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OREGON

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This publication is issued for the purpose of recording observations and making known the results of research and scientific investigation concerning the natural history of Crater Lake National Park. It is under the jurisdiction of the Research and Education Staff and is supplemental to the lectures, field excursions and other services. Publications using these notes please give credit to the author and to Crater Lake National Park Nature Notes.

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"Thou who wouldst see the lovely and the wild  
Mingled in harmony on Nature's face,  
Ascend our mountains. Let thy foot  
Fail not with weariness, for on their tops  
The beauty and majesty of the earth,  
Spread wide beneath, shall make thee to forget  
The steep and toilsome way."

--Bryant

## THE CRYSTAL GEMS OF CRATER LAKE IN WINTER

Would that each of you could spend a time in the silent grandeur of Crater Lake in the dead of winter. After a heavy, moist snowfall, the boughs of the conifer trees are garbed in beauty. Crater Lake National Park, on the crest of the Cascade Range, is located in the realm of snow flakes, the crystal forms of frozen water. The intricate filigree work and the myriad forms showing snow sculpture everywhere depict "Gaywas" (the picturesque Indian name for Crater Lake) in fairyland attire.

Literally, as one sees the snow flakes so abundantly developed at Crater Lake in winter, he realizes that there is no art comparable to Nature's art and no beauty that can approach the handiwork of Nature. As Lowell says in verse so familiar: "Every tree twig is bedecked with crystals rare, rimmed inch deep with pearl".



The cover design, as well as the margin of this page, shows treasures of the snow. Snow flakes are among the most evanescent of all Nature's creations. They are unique and precious particularly so since they are fleeting forms and cannot be preserved like other gems.

Examine the sketches and you will discern that the snow flake crystals are formed with six faces, being of the true hexagonal system. Of course, all snow flakes are not perfect crystals and all gradations between shapeless amorphous masses to the intricate hexagonal filigree designs are found. No two snow flake crystals are exact duplicates. If one is interested in studying crystal forms and is prepared to make micro-photographs of these fleeting crystals, one has in every new photographic reproduction a thrill for each may possess more beauty and complexity than the previous.

The avocation of collecting reproductions of snow flake crystal forms has a practical side as well as a pleasurable one which is vicarious in its nature. Artists, designers, architects and interior decorators frequently draw from snow crystal designs the foundation for the creation of bizarre and unique sketches and reproductions. One who collects such photographs does not find that every snow storm produces perfect, beautiful specimens.



It appears that ideal conditions for crystal growth are dependent upon a very fine adjustment of correct temperature, air currents and rate of formation. When wind conditions in the sky cause the forming snow to be driven and forced against other fleecy particles, the delicate forms are destroyed. The arrangement of the freezing water

molecules and the crowding against one another cause lack of symmetry in crystal formation. There is little doubt but that Crater Lake National Park is an area affording an ideal place to study and see the development of snow forms and crystal aggregates.

"The beautiful is as useful as the useful" -----  
Victor Hugo

## CRATER LAKE IN WINTER

Charles H. Simson, Permanent Park Ranger

One of the questions frequently asked by the multitude of visitors from all over the world who come each summer to view Crater Lake is "How much snow falls?" "How does it accumulate?" and "What are the winter conditions?" They are impressed by the scenic grandeur of the lake and its unique setting. After experiencing the beautiful colors of this bluest of blue lakes framed in the jagged and precipitous multi-colored lava and numise slopes, and garlanded around the rim by the jade green fringe of hemlock and pine, the visitor wonders as to the transformation which winter time brings.

The opportunity is now offered for you to visit this scenic marvel while it is still wrapped in its winter cloak of white, at a time when the maximum accumulation of snow occurs. Curiously the greatest snow depth comes after spring has arrived down in the valleys and all living things have felt the thrill which comes with the recurrent throb of renewed life.

"The Frost Flowers" of winter, which replaced the blossoms of summer time, still remain. The tree boughs are bent under the burden of snow and ice masses and appear like giant plumes frosted with a fleecy covering of iridescent jewels.

As a result of the winter-long operation of the snow plow the highways will be opened early in April and you are invited to visit Crater Lake. You will drive through miles of snow-walled highway to reach the Rim and view this magic land, sparkling under the rays of a brilliant sun. It is your opportunity to see for yourself how this unique scenic wonder, the rare jewel of the National Park system appears after the heavy snows of a long and severe winter.

On April 1, 1933 - 727" or 60' 7" of snow had fallen since last October. This is  $65\frac{1}{2}$  inches or 5 feet  $5\frac{1}{2}$  in. more than had fallen at the same date for the previous year and the snowfall for the winter of 1931-32 was the greatest on record. If the snowfall for the balance of the year to any degree approaches a normal fall there will be a greater accumulation this year than last. The comparative snow fall figures for the winters of 1931-32 and 1932-33 by months are as follows:

| <u>1931-1932</u> |                                      | <u>1932-33</u> |           |
|------------------|--------------------------------------|----------------|-----------|
| September        | 3 inches                             | September      | --        |
| October          | 31 "                                 | October        | 33 inches |
| November         | 114 "                                | November       | 61 "      |
| December         | 151 $\frac{1}{2}$ "                  | December       | 156 "     |
| January          | 182 "                                | January        | 256 "     |
| February         | 69 "                                 | February       | 130 "     |
| March            | 111 "                                | March          |           |
| April            | 91 "                                 |                |           |
| May              | 38 "                                 |                |           |
| Total            | <u>790<math>\frac{1}{2}</math> "</u> |                |           |

From the above it is evident that only 63 $\frac{1}{2}$  inches of snow will have to fall during April and May to equal the total snow fall for last year. It appears very probable that the record-breaking snow fall of last season, amounting to 65 feet 10 $\frac{1}{2}$  inches, will be exceeded.

The maximum accumulation of snow on the ground at any one time last season was 13 feet 10 inches at Headquarters. This consisted of packed snow and ice and the peak was reached during April. Since, on April 1 this year, we had a depth of 13 feet 9 inches at Park Headquarters, it appears that when it is deemed safe to permit cars inside the park, early in April, the visitors will find an equal or greater snow accumulation.

Crater Lake will present a marvelous picture to our early season visitors. The mysterious and weird forms which have been taken on by the various two and three story utility buildings, checking stations and the Park Headquarters building, are grotesque and fascinating. It is indeed a magic land which beckons to you, sparkling under the lustre of Nature's wonderful mantle of white. Come lovers of winter sports - skiers and tobogganners - you will find a play ground that equals your fondest dreams. Above all you have the lure of seeing Crater Lake, still bodecked in a diadem of snow covering the encircling cliffs.

\* \* \* \* \*

Thirty-five inches of snow in one day.

February 15, 1933 will go down in the records very probably as the day of greatest snowfall for any one day of the winter of 1932-33. In the 24-hour period 35 inches of snow fell. The precipitation or water content amounted to 2.87 inches.

The Coldest day of the year in the park.

The lowest temperature recorded this winter occurred on the morning of February 9. The mercury dropped to 18° below zero. At Fort Klamath a temperature of 22° below occurred at the same time and at Redford the temperature was 18° above.

## BETSY, THE ROTARY

### Harry (Happy) Fuller - Snow Plow Operator

Your editor informed me that the readers of Nature Notes from Crater Lake National Park would be interested in a short article about snow removal. Now since my original home was in Boston, I should be better fitted for writing this little story of the snow plow than for its actual operation. But with eight months of the last four years, from October 1 to June 1, spent on the plow and not at a desk, you may judge for yourselves.

As for Betsy, my pal the plow, she's really a lady of two parts for she has a plow unit and a truck unit. She looks it too, since she's twenty-three feet long, eight feet wide and ten feet high. Her staunch old six cylinder heart has a pulse beat of one hundred and sixty-five horse power and furnishes the power for both her units. She can get around on her four-wheel drive in ten different speeds. She can travel from one quarter of a mile an hour up to fifteen miles an hour. The plow unit consists of a big scoop or bucket with two revolving augers to gobble up the snow for the fan. This fan disperses the snow through a spout to either the right or left of the cut. It spews it out in a mighty stream that will carry over banks of snow twenty-five feet high. With the banks, or walls, of the cut only ten feet high, the snow will be thrown a distance of one hundred feet. While working, the plow consumes an average of nine gallons of gasoline an hour. Last winter we used ten thousand and nine gallons.

But plowing is only a part of the work. The plow must be kept thoroughly greased and oiled. Some parts must be greased every day and the others every week. Falling back on additional statistics from last winter, I find that we used one hundred and fifty-nine gallons of oil and three hundred and seventy-six pounds of grease. Excellent lubrication lessens the possibilities of break downs. However, the heavy work occasionally results in a mishap and spare parts are kept on hand. Any lengthy delay, especially during a storm, would probably result in the complete blocking of the roads for the winter.

Twenty-five miles of two-way road are kept plowed throughout the winter, and it's no small task. Last winter we had a total snow fall of sixty-five feet 10½ inches and this winter to date, March 31, the snow fall has been sixty feet and seven inches. But a great deal more snow than that must be plowed for terrific winds will fill the cut with blown snow, even when it's not snowing. Enough snow was plowed last winter to make a ski track three feet wide, six inches deep, and long enough to encircle the world at the equator. When it starts snowing we wait, which is not for long I can assure you, until there is a foot of snow on the road before we start plowing. We must then continue to plow through the storm and for approximately four days afterwards before the roads are clear. It is not unusual to plow for thirty-six hours without a break; then a hasty meal, a couple of hours sleep and back to plowing. This seems more credible when the violence of

our storms is known. For instance, in one storm this winter that lasted for eleven days, thirteen feet, nine inches of snow fell. After another storm that lasted for one day, we found thirty-five inches of fresh snow on the roads. And then perhaps there only will be one clear day before the start of another storm. From this you can see that Betsy and I are pretty close companions. There is something binding about facing a fury of driving snow and sub-zero temperatures together.

There are bright spots to everything and plowing is not an exception. The work is interesting and moments of fun enliven a hard day. In relating the following amusing incident, I must mention that the plow is a two-man machine since I have a helper to manipulate the controls of the plow unit. One of the helpers I had for the major portion of this winter, Bert Long, was an efficient fellow and something of an amateur photographer. He was one day going to take a picture of the plow in action. We were working between Headquarters and the Rim, a side hill cut and subject to frequent snow slides. Bert had just opened the door of the cab and was stepping out to take the picture when a slide started. Snow poured into and over the plow and Bert, in haste to get back in, landed in my lap. Fortunately it was only a minor slide. Occasionally we have a slide that will bring down thousands of tons of snow and carry everything before it. Such a slide fills the road with trees and packed snow to such a depth that long hours of work are necessary for its removal. Needless to say, and I'm knocking on wood, I have never been in the way of a slide of those proportions. This part of my story concerning the bright spots of the work would not be complete without the mention of the animals encountered. Because of the depth of the precipitous walls of the cut, most animals that enter are unable to get out if the snow is soft after a storm. We see squirrels, mink, marten, snowshoe rabbits, porcupines, and numerous other small animals as well as an occasional coyote. Most of these animals, if they remained in the cut, would either freeze to death or be devoured by the more agile carnivorous species. Consequently it is one of our duties to remove them to safety. To do this we must pursue them down the cut with the plow until they are completely exhausted. This may seem heartless, but have you ever tried to catch a fresh snowshoe rabbit? Porcupines are easily caught but present an embarrassing difficulty in getting them up and out. Once in a while we take home a rabbit or a squirrel and give them the freedom of our quarters until spring. At the present time we have a young snowshoe that is gentle and friendly but has the annoying habit of curiously watching our cook. He jumped into a pudding the other day and Jesse threatens to show him the inside of a stew pot unless he behaves.

After reading this little story of the plowing of the roads, perhaps you wonder why you are not permitted to use them and participate in winter sports on the rim of Crater Lake all winter. Barriers of snow are left to plug the roads at the park boundaries. Although we travel the roads, they are not fit for tourist travel. During a storm they are sometimes impassable an hour after the plow has passed. To keep them in condition for tourist travel would require one more plow and in addition two blades mounted on trucks. But the park has neither the equipment nor the money for its purchase

and operation -- therefore the barriers. Why all this work then if you can't come in until April? As the winter progresses the snow continually becomes packed more solidly until by spring it is almost ice. Such snow is difficult and expensive to move. Before we started this winter plowing, it was very often the first of July before you could drive to the lake. Since we started plowing, the roads are opened to travel on the first of April. The park is still very beautiful well into April and nearly approaches the grandeur of mid-winter. Remember the maximum snow accumulation comes in April. Drive up and see the glory of Crater Lake in early spring.

### THE WINTER'S GREATEST STORM

The snowfall at Crater Lake comes in storms. The great snow storm of January 1933 at Crater Lake will probably go down in the records of the park as one of the greatest ever experienced. The storm starting on January 20 continued until the last day of the month. During the storm one hundred sixty-five inches of snow fell and at no time during the period was there any very perceptible break in the continuous fall of snow.

The rotary snow plow in continuous operation each day from early morning until twelve o'clock at night and on many occasions until 2 o'clock in the morning. Snow plow operator Harry "Happy" Fuller and his helpers during the period performed a really Herculean task. Once during the period of the storm they worked in relays and the plow was kept operating throughout the night without stop except for fuel and oil.

As you drive your car into the park in early April with vertical walls of snow and ice on either side 15 to 20 feet high, remember it is only through the constant and skillful application of the winter crew that the early opening of the park is possible. But for the snow plow operation which is now maintained at Crater Lake the opening of the park to visitors would be delayed for months each year.

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### Winter Birds

The following members of the feathered fraternity spend the long winters at Crater Lake:

Bald Eagles, Great Horned Owls, Sierra Grouse, Oregon Jay--commonly called the "Camp Robber", Clarke Nutcracker, Steller Jay, Ravens, Hairy Woodpeckers, and the mountain chickadees are the birds which comprise the winter group. The majority of the summer birds migrate to more agreeable localities with the coming of winter snows and raging blizzards.

## A BEAR STORY

David H. Canfield, Chief Ranger

Despite the fact that we who live regularly in the park think no more of seeing a bear nosing around than the average would of seeing a dog about a farm, those of us privileged to watch the bruins at their post-fall convention near the messhall kitchen door were furnished a tremendous amount of entertainment.

During the summer fewer of these friends, the black bears, made the Government Camp area with its nearby garbage pit (which when conversing with visitors must be officially tored up to "bear feeding grounds") their headquarters than in recently previous seasons. But coincident with the first heavy snows that hindered natural foraging at their scattered summer habitats the convention call was evidently sounded. To the slope back of the messhall came the delegates. Two one day, one the next, until all told, or all granting, fourteen answered the roll call. All appeared qualified members except two minors, not yet out of their weans, who accompanied their mother, patently a suffragette leader, and, if you ask me - an old bear to them.

Soft, deep snow stilled the roaming impulse while luscious garbage provided added incentive to stay nearby. An area approximately fifty feet in diameter embracing a woodpile and numerous splendid rocks for lounging places was soon packed smooth and hard by their paws and the little cubs' Ma. Into this convenient arena we could see from the sleeping quarters on the second floor and spare moments always found some of us at the window watching the proceedings below.

Eating, playing, and loafing. What a life for a bear! Fine garbage with scarcely the effort of raising a finger except to slap down some intruder who had designs on the same choice tidbit.

Complete insouciance seemed the order of the day as they lolled about. Laughable indeed were some of the positions of utter repose they would assume. One would be lying lengthwise on the edge of the woodpile, two legs hanging off into space and his head cushioned on his other front paw; another would be lying with his head propped up by a big rock; still another would be lying on his back with a rock pillow for head support, nonchalantly scratching his tummy.

One of our favorite actors was a coal black fellow slightly smaller than the average among them, but a regular little rowdy who seemingly never tired of rough play. Wrestling, boxing, and general scuffling were his idea of a real time and as long as he could find a prospect he was in some kind of meleco. He would rouse another bear from a pleasant after dinner lethargy and the bout would begin. First they would stand up and box.

This would inevitably result in a clinch sooner or later, and down they would go, rolling over and over down the sidehill, and the bout would continue as a wrestling match.

Finally they one challenged would tire of all this horseplay, and indicate his decision by an extra hard nip or cuff, thereby terminating that contest. So our little rowdy would approach another spectator who had comfortably and drowsily been watching the fracas. An exploratory feint or two without a snappy comeback was deemed a good omen as to the intended victim's disposition; so with a prompt pounce this little roughneck would have a new battle on his hands. These individual affrays would last anywhere from ten minutes to half an hour and as long as he could find a willing contestant he was continually embroiled in a good-natured scuffle.

Gradually as the snow became deeper one or two would fail to appear at mealtime, having left the conclave to begin their winter's hibernation. By December 20 all had left except one old buck who seemingly preferred good food and regular meals over the sweetness of sleep. One morning he did not appear at the cook's breakfast cry, and it had been storming hard since the afternoon previous so we assumed he had gone the way of the rest.

Late that afternoon as I glanced out my window something well up in a big fir tree nearoy caught my eye. There, some forty feet above the ground, reclining on a big limb on the lee side of the tree was our old buck, waiting out the storm. He lay at full length, two legs hanging grotesquely into space.

By the next morning the storm had broken, leaving some three feet of soft, fluffy snow on the ground. And as cook gave his come and get it cry, over, or rather, through the snow came old Buck. A combination of swimming and wallowing was the only way he could get through the snow, and it was obvious that he did not like having his upraised snout making a furrow. But after having spent at least 36 hours in the same tree and with nothing to eat we did not begrudge him a wee bit of temper which was soon to be dispelled by his pleasure at having a big pan of food that he need share with no one.

On the last day of the year he disappeared for the winter. In a few weeks we will see some of them again, for while the snow will be fourteen to fifteen feet deep and will be months before they can forage for themselves, they seem to know as they wake up that they can go over to the messhall where Jesso will be big hearted and find some splendid handouts.

## ICE RIBBONS AT CRATER LAKE

Have you ever seen the frosted white ice ribbons with which Jack Frost adorns the stems of plants and weeds on frosty mornings? Ice ribbons are prone to occur in the chill of early winter when the



ground is neither frozen nor covered with snow. The *Cunila* - *Cunila origanoides* - found up and down the Appalachian highland system is the favorite plant on which the ribbons form. Frequently similar ice ribbons have been observed growing from the stems of dead plants and weeds on the frosty slopes of the "hills" of our central plateaus.

The past winter very warm and moist weather occurred the last two weeks of November and the first few days of December. As a result the pumice slopes and bogs along the margins of Crater Lake National Park became thoroughly saturated with water from the nearly incessant mantle of fog and mist. Then came slightly colder weather with frost and ice. The chill of early mornings is the time to look for the ribbons which are tied by jolly old Jack Frost.

Ice ribbons were found in the bogs and in the canyon floors of the park to delight the lover of Nature. The ribbons observed were about two to three inches long and one inch wide, some transparent but most of them were frozen white, colored as the hoar frost of the dead of winter. It appears that the ribbons grow from the sides of dead stems and the water is supplied by the large sap tubes in the thin woody shell of the stems and not by the central pith. Since the ribbons are frequently found in dead stems broken off with one end sticking in a pool of water or a saturated bog, it is evident that a root system is not essential for the formation of these curious ice festoons.

Many partially formed ribbons were found, and from the various stages in the development observed, it is evident that the ribbons begin as a row, vertical with the stem, of closely spaced hair-like spicules of ice--crystal-like in their delicate tracery. Intermediate stages in the growth show a fibrous structure running length-wise with a silky sheen and the ribbon in each case growing from the contact with the saturated stem. The stem is fed with the necessary water by capillary action; the moisture being conducted up through the sap ducts of the woody stems. The graceful curves develop as the knife blade thin ribbon is forced out by the freezing moisture as it is continuously fed from the saturated pores.

## CRATER LAKE ANNUAL SNOW CARNIVAL AND SKI TOURNAMENT

The period from February 19 to 26 in Klamath County was devoted to the various activities of the Seventh Annual Snow Carnival and Ski Tournament. The contests were held at the ski jumping grounds which are located just below the south boundary of Crater Lake National Park and about six miles north of Fort Klamath. Various service clubs, the Pelicans - a local community group of Klamath Falls, and other organizations and individuals assisted the Crater Lake Ski Club with the program.



A feature of this year's carnival was the presence and active competition of Scotty Allan of Nome and his dog team of Alaskan huskies. Scotty and his team added a touch of color to the festivities which smacked of the rigors and romances of the northland where he has won coveted riches and many honors. In the dog team race, the first ever to be included in the club's

activities, Scotty Allan won first honors, followed in second place by Virgil Jones, Pocatello, Idaho, musher. The team of 15 dogs pulled the "Princess of the Snows", Miss Doris Noah, elected by Klamath County, on the sledge in a race against the several competitors in the feature event - the long thirty-two mile gruelling race to Crater Lake Lodge on the rim of Crater Lake and return. The dog team came in thirty minutes after Pete Hedburg, a blonde Scandinavian from Modoc Point, winner of the race and the recipient of the large Sterling Silver loving cup named "The Shadow of the Klamath". He negotiated the distance in four hours and thirty minutes. To obtain permanent possession of the cup Hedburg must be the victor a subsequent year.

Other features of the Carnival included ski jumping, various ski races, novelty contests and dances. The event which held second interest to the long thirty-two, feature contest was the Trail Breakers race of sixteen miles which starts from the rim of Crater Lake. Out of the field of twelve entrants Delbert Denton of Fort Klamath took first place, covering the distance in one hour and forty-two minutes.

To indicate how "ski minded" the youths of Klamath County are there is one race named "The Future Defenders of the Klamath". Contestants for this must be less than ten years of age.

Interest for years in the Crater Lake Ski Club has centered in the community of Fort Klamath, a village located near the site of the historic old fort of that name, where Federal soldiers were stationed during the days of pioneer development in southern Oregon. It was from Fort Klamath that troops were dispatched during the time of the spectacular Modoc War.



This year the Annual Snow Carnival and Ski Tournament attracted so much interest that contestants and visitors were brought from many sections of the Pacific Northwest. In all over four thousand people attended the various features of the Carnival. The festival was probably the most successful ever held since the inauguration of the Annual Ski Tournament in 1927. The officials and personnel of Crater Lake National Park congratulate the Ski Club and assure them it was a pleasure to extend all possible cooperation.

#### GLEAMINGS BY THE CHIEF RANGER

Apparently in semi-coma, cold and groggy, a golden mantled ground squirrel arouses from his hibernation and huddles up to the stove each time a fire is built in one of the smaller warehouses. After he thaws out a feed is welcome.-- The winter crew has for pets a pine squirrel, a golden mantled ground squirrel, and a snowshoe rabbit, all of them have the freedom of the messhall,.....

Bullcook Blackie's conservatory, with tin cans for flower pots includes sprouting parsnips, carrots, an onion, and a cabbage.. ...

Visitors acclimated to sea level atmospheric pressure seldom sleep soundly for the first night or two at the 7,000 feet elevation of the park.

Eighty tiers of twelve, sixteen and twenty inch wood stored for winter use in the messhall. The bunkhouse was rather cramped for space for a bit last fall.....there is considerably more room now.....

It has been noted several times that telephone wires buried in the hard packed snow may be broken and the ends separated by several feet, yet give perfect service. Using a twenty-two mile telephone line as an aerial, our small radios have been able to pick up Atlantic Coast stations with ease.....

Wild animals get into the road cut and cannot scale the sheer bank the plow leaves.....Brown lemmings, rabbits, coyotes, marten, squirrels, porcupines, and mice are often found in that predicament.....

Snow slides catapulting down the rim wall into the lake form snowbergs, pretty against the blue waters as they float away.....

Where did the muskrat come from that was found wandering on the highway between snowbanks thirteen feet high and in the dead of winter, more than twenty miles from the nearest muskrat habitat .....who cares about all this stuff anyway??

## "GRAUPEL -- THE SOFT HAIL OF METEOROLOGISTS"

It is natural that the many forms which falling snow assume should be displayed in such a nival region as Crater Lake. One of the odd forms is graupel. It is little pellets of compact snow--miniature snow balls--ranging from the size of coarse shot to that of small peas. Meteorologists formerly called it "soft hail", though it is crumbly rather than soft.

The graupel which falls at Crater Lake is mixed with soft snow. It appears that large wet flakes form and become involved in "traffic jams" up in Cloudland. As the masses come on down through cooler layers of atmosphere they freeze and the crumbly graupel aggregates result.

## THE TULE FOG OF THE KLAMATH BASIN

The Klamath Basin with its upper and lower Klamath Lakes and Agency Lake presents a very interesting phenomenon concerning fog conditions. It is most prevalent during the winter months but also occurs in the late evening and early morning hours for the warmer periods of the year. The fog is due to radiation of heat with the attendant ascending water vapor from the extensive water surfaces and adjacent tule swamp lands.

The depth of this so-called Tule Fog mantle is variable but usually it is quite shallow. As a rule the fog disappears by midday -- the daily period of maximum sun insolation. On the other hand there are days and in some cases longer periods of continuous fog with the resulting poor visibility.

## CHISEL TEETH

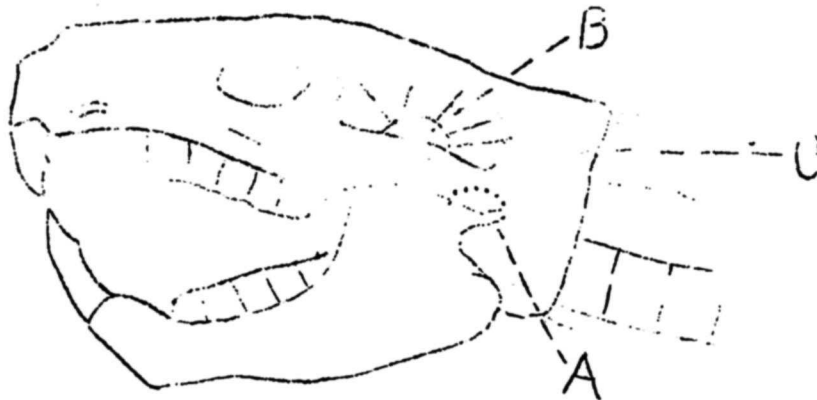
E. W. Count, - Ranger Naturalist

Having been bitten in desperation by one of our Gilded Ground Squirrels - she was a lady, too - I was left to soliloquize on the potency of chisel teeth.

The wounds - two little punctures on the last joint of my middle finger - were  $1\frac{1}{2}$  cm apart. Either both upper incisors had teamed to make one hole, and the lower likewise, or else only the teeth of the right jaws had been engaged. From the size of the holes, I should have judged the latter to be more probable.

Now, here was the interesting matter. The laceration from the upper jaw was slight: hardly more than an indentation. The tooth had struck glancingly. But the lower tooth or teeth had penetrated more deeply.

And there is a reason, which any one can ascertain by watching the little rodents at their chewing. It has been illuminating to note carefully one of my small beneficiaries trying to "stow away" a pear. The head is worked in such a way as to push the lower jaw up into the bite, the upper teeth acting, apparently, more as a hold or a bracer.



Then, if you examine a skull of a rodent, the cause becomes obvious (see sketch). The teeth of the lower jaw are longer and slightly heavier than those of the upper. The lower jaw used the same leverage scheme as that of any other animal's jaw - including man's: the fulcrum, a ball working in a socket, is shown at A. Strong muscles spread fanwise from the blade B to attach to the sides of the skull. (They are the same as the muscles one may feel swelling in the temples when he grinds his teeth.) But in the rodent, the leverage is greater and the muscles are relatively more powerful than in man. Furthermore, strong muscles run back from the skull (at C) to attach to the upper side of the neck vertebrae. As the squirrel gnaws, these may be seen rippling under the heavy skin of the nape.

A squirrel's head is an astounding thing in more ways than one. At the Lodge seventy-two Spanish peanuts were counted as they were solemnly stuffed at one sitting into the cheek pouches of one bushy-tailed little scrambler.

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On March 29 the snow depth at the Headquarters in the park reached 171 inches, exceeding the maximum depth of 166 inches for last year which occurred in early April.

The winter of 1932-33 appears to be a record-making one for Crater Lake. Already the depth of packed snow and ice exceeds the record of last year and it is very probable the total snowfall for the season will exceed that of last year.