

The Mountain Lakes of California

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AMONG all the unlooked-for treasures bound up and hidden away in the depths of the Alpine solitudes of the Sierra, none so surely charm and surprise all kinds of travelers as the glacier-lakes. The belted forests and the glaciers and snow make a telling appearance, even to the distant plains; but not a single stream is visible, nor a hollow, where one might hope for a lake. Nevertheless, wild rivers are falling and sounding in every canyon, and all their upper branches are fairly laden with lakes, like orchard trees so with fruit. They lie embosomed in the deep woods, down in the bottoms of canons, high on bald table-lands, and around the feet of the icy Alps, mirroring back their wild beauty over and over again. Some conception of their lavish abundance may be made from the fact that, from one stand-point on to the summit of Red Mountain, a day's journey to the east of Yosemite Valley, no less than forty-two are displayed within a radius of ten miles. The whole number in the California Alps can hardly be less than fifteen hundred, not counting the smaller pools and tarns, which are innumerable. Perhaps two-thirds or more lie on the western flank of the range, and all are restricted to the Alpine and sub-Alpine regions. At the close of the last glacial period, the middle and foot-hill regions also abounded in lakes, all of which have long since vanished as completely as the glaciers that brought them into existence. The eastern flank of the range is excessively steep; nevertheless, we find lakes pretty regularly distributed throughout even the most precipitous portions. They are mostly found in the upper branches of the canons, and ample glacier wombs around the peaks. Occasionally long narrow specimens occur upon the steep sides of dividing ridges, their basins swung lengthwise like hammocks, and very rarely one is found lying so exactly on the summit of the range at the head of some pass that its waters are discharged down both flanks, - east, to be lost in the torrid sage plains of the Great Basin; west, to escape through the Golden Gate to the sea. But, however situated, they soon cease to form surprises to the studious mountaineer; for, like all the love-work of nature, they are harmoniously related to one another, and to all the other features of the

mountains. It is easy therefore to find the bright lake eyes in the roughest and most ungovernable looking topography of any landscape countenance. Even in the lower regions, where they have been closed for many a century, their rocky orbits are still discernible, filled in with flood and avalanche detritus. A beautiful system of grouping is very soon perceived in twos and threes or more in correspondence with the glacial fountains; also their extension in the direction of the trends of the ancient glaciers; and in general their dependence as to form, size, and position, upon the character of the rock in which their basins have been eroded, and the quantity and direction of application of the glacial force expended upon each basin. In the upper canons we usually find them in pretty regular succession, strung together like beads on the bright ribbons of their feeding streams which pour white from one to the other, their perfect mirror stillness making impressive contrasts with the grand glare and glare of the connecting cataracts. In Lake Hollow, on the north side of the Hoffman spur, immediately above the great Tuolumne, there are ten lovely lakes lying near together in one general hollow like eggs in a nest. Seen from above in one general view, feathered with Williamson spruce, and fringed with sedge, they seem to me the most singularly beautiful and interestingly located lake-cluster I have ever yet discovered. Lake Tahoe, twenty-two miles long by about ten wide, and from five hundred to over one thousand six hundred feet in depth, is the largest of all the Sierra lakes. It lies just beyond the northern limit of the true Alps, between the main axis of the range and a spur that puts out on the east side from near the head of the Carson. Its forested shores go curving in and out around many an emerald bay and pine-crowned promontory, and its waters are everywhere as intensely pure as any to be found in the icy Alps. It seems to lie separate from all others, - a kind of heaven to which all the dead lakes of the lowlands had come with their best beauty spiritualized. Donner Lake, rendered memorable by the terrible fate of the Donner party, is about three miles long, and lies about ten miles to the north of Tahoe, at the head of one of the tributaries of the Truckee. A few miles farther north lies Lake Independence, about the same size as Donner. But by far the greater number of the high Alpine lakes are quite small, few of them exceeding a mile in length, most of them less than half a mile. Along the lower edge of the lake-belt, the smallest have disappeared by the filling in of their basins,

leaving only those of considerable size. But all along the upper freshly glaciated margin of the Jake-bearing zone, every cup-hollow, however small, lying within reach of any portion of the close network of streams, contains a bright brimming pool; so that the landscape seems from the mountain-tops to be sown broadcast with them. Many of the larger lakes are seen encircled with smaller ones like large central gems inozoned with sparkling brilliants. In general however there is no marked dividing-line as to size, the smallest graduating directly into the largest. In order, therefore to prevent confusion, I would state here that, in giving numbers, I include none less than five hundred yards in circumference. On the Merced alone I counted a hundred and thirty-one, of which a hundred and; eleven are upon the tributaries that fall so grandly into Yosemite Valley. The Pohono which forms the fall of that name, takes its rise in a beautiful lake, lying beneath the shadow of a lofty granite spur that puts out from Buena Vista peak. This is now the only lake left in the whole Pohono basin. The Illillouette has sixteen, the Nevada no less than sixty-seven, the Tenaya eight, Hoffmann Creek five and Yosemite Creek fourteen. There are but two other lake-bearing affluents of the Merced, viz., the South Fork with fifteen, and Cascade Creek with five, both of which unite with the main trunk below Yosemite. The Merced River, as a whole, is remarkably like an elm-tree, and it requires but little effort on the part of the imagination to picture it standing upright, with all its lakes hanging upon its spreading branches, the topmost eighty miles in height. Now add all the other lake-bearing rivers of the Sierra, each in its place, and you will have a truly glorious spectacle,-an avenue the length and width of the range; the long, slender, gray shafts, the milky-way of arching branches, and the moon-like lakes all clearly defined and shining on the blue sky. How excitedly such an addition to astronomy would be gazed at ! Yet these lakeful rivers are still more excitingly beautiful and impressive in their natural positions to those who have the eyes to see them as they lie imbedded in their meadows and forests and glacier-sculptured rocks. When a mountain-lake is born-when, like a young eye, it first opens to the light- it is an irregular) expressionless crescent, enclosed in banks of rock and ice,-bare, glaciated rock on the lower side, the rugged snout of a glacier on the upper. In this condition it remains for many a year, until at length, toward the end of some auspicious cluster of seasons, the glacier recedes beyond the upper margin, leaving it open from

shore to shore for the first time thousands of years after its conception beneath the glacier that scooped its basin. The landscape, cold and bare, is reflected in its pure depths; the winds ruffle its glassy surface, and the sun fills it with throbbing spangles, while its waves begin to lap and murmur around its leafless shores,-sun-spangles and stars its only flowers, the winds and the snow its only visitors. Meanwhile the glacier continues to recede, and numerous rills, still younger than the lake itself, bring down glacier-mud, sand-grains and pebbles, giving rise to margin-rings and plats of soil. To these fresh soil-beds come many a waiting plant. First, a hardy carex, with arching leaves and a spike of brown flowers; then, as the seasons grow warmer, and the soil-beds deeper and wider, other sedges take their appointed places, and these are joined by blue gentians, daisies, dodecatheons, violets, honeyswords and many a lowly moss. Shrubs also hasten in time to the new gardens,-kalmia, with its glossy leaves and purple flowers, the Arctic willow, making soft woven carpets, together with the heathy bryanthus and cassiope-the fairest and dearest of them all. Insects now enrich the air, frogs pipe cheerily in the shallows, soon followed by the ouzel, which is the first bird to visit a glacier lake, as the sedge is the first of plants. So the young lake grows in beauty, becoming more and more humanly lovable from century to century. Groves of aspen spring up, and hardy pines, and the Williamson spruce, until richly overshadowed and embowered. But while its shores are being enriched, the soil-beds creep out with incessant growth, contracting Its area, while the lighter mud particles deposited on the bottom cause it to grow constantly shallower, until at length the last remnant of the lake vanishes,-closed forever in ripe and natural old age. And now its feeding stream goes winding on through the new gardens and groves that have taken its place without halting for a moment. The length of the life of any lake depends ordinarily upon the capacity of its basin, as compared with the carrying power of the streams that flow into it, the character of the rocks over, which they flow, and the relative position of the lake toward other lakes. In a series whose basins lie in the same canon, and are fed by one and the same stream, the uppermost will, of course, vanish first unless some other lake-filling agent comes in to modify the result; because it receives nearly all of the sediments that the stream brings down, only the finest of the mud-particles being carried through the highest of the series to the next below. Then

the next higher, and the next would be successively filled, and the lowest would be the last to vanish. But this simplicity as to duration is broken in upon in various ways, chiefly through the action of side-streams that enter the lower lakes direct. For, notwithstanding many of these side tributaries are quite short, and, during late summer, quite feeble, they all become powerful torrents in spring-time when the snow is melting, and carry not only sand and pine needles, but large trunks and bowlders tons in weight, sweeping them down their steeply inclined channels and into the lake-basins with astounding energy. Many of these side affluents also have the advantage of access to the main lateral moraines of the vanished glacier that occupied the canon, and upon these they draw for lake-filling material, while the main trunk stream flows mostly over clean glacier pavements, where but little moraine matter is ever left. Thus a small stream with abundance of loose transportable material within its reach may fill up an extensive basin in a few centuries, while a large perennial trunk stream, flowing over clean enduring pavements, though ordinarily a hundred times more powerful, may not fill a smaller basin in thousands of years. The comparative influence of great and small streams as lake-fillers is strikingly illustrated in Yosemite Valley, through which the Merced flows. The bottom of the valley is now composed of level meadow-lands and dry, sloping soil-beds, planted with oak and pine, but it was once a lake stretching from wall to wall and from one end of the valley to the other, forming one of the most beautiful cliff-bound sheets of water that ever existed in the Sierra. And though never perhaps seen by human eye, it was but yesterday, geologically speaking, since it disappeared, and the traces of its existence are still so fresh, it may easily be restored, and viewed in all its grandeur, about as truly and vividly as if actually before us. Now we find that the detritus which fills this magnificent basin was not brought down from the distant mountains by the main streams that converge here to form the river, however powerful and available for the purpose at first sight they appear; but almost wholly by the small local tributaries, such as those of Indian Canon, the Sentinel, and Three Brothers. Had the glaciers that once covered the range been melted at once, leaving the entire surface bare from top to bottom simultaneously, then of course all the lakes would have come into existence at the same time, and the highest, other circumstances being equal, would, as we have seen, be the first

to vanish. But because they melted gradually from the foot of the range upward, the lower lakes were the first to see the light and the first to be obliterated. Therefore, instead of finding the lakes of the present day at the foot of the range, we find them at the top. Most of the lower lakes were dead thousands of years before those now brightening the Alpine landscapes were born. And in general, owing to the deliberation of the upward retreat of the glaciers, the lowest of the existing lakes are also the oldest, a gradual transition being apparent throughout the entire belt, from the older forested and contracted forms all the way up to those that are new-born, lying bare and meadowless among the highest peaks. The lake line is of course rising, its present elevation being about 8,000 feet above sea-level; somewhat higher than this toward the southern extremity of the range, and lower toward the northern, on account of the difference in time of the withdrawal of the glaciers from difference in climate. Specimens occur here and there considerably below this limit, in basins specially protected from inwashing detritus, or exceptional in size. These however are not sufficiently numerous to make any marked irregularity in the line. The highest I have yet found lies at an elevation of about 12,000, in a glacier womb, at the foot of one of the highest of the Alps, a few miles to the north of Mount Ritter. The basins of perhaps twenty-five or thirty are still in process of formation beneath the few lingering glaciers, but by the time they are born an equal or greater number will probably have died. Since the beginning of the close of the ice-period the whole number in the range has perhaps never been greater than at present. A few lakes unfortunately situated are extinguished suddenly by a single swoop of an avalanche, carrying down immense numbers of trees, together with the soil they were growing upon. Others are obliterated by land-slips, earthquake taluses, etc., but these lake-deaths compared with those resulting from the deliberate and incessant deposition of sediments, may be termed accidental. Their fate is like that of trees struck by lightning. A rough approximation to the average duration of these mountain lakes may be made from data already suggested, but we cannot stop here to present the subject in detail. We must also forego, in the meantime, the pleasure of a full discussion of the interesting question of lake-basin formation, fine, clear, demonstrative material for which abounds in these mountains. In addition to what has been already given on the subject, we will only make this one statement.

Every lake in the California Alps is a glacier lake. Their basins were not merely remodeled and scoured out by this mighty agent, but eroded from the solid in the first place. I must now make haste in this little article to give some nearer views of representative specimens lying at different elevations on the main lake-belt, confining myself to descriptions of the features most characteristic of each.

SHADOW LAKE.

THIS is a fine specimen of the oldest and lowest of the lakes. It lies about eight miles above Yosemite Valley, on the main branch of the Merced, at an elevation of about seven thousand three hundred and fifty feet above the sea; and is everywhere so securely cliff-bound, that without artificial trails, only the wild animals can get down to its rocky shores from any direction. Its original length was about a mile and a half, now it is only half a mile, by about a fourth of a mile in width, and over the lowest portion of the basin ninety-eight feet deep. Its crystal waters are clasped around on the north and south by majestic granite walls sculptured in true Yosemite style into domes, gables, and battlemented head-lands, which on the south come plunging down sheer into deep water, from a height of from 1,500 to 2,000 feet. The South Lyell glacier eroded this magnificent basin out of hard porphyritic granite, while forcing its way westward from the summit fountains toward Yosemite, and the exposed rocks around the shores, and the projecting bosses of the walls ground and burnished beneath the vast ice-flood, still glow with silvery radiance in the light, notwithstanding the innumerable corroding storms that have fallen upon them. The general conformation of the basin, as well as the moraines laid along the top of the walls, and the grooves and scratches on the bottom and sides, indicate in the most unmistakable manner the depth and direction pursued by this mighty ice-river, and the tremendous energy it exerted in thrusting itself into and out of the basin, bearing down with superior pressure upon this portion of its channel because of the greater declivity, consequently eroding it deeper, and producing the lake-bowl as the necessary result. With these magnificent ice-characters so vividly before us it is not easy to realize that the old glacier that made them vanished centuries of centuries ago; for excepting the vegetation that has sprung up, and the changes effected by an earthquake that hurled rock-avalanches from the weaker headlands, the basin as a whole presents the

same appearance that it did when first brought to light. The lake itself, however, has undergone very marked changes; one sees at a glance that it is growing old. More than two-thirds of its original area is now dry land covered with meadow grasses and groves of pine and fir, and the level bed of alluvium, stretching across from wall to wall at the head, is growing out all along its lake-ward margin, and will at length close the lake forever. Every lover of fine wildness would delight to saunter on a summer day through the flowery groves now occupying the filled-up portion of the old lake. The curving shore is clearly traced by a ribbon of white sand upon which the ripples play; then comes a belt of broad-leaved sedges, interrupted here and there by impenetrable tangles of tall willows; beyond this, groves of trembling aspen; then a dark shadowy belt of two-leaved pine, with here and there a round carex meadow ensconced nest-like in its midst; and lastly, a narrow outer margin of majestic silver fir 200 feet high. The ground beneath the trees is covered with a luxuriant crop of grasses, triticum, bromus, and calamagrostis, with purple spikes and panicles arching to one's shoulders, while the open meadow patches glow throughout the summer with showy flowers, - heleniums, golden-rods, erigerons, lupines, castilleias, and lilies; forming favorite hiding and feeding grounds for bears and deer. The rugged south wall is feathered darkly along the top with an imposing array of spirey silver firs, while the rifted precipices all the way down to the water's edge are adorned with picturesque old junipers, their cinnamon-colored bark showing finely upon the neutral gray of the granite. These, with a few venturesome dwarf pines and spruces, lean out over fissured ribs and tablets, or stand erect back in shadowy niches, in an indescribably wild and fearless manner. Moreover, the white-flowered Douglass spiraea and dwarf evergreen oak form graceful fringes along the narrower seams, wherever the slightest hold can be effected. Rock-ferns, too, are here, such as allosorus, pellrea, and cheilanthes, making handsome rosettes on the drier fissures; and the delicate maidenhair, cistoperis, and woodsia hide back in mossy grottoes, moistened by some trickling rill; and then the orange wall-flower holds up its showy panicles here and there in the sunshine, and bahia makes bosses of gold. But, notwithstanding all that, the general impression in looking across the lake is stem, unflinching rockiness; the ferns and flowers are scarce seen, and not one-fiftieth of the whole surface is screened with plant life. The sunnier north wall

is more varied in sculpture, but the general tone is the same. A few headlands, flat-topped and soil-covered, support clumps of cedar and pine; and up-curving tangles of chinquapin and live-oak, growing on rough earthquake taluses, girdle their bases. Small streams come cascading down between them, their foaming margins brightened with gay primulas, gillias, and mimuluses. And close along the shore on this side there is a strip of rocky meadow enameled with buttercups, daisies, and white violets, and the purple-topped grasses out on its beveled border dip their leaves into the water. The lower edge of the basin is a dam-like swell of solid granite, heavily abraded by the old glacier, but scarce at all cut into by the outflowing stream, though it has flowed .on unceasingly since the lake was born. As soon as the stream is fairly over the lake-lip, it breaks into blooming cascades, never for a moment halting, and scarce abating one jot its glad energy, until it reaches the next filled-up basin, a mile below. Then, swirling and curving drowsily through meadow and grove, it soon breaks forth anew into gray rapids and falls, leaping and gliding, in glorious exuberance of wild bounce and dance, down into another, and yet another dead lake. Then, after a long rest in the levels of Little Yosemite, it makes its grandest display in the famous Nevada Fall. Then more cascades, into Emerald Pool and down Vernal Fall. Then, dashing through earthquake bowlders, it finally gains the tranquil reaches of the main Yosemite. The color-beauty of the lake surroundings during the Indian summer is much richer than one could hope to find in so young and so glacial a wilderness. Almost every leaf is tinted then, and the golden-rods are in bloom; but most of the color is given by the ripe grasses, willows and aspens. At the foot of the lake you stand in a trembling aspen grove; every leaf painted like a butterfly, and away to right and left round the shores sweeps a curving ribbon of meadow, red and brown dotted with pale yellow, shading off here and there into hazy purple. The walls, too, are dashed with bits of bright color that gleam out on the neutral granite gray. But neither the walls, nor the margin meadow, nor yet the gay, fluttering grove in which you stand, nor the lake itself, flashing with spangles, can long hold your attention; for at the head of the lake there is a gorgeous mass of orange yellow, belonging to the main aspen belt of the basin, which seems the very fountain whence all the color below it had flowed, and here your eye is filled and fixed. This glorious mass is about thirty feet high, and extends across the basin

nearly from wall to wall. Rich bosses of willow flame in front of it, and from the base of these the brown meadow comes forward to the water's edge, the whole relieved against the unyielding green of the coniferae, while thick sun-gold is poured over all. During these blessed color-days no cloud darkens the sky, the winds are gentle, and the landscape rests, hushed everywhere, and indescribably impressive. A few ducks are usually seen sailing the lake, apparently more for pleasure than anything else, and the ouzels at the head of the rapids sing always; while robins, grosbeaks, and the Douglass squirrels are busy in the groves, giving delightful animation, and intensifying the feeling of grateful sequesuoation without ruffling the deep, hushed calm. This autumnal mellowness usually lasts until the end of November. Then come days of quite another kind. The winter clouds grow and bloom, shedding their starry crystals on every leaf and rock, and all the colors vanish like a sunset. The deer gather and hasten down their well-known trails, fearful of being snow-bound. Storm succeeds storm, heaping snow on the cliffs and meadows, and bending the slender pines to the ground in wide arches, over the other, clustering and interlacing like lodged wheat. Avalanches rush and boom from the shelving heights, piling immense heaps upon the frozen lake, and all the summer glory is buried and lost. Yet in the midst of this hearty winter the sun shines warm at times, calling the Douglass squirrel to frisk in the snowy pines and seek out his hidden stores, and the weather is never so severe as to drive away the grouse and little nut-hatches and chickadees. Toward May, the lake begins to open. The hot sun sends down innumerable streams over the cliffs, streaking them round and round with foam. The snow slowly vanishes, and the meadows show tintings of green. Then spring comes on apace flowers and flies enrich the air and the sod, and the deer come back to the upper groves like birds to an old nest. I first discovered this charming lake in the autumn of 1872, while on my way to the Alps at the head of the river. It was rejoicing then in its gayest colors, untrodden, hidden in the glorious wilderness like unmined gold. Year after year I walked its shores without discovering any other trace of humanity than the remains of an Indian camp-fire, and the thigh-bones of a deer that had been broken to get at the marrow. But it lies out of the regular ways of Indians, who love to hunt in more accessible fields adjacent to trails. Their knowledge of deer-haunts had probably enticed them here some hunger-time when they wished to make sure of a

feast j for hunting in this lake-hollow is like hunting in a fenced park. I had told the beauty of Shadow Lake only to a few friends, fearing it might come to be trampled and improved like Yosemite. On my last visit, as I was sauntering along the shore on the strip of sand between the water and sod, reading the tracks of the wild animals that live here, I was startled by a human track, which I at once saw belonged to some shepherd; for each step was turned out 350 or 400 from the general course pursued, and was also run over in an uncertain sprawling fashion at the heel, while a row of round dots on the right indicated the staff that shepherds always carry. None but a shepherd could make such a track, and after tracing it a few minutes I began to fear that he might be seeking pasturage, for what else could he be seeking: certainly not scenery. Returning from the glaciers shortly afterward, my worst fears were realized. A trail had been cut down the mountain-side from the north, and all the gardens and meadows were destroyed by a hoard of hooped locusts, as if swept by a fire. The money-changers were in the temple.

ORANGE LAKE

BESIDES these larger canon-lakes, fed by the main canon streams, there are many a smaller ones lying aloft on the top of rock benches, entirely independent of the general drainage channels, and of course drawing their supplies from a very limited area. Notwithstanding they are mostly small and shallow, owing to their immunity from avalanche detritus and the in-washings of powerful streams, they often endure far, longer than others many times larger but less favorably situated. When very shallow they become dry toward the end of summer; but because their basins are ground out of seamless stone they suffer no loss save from evaporation alone; and the great depth of snow that falls, lasting into June, makes their dry season short in any case. Many of them maintain a fair level all the summer, but little below the outlet when they have one; -most have, but occasionally a basin is found sufficiently large to contain all the snow and rain that falls without overflowing at all. Orange Lake is a fair illustration of this species, lying in the middle of a broad glacial pavement near the lower margin of the lake-line, about a mile and a half to the north-west of Shadow Lake. It is only about a hundred yards in circumference. Next the water there is first, a girdle of carices with wide overarching leaves, then comes a shaggy ruff of huckleberry bushes, then a zone of willows with here and there a

bush of the mountain-ash, then a zone of aspens with a few pines around the outside. These zones are regularly concentric, and together form a perfect wall beyond which the naked ice-burnished granite stretches away in every direction, leaving it conspicuously relieved like a bunch of palms in a desert. In autumn, when the colors are ripe, the whole circular grove, at a little distance, looks like a big handful of flowers set in a cup to be kept fresh-a tuft of blooming golden-rods. Its feeding streams are exceedingly beautiful, notwithstanding their inconstancy and extreme shallowness. They have no channel whatever, and consequently are left free to spread themselves out in thin sheets upon the shining granite and wander at will. In many places the current is less than a fourth of an inch deep, and flows with so little friction it is scarce visible. Sometimes there is not a single foam-bell, or drifting pine-needle, or irregularity of any sort, to manifest its motion. Yet when observed narrowly it is seen to form a web of swift-gliding lace-work exquisitely woven, given beautiful reflections from its minute curving ripples and eddies, and differing from the water-laces of large cascades in being everywhere transparent. In spring when the snow is melting, the lake-bowl is brimming full, and sends forth quite a large stream, that slips glassily for two hundred yards or so, until it comes to an almost vertical precipice 800 feet high, down which it plunges in a fine cataract; then gathers, and goes smoothly over folds of gently dipping granite to its confluence with the main canon stream. During the greater portion of the year, however, not a single water sound will you hear either at head or foot of the lake, not even the whispered lappings of ripple-waves along the shore; for the winds are fenced out. But the deep mountain silence is sweetened now and then by birds that stop here to rest and drink on their way across the canon.

LAKE STAR KING

A BEAUTIFUL variety of the bench-top lakes occurs just where the great lateral moraines have been shoved forward in outswelling concentric rings, by small residual glaciers that moved generally at right angles to the main trunk glaciers that filled the canons below them. Instead of being encompassed by a narrow ring of trees like Orange Lake, these lie embosomed in dense moraine woods, so dense that in seeking them you may pass them by again and again, although you may know very nearly where they lie concealed. Lake Starr King, lying to the north

of the cone of that name, above the Little Yosemite Valley, is a fine specimen of this variety. The ouzels pass it by, and so do the ducks. They could hardly get into it if they would, without plunging straight down inside the circling trees. Yet these isolated gems, lying like fallen fruit detached from the branches, are not altogether without inhabitants and joyous animating visitors. Of course fishes cannot get into them, and this is generally true of nearly every glacier lake in the range, but they are all well stocked with happy frogs whose progenitors must have made some exciting excursions through the woods and up the sides of the canons. Down in their still, pure depths you may also find the larvae of innumerable insects and a great variety of beetles, while the air above them is thick with humming wings through the midst of which fly-catchers are constantly darting. And in autumn when the huckle-berries are ripe, bands of robins and grosbeaks come to feast, forming altogether very delightful little by-worlds for the naturalist. Pushing our way upward toward the axis of the range, we find lakes in greater and greater abundance, and more youthful in aspect. At an elevation of about 9,000 feet above sea-level they seem to have arrived at middle age, -that is their basins seem to be about half filled with alluvium. Broad sheets of meadow-land are seen growing out into the water, which are often boggy and more nearly level than the meadows of older lakes below them. The vegetation of their shores is of course more Alpine. *Kalmia*, *ledum* and *cassiope* fringe the meadow rocks, and the luxuriant waving groves, so characteristic of the lower lakes, are represented only by clumps of dwarf pine and Williamson spruce. These, however, are oftentimes very picturesquely grouped on rocky headlands around the outer rim of the meadows, or with still more striking effect crown some rocky islet. And, from causes that we cannot stop here to explain, the cliffs about these middle-aged lakes are seldom of the massive Yosemite type, but more broken, and less sheer, and they usually stand back, leaving the shores comparatively free; while the few precipitous rocks that do come forward and plunge directly into deep water are seldom more than three or four hundred feet high. I have never yet met ducks in any of the lakes of this kind; but the ouzel is never wanting where the feeding streams are perennial. Wild sheep and deer may occasionally be seen on the meadows, and very rarely a bear. One might camp on the rugged shore of these bright fountains for weeks,

without meeting any animal larger than the marmots that burrow beneath glacier boulders along the edges of the meadows. The highest and youngest of all the lakes lie nestled in glacier wombs. At first sight, they seem pictures of pure bloodless desolation, miniature Arctic seas, bound in perpetual ice and snow, and overshadowed by harsh, gloomy, crumbling precipices. Their waters are keen ultramarine blue in the deepest parts, lively grass-green toward the shore shallows and around the edges of the small bergs usually floating about in them. A few hardy sedges, frost-pinchd every night, are occasionally found making soft sods along the sun-touched portions of their shores, and when their northern banks slope openly to the south, and are soil-covered, no matter how coarsely, they are sure to be brightened with flowers. One lake in particular now comes to mind which illustrates the floweryness of the sun-touched banks of these icy gems in a truly splendid manner. Close up underneath the shadow of the Sierra Matterhorn, on the eastern slope of the range, lies one of the iciest of these glacier lakes at an elevation of about twelve thousand feet. A short, ragged-edged glacier crawls into it from the south, and on the opposite side it is embanked and dammed by a series of concentric terminal moraines, made by the glacier when it entirely filled the basin. Half a mile below lies a second lake, at a height of 11,500 feet, about as cold and as pure as a snow crystal. The waters of the first come gurgling down into it over and through the moraine dam, while a second stream pours into it direct from a glacier that lies to the south-east. Sheer precipices of crystalline snow rise out of deep water on the south, keeping perpetual winter on that side, but there is a fine summery spot on the other, notwithstanding the lake is only about three hundred yards wide. Here, on the 25th of August, 1873, I found a charming company of flowers, not pinched, crouching dwarfs, scarce able to look up, but warm and juicy, standing erect in rich cherry bloom, and high color. On a narrow strip of shingle, close to the water's edge, there were a few tufts of *carex* gone to seed; and a little way back up the rocky bank at the foot of a crumbling wall, so inclined as to absorb and radiate as well as reflect a considerable quantity of sun heat, was the garden, containing a thrifty thicket of *cowania* covered with large yellow flowers; several bushes of the Alpine *ribes*, with berries nearly ripe and wildly acid; a few handsome grasses belonging to two distinct species, and one golden-rod; also, a few hairy

lupines and radiant spragues, whose blue and rose-colored flowers were set off to fine advantage amid dark green carices; and along a narrow seam in the very warmest angle of the wall, there was a perfectly gorgeous fringe of *Epilobium obcordatum*, with flowers an inch wide, crowded together in lavish profusion, and colored as royal a purple as ever was worn by any high-bred plant of the tropics; and best of all, and greatest of all, a noble thistle in full bloom, standing strongly erect, head and shoulders above his companions, and thrusting out his lances in sturdy vigor as if growing on a Scottish brae. All this brave warm bloom among the raw stones, right in the face of the onlooking glaciers. As far as I have been able to find out, these upper lakes are snow-buried in winter to a depth of about thirty-five or forty feet, and those most exposed to avalanches, to a depth of even a hundred feet or more. These last are, of course, nearly lost to the as landscape. Some remain buried for several a years at a time, when the snow-fall is exceptionally great, and many open only on one side late in the season. The snow of the closed side is composed of coarse granules compacted and frozen into a firm, faintly stratified mass, like the act of a glacier. The lapping waves of the open portion gradually undermine and cause it to break off in large berg-like masses, which gives rise to a precipitous front of a very striking appearance. The play of the lights among the crystal angles of these snow-cliffs, the pearly white of the smooth outswelling bosses, the bergs drifting in along in front, aglow in the sun and edged with green water, and the deep blue disk of the lake itself extending to your feet, this forms a picture that enriches your after life, and is never forgotten, But however his perfect the season and the day, the cold incompleteness of these young lakes is always keenly felt. We approach them with a kind of mean caution, and steal unconfidingly around their crystal shores, dashed and at ease, as if expecting to hear some forbidding voice. But the love-songs of the ouzels and the love-looks of the daisies, gradually re-assure us, and manifest the warm fountain humanity that pervades the coldest and most solitary of them all.