tonic and stimulant properties.

Next in importance to the mescal comes the yucca. There are several varieties, but the palm yucca is the most common, and under favorable conditions attains to the proportions of a tree. Fine specimens of yucca grow on the Mojave desert in California that are large and numerous enough to form a straggling forest.

The tree consists of a light, spongy wood that grows as a single stem or divides into two or more branches. Each branch is crowned by a tuft of long, pointed leaves that grow in concentric circles. As the new leaves unfold on top the old leaves are crowded down and hang in loose folds about the stem like a flounced skirt. When dry the leaves burn readily, and are sometimes used for light and heat by lost or belated travelers. White threads of a finer fiber are detached from the margins of the leaves that are blown by the wind into a fluffy fleece, in which the little birds love to nest.

A grove of yucca trees presents a grotesque appearance. If indistinctly viewed in the hazy distance they are easily mistaken for the plumed topknots of a band of prowling Apaches, particularly if the imagination is active with the fear of an Indian outbreak.

The wood of the yucca tree has a commercial value. It is cut into thin sheets by machinery which are used for surgeon's splints, hygienic insoles, tree protectors and calendars. As a splint it answers an admirable purpose, being both light and strong and capable of being molded into any shape desired after it has been immersed in hot water. Its pulp, also, makes an excellent paper.

Another variety of yucca is the amole, or soap plant. Owing to the peculiar shape of its leaves it is also called Spanish bayonet. Its root is saponaceous, and is pounded into a pulp and used instead of soap by the natives. It grows a bunch of large white flowers, and matures an edible fruit that resembles the banana. The Indians call it

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oosa, and eat it, either raw or roasted in hot ashes.

A species of yucca called sotal, or saw-grass, grows plentifully in places, and is sometimes used as food for cattle when grass is scarce. In its natural state it is inaccessible to cattle because of its hard and thorny exterior. To make it available it is cut down and quartered with a hoe, when the hungry cattle eat it with avidity. Where the plant grows thickly one man can cut enough in one day to feed several hundred head of cattle.

There are several other varieties of yucca that possess no particular value, but all are handsome bloomers, and the mass of white flowers which unfold during the season of efflorescence adds much to the beauty of the landscape.

The prickly pear cactus, or Indian fig, of the genus *Opuntia* is a common as well as a numerous family. The soil and climate of the southwest from Texas to California seem to be just to its liking. It grows rank and often forms dense thickets. The root is a tough wood from which, it is said, the best Mexican saddletrees are made.

The plant consists of an aggregation of thick, flat, oval leaves, which are joined together by narrow bands of woody fiber and covered with bundles of fine, sharp needles. Its pulp is nutritious and cattle like the young leaves, but will not eat them after they become old and hard unless driven to do so by the pangs of hunger. In Texas the plant is gathered in large quantities and ground into a fine pulp by machinery which is then mixed with cotton-seed meal and fed to cattle. The mixture makes a valuable fattening ration and is used for finishing beef steers for the market.

The cholla, or cane cactus, is also a species of *Opuntia*, but its stem or leaf is long and round instead of short and flat. It is thickly covered with long, fine, silvery-white needles that glisten in the sun. Its stem is hollow and filled with a white pith like the elder. After the prickly bark is stripped off the punk can be picked out through the fenestra with a penknife, which occupation affords pleasant pastime for a leisure hour. When thus furbished up the unsightly club becomes an elegant walking stick.

The cholla is not a pleasant companion as all persons know who have had any experience with it. Its needles are not only very sharp, but also finely barbed, and they penetrate and cling fast like a burr the moment that they are touched. Cowboys profess to believe that the plant has some kind of sense as they say that it jumps and takes hold of its victim before it is touched. This action, however, is only true in the seeming, as its long transparent needles, being invisible, are touched before they are seen. When they catch hold of a moving object, be it horse or cowboy, an impulse is imparted to the plant that makes it seem to jump. It is an uncanny movement and is something more than an ocular illusion, as the victim is ready to testify.

These desert plants do not ordinarily furnish forage for live stock, but in a season of drought when other feed is scarce and cattle are starving they will risk having their mouths pricked by thorns in order to get something to eat and will browse on mesquite, yucca and cactus and find some nourishment in the unusual diet, enough, at least, to keep them from dying. The plants mentioned are not nearly as plentiful now as they once were. Because of the prolonged droughts that prevail in the range country and the overstocking of the range these plants are in danger of being exterminated and, if the conditions do not soon change, of becoming extinct.

The saguaro, or giant cactus, is one of nature's rare and curious productions. It is a large, round, fluted column that is from one to two feet thick and sometimes sixty feet high. The trunk is nearly of an even thickness from top to bottom but, if there is any difference, it is a trifle thicker in the middle. It usually stands alone as a single perpendicular column, but is also found bunched in groups. If it has any branches they are apt to start at right angles from about the middle of the tree and curve upward, paralleling the trunk, which form gives it the appearance of a mammoth candelabrum.

The single saguaro pillar bears a striking resemblance to a Corinthian column. As everything in art is an attempt to imitate something in nature, is it possible that Grecian architecture borrowed its notable pattern from the Gila

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valley?

Southern Arizona is the natural home and exclusive habitat of this most singular and interesting plant and is, perhaps, the only thing growing anywhere that could have suggested the design. Wherever it grows, it is a conspicuous object on the landscape and has been appropriately named "The Sentinel of the Desert."

Its mammoth body is supported by a skeleton of wooden ribs, which are held in position by a mesh of tough fibers that is filled with a green pulp. Rows of thorns extend its entire length which are resinous and, if ignited, burn with a bright flame. They are sometimes set on fire and have been used by the Apaches for making signals. The cactus tree, like the eastern forest tree, is often found bored full of round, holes that are made by the Gila woodpecker. When the tree dies its pulp dries up and blows away and there remains standing only a spectral figure composed of white slats and fiber that looks ghostly in the distance.

Its fruit is delicious and has the flavor of the fig and strawberry combined. It is dislodged by the greedy birds which feed on it and by arrows shot from bows in the hands of the Indians. The natives esteem the fruit as a great delicacy, and use it both fresh and dried and in the form of a treacle or preserve.

The ocotillo, or mountain cactus, is a handsome shrub that grows in rocky soil upon the foothills and consists of a cluster of nearly straight poles of brittle wood covered with thorns and leaves. It blossoms during the early summer and each branch bears on its crest a bunch of bright crimson flowers.

If set in a row the plant makes an ornamental hedge and effective fence for turning stock. The seemingly dry sticks are thrust into yet drier ground where they take root and grow without water. Its bark is resinous and a fagot of dry sticks makes a torch that is equal to a pineknot.

The echinocactus, or bisnaga, is also called "The Well of the Desert." It has a large barrel-shaped body which is covered with long spikes that are curved like fishhooks. It is full of sap that is sometimes used to quench thirst. By cutting off the top and scooping out a hollow, the cup-shaped hole soon fills with a sap that is not exactly nectar but can be drunk in an emergency. Men who have been in danger of perishing from thirst on the desert have sometimes been saved by this unique method of well digging.

Greasewood, or creasote bush as it is sometimes called on account of its pungent odor, grows freely on the desert, but has little or no value and cattle will not touch it. Like many other desert plants it is resinous and if thrown into the fire, the green leaves spit and sputter while they burn like hot grease in a frying pan.

The mesquite tree is peculiarly adapted to the desert and is the most valuable tree that grows in the southwest. As found growing on the dry mesas of Arizona, it is only a small bush, but on the moist land of a river bottom it becomes a large forest tree. A mesquite forest stands in the Santa Cruz valley south of Tucson that is a fair sample of its growth under favorable conditions.

Its wood is hard and fine grained and polishes beautifully. It is very durable and is valuable for lumber, fence posts and firewood. On the dry mesas it seems to go mostly to root that is out of all proportion to the size of the tree. The amount of firewood that is sometimes obtained by digging up the root of a small mesquite bush is astonishing.

It makes a handsome and ornamental shade tree, having graceful branches, feathery leaves and fragrant flowers, and could be cultivated to advantage for yard and park purposes.

Its principal value, however, lies in its seed pods, which grow in clusters and look like string beans. The mesquite bean furnishes a superior article of food and feeds about everything that either walks or flies on the desert. The Indians make meal of the seed and bake it into bread. Cattle that feed on the open range will leave good grass to

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browse on a mesquite bush. Even as carnivorous a creature as the coyote will make a full meal on a mess of mesquite beans and seem to be satisfied. The tree exudes a gum that is equal to the gum arabic of commerce.

The palo verde is a tree without leaves and is a true child of the desert. No matter how hot and dry the weather the palo verde is always green and flourishing. At a distance it resembles a weeping willow tree stripped of its leaves. Its numerous long, slender, drooping branches gracefully criss-cross and interlace in an intricate figure of filigree work. It has no commercial value, but if it could be successfully transplanted and transported it would make a desirable addition to green-house collections in the higher latitudes.

The romantic mistletoe that is world renowned for its magic influence in love affairs, grows to perfection in southern Arizona. There are several varieties of this parasitic plant that are very unlike in appearance. Each kind partakes more or less of the characteristics of the tree upon which it grows, but all have the glossy leaf and waxen berry.

CHAPTER IX. HOOKER'S HOT SPRINGS

Arizona has several hot springs within her borders but, perhaps, none are more valuable nor picturesquely located than Hooker's hot springs. These springs are located in the foothills on the western slope of the Galiura mountains in southeastern Arizona, thirty-five miles west of Willcox on the Southern Pacific Railroad. The spot is beautifully situated, commanding an extended view of valley and mountain scenery.

There are a dozen springs, big and little, in the group and are scattered over several acres of hillside. The temperature of the water is 130 degrees Fahrenheit and too hot to drink but, if sipped slowly, it makes an admirable hot-water draught. The springs evidently have their source deep down in the earth and the flow of water never varies. When the water from the different springs is all united it forms a good sized brook. The water is conducted through pipes into the bath house, where it supplies a row of bath-tubs with water of any desired temperature. The surplus water flows into a large earthen tank or artificial lake and is used for irrigating a small farm that produces grain, fruits and vegetables.

The water from these springs is in great demand and is not only sought by the human biped, but is also in favor with the equine quadruped. Every morning after the stable doors are thrown open and the horses turned loose they invariably, of their own accord, proceed to the lake, wade out into shallow water and take a bath. They lie down and splash the water about like a lot of schoolboys taking a swim.

The water from all the springs is perfectly soft and pure. It cannot be called a mineral water, as an analysis shows that it contains only a trace of any kind of mineral matter. This peculiarity of the water is no damage to the springs, since purity is the best recommendation that any water can have. Water that is heavily mineralized may be medicinal, but is not necessarily remedial, or even wholesome, notwithstanding the popular belief to the contrary. Water that is charged with much mineral is spoiled for drinking. Moderately hard water need not be injurious to anybody, but is especially beneficial to children. The assimilative function in the child appropriates mineral water tardily and sometimes absorbs it altogether too slowly for the child's good. Its absence in the system causes a disease called rickets, in which, from all lack of lime, the bones of the child become soft and yielding. The bones of a rickety child will bend rather than break. It is slow to walk and inclines to become bow-legged.

It is entirely different in old age. As the years multiply the system absorbs an abnormal and ever increasing amount of calcareous matter. The bones become unduly hard and brittle and are easily broken. Bony matter is liable to be deposited in and about the joints, when they become stiff and painful. It also lodges in the various soft tissues of the body, and ossification of the valves of the heart and walls of the arteries sometimes happens. It weakens the blood vessels so that they easily rupture, which causes apoplexy, paralysis and death. Calcareous concretions in the kidneys and bladder, also, come from the same cause, and are called gravel. Such deposits are

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not only annoying and painful to the patient, but in time may prove fatal if not removed by surgery.

Middle-aged and elderly people should never drink anything but soft water. If a natural supply of soft water cannot be obtained distilled water should be substituted. If neither natural soft water nor distilled water are available, and there is doubt as to the purity of the water that is being used, it should be boiled and then let stand to cool and settle. Boiling not only destroys and renders harmless any organic germs that may be present, but also precipitates and eliminates much of its inorganic salts.

A few drops of a weak solution of nitrate of silver added to a glass of water will quickly determine its quality. If the water that is being tested is free from mineral matter no change is produced, but if it contains mineral it turns the water opaque or milky.

The value of mineral water as a healthful or necessary drink has been greatly exaggerated. While it may do good in some instances, it is not nearly as beneficial as is commonly supposed. Instead of it always doing good the contrary is often true.

If a mineral water is desired there is no necessity of visiting a mineral spring to obtain it, as it can be made artificially at home or at the nearest pharmacy in any quantity or of any quality desired, with the additional advantage of having it contain exactly the ingredients wanted. There are nearly as many mineral waters on the market as there are patent medicines, and both are about equally misrepresented and deceiving. All classes of people would undoubtedly be greatly benefited in health, strength and longevity if more attention was given to the quality of our domestic water supply. Any one who needs a change, other things being equal, should seek a resort that furnishes pure, soft water rather than choose a spring that only boasts of its mineral properties. Not all of the benefit that is derived from a course at watering place is due to the virtues of the water, be it ever so potent. The change of environment, climate, diet, bathing, etc., are each factors that contribute something towards a cure.

Next to using pure water as a beverage it is important to know how to bathe properly, such knowledge being simple and plain enough if only common sense is used. Usually the more simply a bath is administered the better are the results. Some people seem to think that in order to derive any benefit from a bath it is necessary to employ some unusual or complicated process. Nothing is further from the truth. The plain, tepid bath is the best for general use. It thoroughly cleanses the body and produces no unpleasant shock. A hot bath is rarely needed but, if it is used, enough time should be given after it to rest and cool off before going out into the open air in order to avoid taking cold. The good or harm of a bath must be judged by its effects.

A bath is only beneficial when it is followed by a healthy reaction, which is indicated by an agreeable feeling of warmth and comfort, and is injurious if the subject feels cold, weak or depressed. A bath does not affect all people alike; what will do one person good may injure another. It is never wise to prescribe a stereotyped treatment for every patient. The disease, temperament and constitution of each individual must be taken into account and the temperature and frequency of the bath must be determined and regulated by the necessity and idiosyncrasies of each case. The amount of bathing that a strong, full-blooded person could endure would mop out the life of a thin, bloodless weakling.

Locally, these springs have become famous because of the remarkable cures they have effected, and are sought by many sick people who have failed to find relief by other means. Before the white man came the Indians used the water for curing their sick. The water is curative in rheumatism, neuralgia, dyspepsia, blood and skin disorders and kidney complaint. The water cure is all right even if it does not always fulfill every expectation.

Hooker's hot springs is a pleasant place to visit for people who are not invalids. It is off the beaten path of travel and is an ideal spot for the tired man who needs a rest. It has not yet been overrun by the crowd, but retains all of the natural charm of freshness which the old resorts have lost. Here nature riots in all of her wild beauty and has not yet been perceptibly marred by the despoiling hand of man.

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Aside from the luxury of the baths which the place affords the visitor can find a great deal to please him. The climate is healthful and the weather pleasant during most of the year. In the near vicinity much can be found in nature that is interesting. Never-failing mountain streams, deep canons and dark forests wait to be visited and explored, while curiosities in animal and vegetable life abound. Not far off is a place here perfect geodes of chalcedony are found.

Mining and ranching are the leading industries of the country and a visit to some neighboring mine or cattle ranch is not without interest to the novice. But, if he starts out on such a trip he must decide to make a day of it, as the country is sparsely settled and the distances long between camps. If the accommodations where he stops are not always luxurious the welcome is cordial and the entertainment comfortable. The new experience is also delightfully romantic.

CHAPTER X. CANON ECHOES

The Colorado Plateau, in northern Arizona, is the union of the Rocky and Sierra Nevada mountains in their southward trend, and forms the southern rim of the Great Basin. This depression was once a vast inland sea, of which nothing remains but the Salt Lake of Utah, and is drained by the Colorado river. The entire plateau region is remarkable for its grand scenery abysmal chasms, sculptured buttes and towering cliffs, which are "brightly colored as if painted by artist Gods, not stained and daubed by inharmonious hues but beautiful as flowers and gorgeous as the clouds." The plateau is an immense woodland of pines known as the Coconino Forest.

The San Francisco mountains, nearly thirteen thousand feet high, stand in the middle of the plateau which is, also, the center of an extensive extinct volcanic field. The whole country is covered with cinders which were thrown from active volcanoes centuries ago. The track of the Santa Fe Pacific railroad, clear across Arizona, is ballasted with cinders instead of gravel that were dug from pits on its own right of way.

Near the southern base of the San Francisco mountains is the town of Flagstaff built in a natural forest of pine trees. It is sometimes called the Skylight City because of its high altitude, rarefied atmosphere and brilliant sky. It is said to have been named by a company of soldiers who camped on the spot while out hunting Indians, when the country was new. It happened to be on the Fourth of July and they celebrated the day by unfurling Old Glory from the top of a pine tree, which was stripped of its branches and converted into a flagstaff. Here is located the Lowell Observatory, which has made many valuable discoveries in astronomy. It is a delightful spot and offers many attractions to the scientist, tourist and health seeker.

One of the many interesting objects of this locality is the Ice Cave situated eight miles southwest of the town. It not only attracts the curious, but its congealed stores are also drawn on by the people who live in the vicinity when the domestic ice supply runs short. The cave is entered from the side of a ravine and its opening is arched by lava rock. How the ice ever got there is a mystery unless it is, as Mr. Volz claims, glacial ice that was covered and preserved by a thick coat of cinders which fell when the San Francisco Peaks were in active eruption. As far as observed the ice never becomes more nor ever gets less, except what is removed by mining.

The region is unusually attractive to the naturalist. It is the best field for the study of entomology that is known. But all nature riots here. Dr. C. Hart Merriam, in his report of a biological survey of the San Francisco mountains and Painted Desert, states that there are seven distinct life zones in a radius of twenty-five miles running the entire gamut from the Arctic to the Tropic.[2] The variety of life which he found and describes cannot be duplicated in the same space anywhere else upon the globe.

[2] Results of a Biological Survey of the San Francisco Mountain Region and Painted Desert of the Little Colorado, Arizona. 1890.

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But the greatest natural wonder of this region and, it is claimed by competent judges of the whole world, is the Grand Canon of Arizona, which is seventy-two miles north of Flagstaff. Thurber's stage line, when it was running, carried passengers through in one day, but after the railroad was built from Williams to Bright Angel the stage was abandoned. However it is an interesting trip and many people make it every summer by private conveyance who go for an outing and can travel leisurely. It is a good natural road and runs nearly the entire distance through an open pine forest.

Two roads leave Flagstaff for the Canon called respectively the summer and winter roads. The former goes west of the San Francisco mountains and intersects with the winter road that runs east of the peaks at Cedar Ranch, which was the midway station of the old stage line. The summer road is the one usually travelled, as the winter road is almost destitute of water.

The road ascends rapidly from an elevation of seven thousand feet at Flagstaff to eleven thousand feet at the summit, and descends more gradually to Cedar Ranch, where the elevation is less than five thousand feet and in distance is about halfway to the Canon. Here cedar and pinon trees take the place of the taller pines. Cedar Ranch is on an arm of the Painted Desert, which stretches away towards the east over a wide level plain to the horizon. From this point the road ascends again on an easy grade until it reaches an elevation of eight thousand feet at the Canon.

During the long drive through the pine woods the appearance of the country gives no hint of a desert, but beautiful scenery greets the eye on every hand. The air is filled with the fragrance of pine and ozone that is as exhilarating as wine. No signs of severe windstorms are seen in broken branches and fallen trees. If an occasional tree is found lying prostrate it was felled either by the woodman's ax or one of nature's destructive forces, fire or decay, or both. But the large number of shattered trees which are encountered during the day give evidence that the lightning is frequently very destructive in its work. The bark of the pine trees is of a reddish gray color, which contrasts brightly with the green foliage.

The winter road furnishes even more attractions than the summer road on which line a railroad should be built through to the Canon. Soon after leaving town a side road leads to the cliff dwellings in Walnut Canon. Along the wayside a signboard points the direction to the Bottomless Pit, which is a deep hole in the ground that is only one of many such fissures in the earth found on the Colorado Plateau. Four miles east of Canon Diablo a narrow fissure from a few inches to several feet wide and hundreds of feet deep has been traced in a continuous line over one hundred miles.

Further on a group of cave dwellings can be seen among the rocks upon a distant bill. A turn in the road next brings the Sunset Mountain into view. Its crest glows with the colors of sunset, which unusual effect is produced by colored rocks that are of volcanic origin. Black cinders cover its steep sides and its brow is the rim of a deep crater. Between Sunset Peak and O'Leary Peak is the Black Crater from which flowed at one time thick streams of black lava that hardened into rock and are known as the lava beds. Scores of crater cones and miles of black cinders can be seen from Sunset Mountain, and lava and cinders of this region look as fresh as if an eruption had occurred but yesterday.

A peculiarity of the pine trees which grow in the cinders is that their roots do not go down but spread out upon the surface. Some of the roots are entirely bare while others are half buried in cinders. They are from an inch to a foot thick and from ten to fifty feet long, according to the size of the tree which they support. The cause of the queer root formation is not apparent.

The whole plateau country is scarce of water. The Grand Canon drains the ground dry to an unusual depth. The nearest spring of water to the Canon at Grand View is Cedar Spring, forty miles distant. Until recently all the water used at the canon was either packed upon burros from springs down in the canon or caught in ponds or reservoirs from rains or melted snow. Since the completion of the railroad the water is hauled in on cars

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constructed for that purpose.

The watershed of the canon slopes away from the rim and instead of the storm water running directly into the river it flows in the opposite direction. Only after a long detour of many miles does it finally reach the river by the Little Colorado or Cataract Creek.

Now that the Grand Canon is made accessible by rail over a branch road of the Santa Fe from Williams on the main line, it is reached in comparative ease and comfort. But to stop at the Bright Angel Hotel and look over the guard rail on the cliff down into the canon gives merely a glimpse of what there is to see. A brief stay of one day is better than not stopping at all, but to get even an inkling of its greatness and grandeur days and weeks must be spent in making trips up and down and into the canon.

After having seen the canon at Bright Angel the next move should be to go to Grand View fourteen miles up the canon. An all day's stage ride from Flagstaff to the canon was tiresome, but the two hours' drive through the pine woods from Bright Angel to Grand View is only pleasant recreation.

Seeing the Grand Canon for the first time does not necessarily produce the startling and lachrymose effects that have been described by some emotional writers, but the first sight never disappoints and always leaves a deep and lasting impression.

As immense as is the great chasm it is formed in such harmonious proportions that it does not shock the senses. But as everything about the canon is built on such a grand scale and the eyes not being accustomed to such sights it is impossible to comprehend it to measure its dimensions correctly or note every detail of form and color at the first glance. As the guide remarked, "God made it so d big that you can't lie about it."

To comprehend it at all requires time to re-educate the senses and make them accustomed to the new order of things. But even a cursory view will always remain in the memory as the event of a lifetime in the experience of the average mortal.

Distance in the canon cannot be measured by the usual standards. There are sheer walls of rocks that are thousands of feet high and as many more feet deep, but where the bottom seems to be is only the beginning of other chasms which lie in the dark shadows and descend into yet deeper depths below. The canon is not a single empty chasm, which is the universal conception of a canon, but consists of a complex system of sub and side canons that is bewildering. Out of its depths rise an infinite number and variety of castellated cliffs and sculptured buttes that represent every conceivable variety of architecture. They have the appearance of a resurrected city of great size and beauty which might have been built by an army of Titans then buried and forgotten.

A trip into the canon down one of the trails makes its magnitude even more impressive than a rim view. The distance across the chasm is also much greater than what it seems to be, which is demonstrated by the blue haze that fills the canon. The nearby buttes are perfectly distinct, but as the distance increases across the great gorge the haze gradually thickens until the opposite wall is almost obscured by the mist.

The myriads of horizontal lines which mark the different strata of rocks have the appearance of a maze of telegraph wires strung through the canon.

A ride leisurely on horseback along the rim trail from Thurber's old camp to Bissell's Point, seven miles up the canon, and back is easily made in a day. It presents a panorama of magnificent views all along the rim, but Bissell's is conceded to be the best view point on the canon. From this point about thirty miles of river can be seen as it winds in and out deep down among the rocks. The Colorado river is a large stream, but as seen here a mile below and several miles out, it dwindles into insignificance and appears no larger than a meadow brook. The river looks placid in the distance, but is a raging, turbulent torrent in which an ordinary boat cannot live and the roar of

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its wild waters can be distinctly heard as of the rushing of a distant train of cars.

A second day spent in riding down the canon to Grand View Point and back is equally delightful. Looking across a bend in the canon from Grand View Point to Bissell's Point the distance seems to be scarcely more than a stone's throw, yet it is fully half the distance of the circuitous route by the rim trail.

There are three trails leading into the canon and down to the river, the Bright Angel, Grand View and Hance trails, which are at intervals of eight and twelve miles apart. They are equally interesting and comparatively safe if the trip is made on the back of a trained pony or burro with a competent guide.

The Hance trail is a loop and is twenty miles long. It is seven miles down to the river, six miles up the stream and seven miles back to the rim. It was built single handed by Captain John Hance, who has lived many years in the canon. The trail is free to pedestrians, but yields the captain a snug income from horse hire and his own services as guide for tourists who go over the trail.

Captain Hance is an entertaining raconteur and he spins many interesting yarns for the amusement, if not the edification, of his guests. The serious manner in which he relates his stories makes it sometimes hard to tell whether he is in jest or earnest. His acknowledged skill in mountaineering, and felicity in romancing has won for him more than a local reputation and the distinguished title of Grand Canon Guide and Prevaricator.

He relates how "once upon a time" he pursued a band of mountain sheep on the rim of the canon. Just as he was about to secure his quarry the sheep suddenly turned a short corner and disappeared behind some rocks. Before he realized his danger he found himself on the brink of a yawning abyss and under such a momentum that he could not turn aside or stop his horse. Together they went over the cliff in an awful leap. He expected to meet instant death on the rocks below and braced himself for the shock. As the fall was greater than usual, being over a mile deep in a perpendicular line, it required several seconds for the descending bodies to traverse the intervening space, which gave him a few moments to think and plan some way of escape. At the critical moment a happy inspiration seized and saved him. On the instant that his horse struck the rock and was dashed to pieces, the captain sprang nimbly from the saddle to his feet unharmed. To prove the truth of his statement he never misses an opportunity to point out to the tourist the spot where his horse fell, and shows the white bones of his defunct steed bleaching in the sun.

At Moran's Point there is a narrow cleft in the rocks which he calls the Fat Woman's Misery. It received its name several years ago from a circumstance that happened while he was conducting a party of tourists along the rim trail. To obtain a better view the party essayed to squeeze through the opening, in which attempt all succeeded except one fat woman who stuck fast. After vainly trying to extricate her from her uncomfortable position he finally told her that there was but one of two things to do, either remain where she was and starve to death or take one chance in a thousand of being blown out alive by dynamite. After thinking a moment she decided to try the one chance in a thousand" experiment.

A charge of dynamite was procured and the fuse lighted. After the explosion he returned to the spot and found the result satisfactory. The blast had released the woman, who was alive and sitting upon a rock. He approached her cheerfully and said:

"Madam, how do you feel?" She looked up shocked, but evidently very much relieved, and replied "Why, sir, I feel first rate, but the jolt gave me a little toothache."

He tells another story of how he once took a drink from the Colorado river. The water is never very clear in the muddy stream but at that particular time it was unusually murky. He had nothing with which to dip the water and lay down on the bank to take a drink. Being very thirsty he paid no attention to the quality of the water, but only knew that it tasted wet. The water, however, grew thicker as he drank until it became balled up in his mouth, and

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stuck fast in his throat and threatened to choke him. He tried to bite it off but failed because his teeth were poor. At last becoming desperate, he pulled his hunting knife from his belt and cut himself loose from his drink.

Different theories have been advanced to account for the origin of the Grand Canon, but it is a question whether it is altogether due to any one cause. Scientists say that it is the work of water erosion, but to the layman it seems impossible. If an ocean of water should flow over rocks during eons of ages it does not seem possible that it could cut such a channel.

Water sometimes does queer things, but it has never been known to reverse nature. By a fundamental law of hydrostatics water always seeks its level and flows in the direction of least resistance. If water ever made the Grand Canon it had to climb a hill and cut its way through the backbone of the Buckskin mountains, which are not a range of peaks but a broad plateau of solid rock. Into this rock the canon is sunk more than a mile deep, from six to eighteen miles wide and over two hundred miles long.

In order to make the theory of water erosion tenable it is assumed that the Colorado river started in its incipiency like any other river. After a time the river bed began to rise and was gradually pushed up more and more by some unknown subterranean force as the water cut deeper and deeper into the rock until the Grand Canon was formed.

Captain Hance has a theory that the canon originated in an underground stream which tunneled until it cut its way through to the surface. As improbable as is this theory it is as plausible as the erosion theory, but both theories appear to be equally absurd.

At some remote period of time the entire southwest was rent and torn by an awful cataclysm which caused numerous fissures and seams to appear all over the country. The force that did the work had its origin in the earth and acted by producing lateral displacement rather than direct upheaval. Whenever that event occurred the fracture which marks the course of the Grand Canon was made and, breaking through the enclosing wall of the Great Basin, set free the waters of an inland sea. What the seismic force began the flood of liberated water helped to finish, and there was born the greatest natural wonder of the known world.

There are canons all over Arizona and the southwest that resemble the Grand Canon, except that they were made on a smaller scale. Many of them are perfectly dry and apparently never contained any running water. They are all so much alike that they were evidently made at the same time and by the same cause. Walnut Canon and Canon Diablo are familiar examples of canon formation.

The rocks in the canons do not stand on end, but lie in horizontal strata and show but little dip anywhere. Indeed, the rocks lie so plumb in many places that they resemble the most perfect masonry.

The rim rock of the Mogollon Mesa is of the same character as the walls of the Grand Canon and is an important part of the canon system. It is almost a perpendicular cliff from one to three thousand feet high which extends from east to west across central Arizona and divides the great northern plateau from the southern valleys. It is one side of an immense vault or canon wall whose mate has been lost or dropped completely out of sight.

In many of the canons where water flows continuously, effects are produced that are exactly the opposite of those ascribed to water erosion. Instead of the running water cutting deeper into the earth it has partly filled the canon with alluvium, thereby demonstrating nature's universal leveling process. Even the floods of water which pour through them during every rainy season with an almost irresistible force carry in more soil than they wash out and every freshet only adds new soil to the old deposits. If these canons were all originally made by water erosion as is claimed, why does not the water continue to act in the same manner now but, instead, completely reverses itself as above stated? There can be but one of two conclusions, either that nature has changed or that scientists are mistaken.

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The Aravaipa in southern Arizona is an interesting canon and is typical of its kind. Its upper half is shallow and bounded by low rolling foothills, but in the middle it suddenly deepens and narrows into a box canon, which has high perpendicular walls of solid rock like the Grand Canon. It is a long, narrow valley sunk deep into the earth and has great fertility and much wild beauty. It measures from a few feet to a mile in width and drains a large scope of rough country. The surface water which filters through from above reappears in numerous springs of clear cold water in the bottom of the canon. In the moist earth and under the shade of forest trees grow a variety of rare flowers, ferns and mosses.

Where the canon begins to box a large spring of pure cold water issues from the sand in the bottom of a wash which is the source of the Aravaipa creek. It flows through many miles of rich alluvial land and empties into the San Pedro river. The valley was settled many years ago by men who were attracted to the spot by its rare beauty, fertility of soil and an abundance of wood and water.

The land is moist and covered by a heavy growth of forest trees, which will average over one hundred feet high. The trees are as large and the foliage as dense as in any eastern forest. Being sunk deep in the earth the narrow valley at the bottom of the canon can only be seen from above. When viewed from some favorable point it has the appearance of a long green ribbon stretched loosely over a brown landscape. The sight of it is a pleasant surprise to the weary wayfarer who, after traveling over many miles of dreary desert road, finds himself suddenly ushered into such pleasant scenes.

The canons of Arizona are unrivaled for grandeur, sublimity and beauty, and will attract an ever increasing number of admirers.

CHAPTER XI. THE METEORITE MOUNTAIN

Ten miles southeast of Canon Diablo station on the Santa Fe Pacific Railroad, stands the Meteorite Mountain of Arizona, on a wide, open plain of the Colorado Plateau. It is two hundred feet high and, as seen at a distance, has the appearance of a low, flat mountain. Its top forms the rim of an immense, round, bowl-shaped hole in the ground that has almost perpendicular sides, is one mile wide and over six hundred feet deep. The hole, originally, was evidently very much deeper than it is at the present time, but it has gradually become filled with debris to its present depth. The bottom of the hole has a floor of about forty acres of level ground which merges into a talus.

This formation is sometimes called the Crater, because of its shape, but there is no evidence of volcanic action. Locally it is known as Coon Butte, which is a misnomer; but Meteorite Mountain is a name with a meaning.

It is not known positively just how or when the mountain was formed, but the weight of evidence seems to favor the meteorite theory, which is that at some remote period of time a monster meteorite fell from the sky and buried itself in the earth.

Mr. F. W. Volz, who has lived in the country twenty years and is an intelligent observer of natural phenomena, has made a careful study of the mountain, and it is his opinion that such an event actually occurred and that a falling star made the mountain. When the descending meteorite, with its great weight and terrific momentum, hit the earth something had to happen. It buried itself deep beneath the surface and caused the earth to heave up on all sides. The effect produced is aptly illustrated, on a small scale, by throwing a rock into thick mud.

The impact of the meteorite upon the earth not only caused an upheaval of the surface, but it also crushed and displaced the rocks beneath. As the stellar body penetrated deeper into the earth its force became more concentrated and either compressed the rocks into a denser mass or ground them to powder.

The plain on which the mountain stands is covered by a layer of red sandstone of variable thickness, as it is much

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worn in places by weather erosion. Below the top covering of red sandstone lie three hundred feet of limestone and beneath the limestone five hundred feet more of white sandstone. This arrangement of the rocks is plainly seen in the walls of Canon Diablo.

The displaced strata of rocks in the hole are tilted and stand outwards and great boulders of red sandstone and limestone lie scattered all about. If the hole had been made by an explosion from below large pieces of rock from each one of the different rock strata would have been thrown out; but, while as just stated, there are plenty of huge blocks of red sandstone and limestone, there are no large pieces of white sandstone. After the superficial layers of rock had been broken up and expelled en masse, the deeper rock of white sandstone, being more confined, could not reach the surface in the shape of boulders, but had first to be broken up and ground to powder before it could escape. Then the white sandstones in the form of fine sand was blown skywards by the collision and afterwards settled down upon the mountain. The mountain is covered with this white sand, which could only have come out of the big hole as there is no other white sand or sandstone found anywhere else upon the entire plain.

In the vicinity of the mountain about ten tons of meteorites have been found, varying in size from the fraction of an ounce to one thousand pounds or more. Most of the meteorites were found by Mr. Volz, who searched diligently every foot of ground for miles around. The smaller pieces were picked up on or near the rim, and they increased in size in proportion as they were distant from the mountain until, on a circle eight miles out, the largest piece was found. Meteorites were found upon all sides of the mountain but they seemed to be thickest on the east side.

The writer first visited the mountain in the summer of 1901 and it was the greatest surprise of his six weeks' trip sightseeing in northern Arizona where are found many natural wonders. He was fortunate enough to find a three pound meteorite within five minutes after arriving on the rim, which Mr. Volz said was the first specimen found by anyone in over four years.

Professor G. K. Gilbert of the United States Geological Survey visited the mountain several years ago to investigate the phenomenon and, if possible, to determine its origin by scientific test. He gave the results of his researches in a very able and comprehensive address,^[3] delivered before the Geological Society of Washington, D.C. The existing conditions did not seem to fit his theories, and he concluded his work without arriving at any definite conclusion.

[3] The Origin of Hypotheses. 1895.

After disposing of several hypotheses as being incompetent to prove the origin of the mountain he decided to try the magnetic test. He assumed that if such a meteorite was buried there the large mass of metallic iron must indicate its presence by magnetic attraction. By means of the latest scientific apparatus he conducted an elaborate magnetic experiment which gave only negative results.

He discussed at length the various hypotheses which might explain the origin of the crater and concluded his notable address as follows:

"Still another contribution to the subject, while it does not increase the number of hypotheses, is nevertheless important in that it tends to diminish the weight of the magnetic evidence and thus to reopen the question which Mr. Baker and I supposed we had settled. Our fellow-member, Mr. Edwin E. Howell, through whose hands much of the meteoric iron had passed, points out that each of the iron masses, great and small, is in itself a complete individual. They have none of the characters that would be found if they had been broken one from another, and yet, as they are all of one type and all reached the earth within a small district, it must be supposed that they were originally connected in some way.

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"Reasoning by analogy from the characters of other meteoric bodies, he infers that the irons were all included in a large mass of some different material, either crystalline rock, such as constitutes the class of meteorites called 'stony,' or else a compound of iron and sulphur, similar to certain nodules discovered inside the iron masses when sawn in two. Neither of these materials is so enduring as iron, and the fact that they are not now found on the plain does not prove their original absence. Moreover, the plain is strewn in the vicinity of the crater with bits of limonite, a mineral frequently produced by the action of air and water on iron sulphides, and this material is much more abundant than the iron. If it be true that the iron masses were thus imbedded, like plums in an astral pudding, the hypothetic buried star might have great size and yet only small power to attract the magnetic needle. Mr. Howell also proposes a qualification of the test by volumes, suggesting that some of the rocks beneath the buried star might have been condensed by the shock so as to occupy less space.

"These considerations are eminently pertinent to the study of the crater and will find appropriate place in any comprehensive discussion of its origin; but the fact which is peculiarly worthy of note at the present time is their ability to unsettle a conclusion that was beginning to feel itself secure. This illustrates the tentative nature not only of the hypotheses of science, but of what science calls its results.

"The method of hypotheses, and that method is the method of science, founds its explanations of nature wholly on observed facts, and its results are ever subject to the limitations imposed by imperfect observation. However grand, however widely accepted, however useful its conclusions, none is so sure that it cannot be called into question by a newly discovered fact. In the domain of the world's knowledge there is no infallibility."

After Prof. Gilbert had finished his experiments, Mr. Volz tried some of his own along the same line. He found upon trial that the meteorites in his possession were non-magnetic, or, practically so. If these, being pieces