Vol. 16 #4

THE CASCADE CAVER

Official Publication of the
CASCADE GROTTO N. S. S.

SEATTLE'S ONLY GENUINE UNDERGROUND NEWSPAPER

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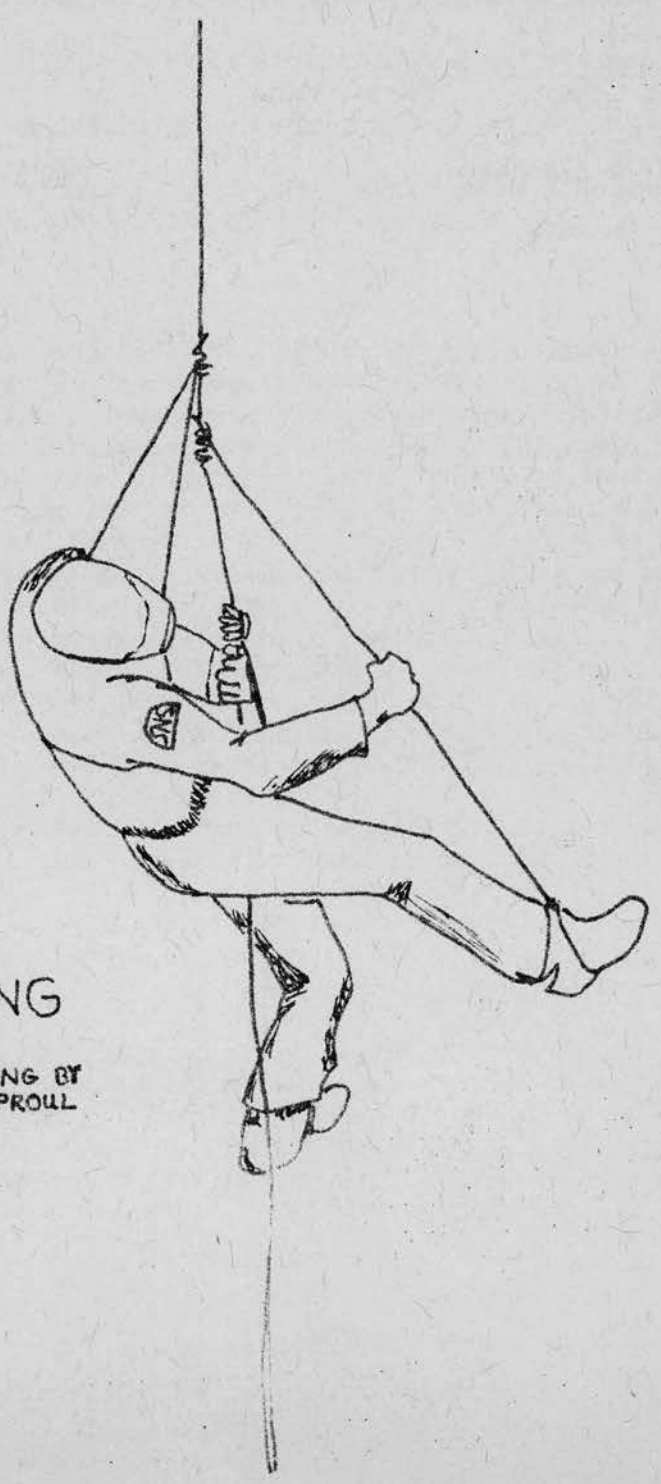

PRUSSIKING

DRAWING BY
ALEX SPROUL

THE CASCADE CAVER is published ten times a year (yes, it is too!) by the Cascade Grotto of the National Speleological Society. Subscription rate is $4.00 per year. Full grotto dues are $4.50, and family memberships (not including subscription) $0.50. All payments should be made to the Grotto treasurer, Chuck Coughlin, 6433 S. 127th Pl., Seattle, Washington 98178.

Coming Events

Saturday, June 4th. Windy Creek Cave. Call Chuck Coughlin, 772-1170.
Monday, June 20th. Regular meeting, 7:30 PM, in Room 325 of the Seattle Public Library at 5th and Madison in downtown Seattle. Cavers will start gathering for conversation at 7:00.
July 1-4, Independence Day Weekend. NWRA CONVENTION, Memekay River area, Vancouver Island. See p. 37 for details.
July 15-16. Oregon Grotto annual potluck, at Trout Lake, in the Mt. Adams area.
(You will see from the above, that either people aren't going caving, or they aren't telling the Caver where and when they're going. Faugh!)

News and Notes

Concerning Chuck Coughlin's trip report on p. 38: The trip was listed as follows in the Pacific Search "Search for Experience" auction catalog: "SNOWSHOE TO THE MOON. Combining snowshoeing with cave exploring, Charles Coughlin will lead you through the snowbound forest to a mile long underground lava tube in the Mount Saint Helens area. The tunnel was studied by NASA experts before the lunar expeditions. Mr. Coughlin is chairman of the National Speleological Society. If you provide the snowshoes, he'll provide the headlamps so you can see when you get inside the cave. 1 day in January or February depending on snow conditions. 1 family or 1 carload." We would like to draw our readers' attention to the fairness and accuracy of this description, even mentioning that the cave is underground, a point often overlooked.

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In the last issue of the Cambrian Caving Council's Annual Journal, Castleguard Cave was spelled "Kassagog" (means something in Welsh, no doubt).

\+ + + + + +

Bob Brown is now accepting donations of things to sell at the Speleo-Auction which is planned for this year's Christmas party.

\+ + + +

Our mistake: The small cave we mentioned in the last issue (p. 22) as being above Utterstrom's Caves, was discovered in 1962 by Jan Utterstrom and Bill Reese, along with the other, named ones.

\+ + + +

We're official: The Cascade Caver, we have learned, now has an International Standard Serial Number (ISSN), assigned by the National Serials Data Program (NSDP) at the Library of Congress (LC). The number is 0008-7211. We are requested (now get this) to display our ISSN "in a prominent position on every issue. The preferred position...is the top right corner of the cover". What will they think of next (WWTTCN)?

\+ + + + +

New Addresses.....

Frank Brandeberry	6 17th St., Edwards, California 93523
Clarence Hronek	4245 Brant St., Coquillam, B.C. V3K 2K6

F E A T U R E A R T I C L E

A SURVEY OF ELECTRIC CAVING LIGHTS AND TECHNIQUES, 1977

by Ed Crawford

Why Bother?

This article was started under an interesting combination of circumstances. First, the author has been an electric caver for longer than he cares to remember, at least long enough to have made most of the mistakes. Second, the Cascade Grotto store has come into possession of a number of Edison Electric headlamps, and nobody else seemed to know what to do to charge, care for, and feed them. Anyway, the first question that should be addressed in an article like this is, why bother? After all, carbide lamps do work, and very well. Although much argument has been published in various Grotto newsletters and in other places on the carbide-electric controversy, I think that by now most people are convinced that for long (longer than 10 hours) caving trips, carbide is superior to electric lighting, and generally I agree. If anyone wants to stretch this time limit, they can, but I prefer the path of least resistance.

Anyway, in the Northwest, who actually goes caving and really stays underground for longer than 10 hours? Electric cave lighting has considerable utility for short to average trips, for cave hunting, where any visit will be short, and you don't want to fire up the old 'bide for what may be an 11.5 foot cave. For the benefit of vertical cavers, electric lamps won't melt that rope just above your head (but watch out for that acid). [Ed. note: they also won't go out in a waterfall.] The lava tube freak (if there are any) can concoct lighting arrangements sufficient to dispel the most stygian gloom, but they will be a bit heavy. The other point, of course, is that if some enterprising caver doesn't revive the art of carbide lamp manufacture as a cottage industry, soon there may be no source of the alternative.

The Starting Point: Commercially Available Headlamps.

This discussion needs to be split into two sections, as two very different types of commercially available lamp are available. One, the consumer type, is generally available, and costs less than $10 per copy, usually without batteries. The second, or industrial type costs $50-100, and usually includes a rechargable battery.

Currently available headlamps of the first kind include the Justrite, which is available either with a "D" cell battery case, or without (I will discuss the implications of this later). The Justrite uses screw base lamps which are now available in a reasonable range of operating conditions (recommended current and voltage). The battery case of the Justrite holds four "D" cells for an open circuit voltage of 6v. It is subject to all of the contact difficulties that I will discuss later under battery systems. The advantage of the Justrite is that it can be focussed to some degree to provide either a spot beam for those high chimneys or a broad beam for average cave passage. A facetted lens is also available for this lamp which is supposed to diffuse the beam, but I haven't seen one in operation.

The Eveready headlamp is a very simple lamp-reflector assembly designed to be powered from a 6v. lantern battery. As such, it avoids the contact problems inherent in multiple "D" cell arrangements. The Eveready lamp uses

the PR series of flanged lamps, and it is somewhat more difficult to find a wide range of lamp types in this series. The headlamp assembly is also of rather flimsy construction, and except for price, I can see no reason to prefer it to the Justrite as a starting point for a custom built lamp. [Note: yr editor prefers the Eveready despite its flimsiness because the reflector gives much more even distribution of light in the beam].

Two other headlamps are available which may be of interest to the occasional caver. The Wonder Lite is a small, french made lamp which uses a special battery pack that consists of three AA size cells wired in series in a flat package. Wonder also makes a bicycle light using the same battery, and it is quite popular because of its reliability, so the batteries should be available for a while. I have had experience with only the bicycle light form, but this gave surprisingly long service on one battery pack, about 20 days of service at about one hour per day. This is in part due to the low current (0.20A) bulb used, but is still surprising, since it indicates a capacity of about 4 amp-hours, quite unusual for this size cell. The other small headlamp now available is the MSA. It uses a molded plastic headlamp which is quite lightweight, and a small batteryholder made of a rather poor battery clip designed for electronic equipment placed in a fabric case. The MSA's distinction is that it is designed to use the very high capacity lithium cell which will be discussed in the following section on batteries and bulbs.

Some General Considerations for the Design of Electric Caving Gear

The reader can probably tell by now that I don't regard any of the commercially available lighting equipment to be completely satisfactory, so I will now go ahead and suggest how one might construct his own electric outfit, as many around the country have. The essential elements are:

A lampholder and reflector; I would buy one, probably a Justrite. These are available from at least one cavers' supply house already equipped with a blade to fit carbide lamp cap brackets.

A cord; none of the available units have a satisfactory one except possibly for the regular miners' lamps. The best solution is to run two lengths of flexible, finely stranded insulated wire, of #22 gauge or heavier, inside a piece of non-stretch tubing. A piece of small diameter aircraft control cable, shorter than the conductors can be added in the same sheath to take up strain. This may seem like a lot of trouble, but a broken cord is probably the most common "real problem" for the Electric Caver. Useful materials for this can be found in surplus stores dealing in electronic and aircraft supplies.

A battery case; this is where some real ingenuity is needed. The standard method of placing button contact cells end to end with some spring compression just doesn't work very well, especially if dust, dirt, or mud infiltrates to make the contact resistance even higher than it normally would be. This is the problem with the Justrite battery case, and in case you haven't noticed, even the common 2 cell flashlight really doesn't work very well after it has accumulated dirt for a couple of years. A battery pack can be used, such as a lantern battery or the Wonder battery, but lantern batteries are an awkward size, and the Wonder is too small for longer caving trips. Some battery holders designed for electronic equipment may be okay, but I haven't seen any really good ones except in some surplus military equipment. If you are using rechargable batteries, probably the best way is to hard wire the cells in the circuit. New Ni-Cad cells can be purchased with spot welded leads which may be soldered together. Wet type Ni-Cad cells are usually wired

together with stainless steel straps. Some of the carbon-zinc primary cells can be used with soldered connections, especially if a good flux is used to make the solder stick to the terminals, which are usually made of steel today. Don't try, however, to solder to the more inexpensive zinc-carbon cells, such as the Eveready "nine lives" type. The heat causes the terminal piece to break loose from the internal electrode and makes the cell completely useless. You just have to try any soldering out on the type of cell you intend to use and see if it works.

Whatever kind of battery arrangement you intend to use, it must be put in some sort of case to protect it from bashes while crawling. Polycarbonate (Delrin, Makralon) plastic is a good choice for this, as is fiberglass. Remember if you are using any of the wet cell types such as lead-acid motorcycle batteries, or wet Ni-Cads with the very caustic KOH electrolyte, that the case is all there is between the bad stuff and your skin (and your rope, pack, and whatever).

Bulbs and Batteries

A light bulb for use in a flashlight or a headlamp is described by a current and voltage rating. The voltage rating is approximately equal to the number of cells intended for its use multiplied by 1.2v. This number is lower than the normal 1.5v per cell rating for a carbon-zinc cell, because some voltage loss is expected due to the battery internal resistance. A bulb must be operated near the rated voltage. If it is run much below the rating it will be quite dim, and if much above, it will burn out fast. The current rating gives a good idea how bright it will be for a given number of cells, since the brightness of a lamp is pretty well correlated with the power into it, that is the product of the lamp voltage and current (watts). Also, the current rating must be used to find out how long a given battery will last, as we will soon see. A list of bulbs which could be useful in caving is shown in Table I, along with their current-voltage ratings.

TABLE I.
Characteristics of Some Lamp Bulbs

Number of Cells (Nicad or Carbon-Zinc)	Lamp Type Number	Lamp Voltage (Volts)	Lamp Current at Rated Voltage (amps)	Lamp Power (Watts)
2	14	2.3	0.3	0.7
2	PR2	2.3	0.5	1.2
2	PR4	2.0	0.27	0.5
2	PR6	2.3	0.3	0.7
	Wonder	3.7	0.7	0.7
3	13	3.7	0.3	1.2
3	PR3	3.7	0.5	1.9
3	PR7	3.7	0.3	1.2
4	27	5.0	0.3	1.5
4	502	5.0	0.5	2.5
4	425	5.0	0.15	0.8
4	PR13	4.8	0.5	2.4
5	605	6.0	0.5	3.0?

TABLE I. (Continued)

# of Cells	Lamp Type	Lamp Voltage	Lamp Current	Lamp Power
5	PR12	6.0	0.5?	3.0?
6	50	7.5	0.22	1.7
6	PR18	7.2	0.55	4.0
8	965	9.6	0.55	5.3

Batteries are rated using two quantities, the open circuit cell voltage and the ampere-hour capacity. The open circuit voltage of a cell is that which you would measure using a voltmeter across the terminals when drawing no significant current. Since all batteries have some internal resistance, the voltage delivered to the lamp is somewhat less than the product of the open circuit cell voltage and the number of cells. The bulb manufacturers know this and have reduced the operating voltages of their lamps by about 20% from a multiple of the cell voltage of 1.5v for the standard carbon zinc cells. Fortunately, the other type of cell commonly in use, the Ni-Cad, has a lower cell voltage of 1.25v combined with an almost negligible internal resistance. The result is that the voltage delivered to the lamp from a string of Ni-Cads is about the same as for the same number of carbon-zinc cells. Actually, freshly-charged Ni-Cads give about 1.4v per cell for the first part of their discharge cycle, and, in my experience, do result in more frequently burned-out lamps. The same is true of the relatively low resistance alkaline cells, so anyone caving with these cells would be wise to carry at least a couple of spare lamps, and to throw away badly blackened lamps before a trip.

TABLE II.
Approximate Ratings of Some Useful Batteries

Type of Battery	Cell Size	Approximate Ampere Hour Capacity	Voltage Per Cell	Comment
Carbon Zonc (Standard)	D	3.0	1.5	Intermittent use
Carbon Zinc (Standard)	C	1.2	1.5	(one half hour
Carbon Zinc (Standard)	AA	0.5	1.5	per day to each
Carbon Zinc (Premium)	D	6.7	1.5	0.85 volts)
Carbon Zinc (Premium)	C	3.5	1.5	" "
Carbon Zinc (Premium)	AA	1.0	1.5	" "
Alkaline	D	8.5	1.5	Continuous Duty
Alkaline	C	3.5	1.5	" "
Alkaline	AA	1.0	1.5	" "
Ni-Cad	D	3.5	1.25	Continuous Duty
Ni-Cad	C	1.5	1.25	(Rechargable)
Ni-Cad	AA	0.5	1.25	" "
Lithium	C	5.6	2.8	

[Editor's note: Some "Standard" carbon-zinc cells are worse than others. Cheap brands such as Radio Shack and other "store brands" won't last the whole cave.]

The ampere-hour of a cell determines how long you should be able to use the light before the battery goes dead. It is simply the product of the current drawn and the number of hours use that will either drain the charge or in the case of a primary cell (a non-rechargable type), deplete the chemicals that produce the current. For instance, a look at table I shows that a PR7 bulb draws 0.3 A current. If you intend to power it with three D-sized Ni-Cads, a look a table 2 shows a capacity of 3.5 A-hours. Then, the length of time it would be expected to last is just 3.5 A-hours ÷ 0.3 A = 11 hours. Some caution should be expressed about the use of Table II. These are ratings given by one manufacturer, Panasonic. The ratings for the carbon zinc cells are for intermittent use of one half-hour per day, starting with fresh batteries, and with a rather low current load of about 0.2 A. If higher current lamps are used, or if you use the light for longer continuous periods, the rating is reduced. The rechargable cells have ratings that are pretty much constant with drain rate, at least at those rates typical of headlamp use, but will vary with the manufacturer. Some Ni-Cads marketed for home use have about half of the ratings stated in table II, so watch out when buying. Generally, for primary headlamp use, the alkaline, or the rechargable Ni-Cads are the best choice, although large carbon zinc batteries will work okay if you want to carry them. As Bob Brown has found out, the lithium cell, which takes the place of two ordinary cells, is an interesting choice for a backup light.

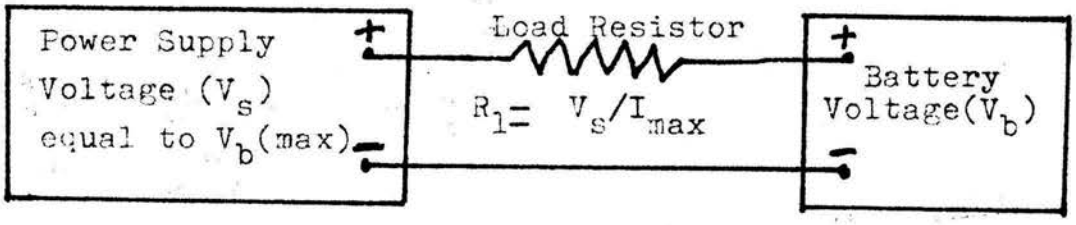
The Care and Feeding of Rechargable Batteries

Battery charging for rechargable batteries is not difficult if you know what you are doing, and the best way to find out is to read the instructions, or the manufacturer's literature, for the type that you are using. I will restrict this discussion to the Ni-Cad type batteries, but basic charging circuits etc. will work for other types. To charge a battery, you cause a current to flow through the battery in the reverse direction from that occurring when the battery is supplying power, This reverses chemical reactions in the battery that supply the power, and restores its energy supply. When the battery is fully charged, it means that you have used up all of the reactants that normally operate in the charge cycle. If you continue to charge the cell, other electro-chemical reactions start up, usually electrolysis of the water in the electrolyte, and this can cause damage to some types of cell.

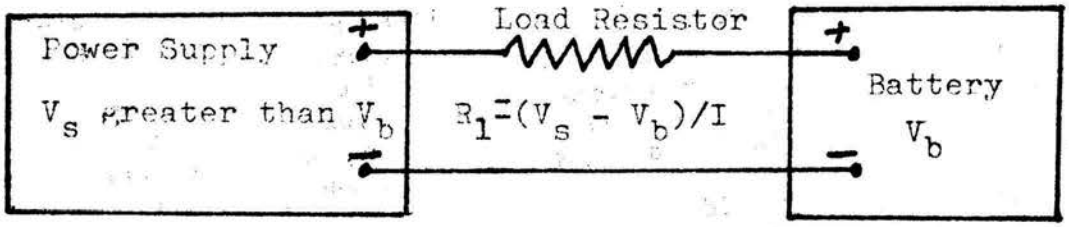
Anyway, the simplest way to provide this reverse current is shown in figure B. A power supply with an open circuit voltage greater than the maximum battery voltage is connected as shown to the battery. A resistor is included in the circuit to limit the maximum current, which will vary with cell size and type. Manufacturers of the small sealed Ni-Cads recommend a constant current charging current of 10% of the rated A-hour capacity. This would be about 0.4 A for the D size. At this current level, overcharging must be avoided by watching the time that the battery is being charged. The manufacturers recommend 16 hours at this 10% rate to fully charge a dead battery. If you don't know how much charge is on the battery when you start, once in a while feel the cells to see if they are getting warm. At the 10% rate, there is little discernible heating of the cells during a normal charge cycle, but there is at an overcharge condition. When charging wet cells with removable filler plugs, it is possible to use a higher charging rate. It is easy to tell when the battery is charged, because at that point, the rate of gas evolution, or bubbling, increases.

The "real" circuit shown in figure C is a useful and simple constant

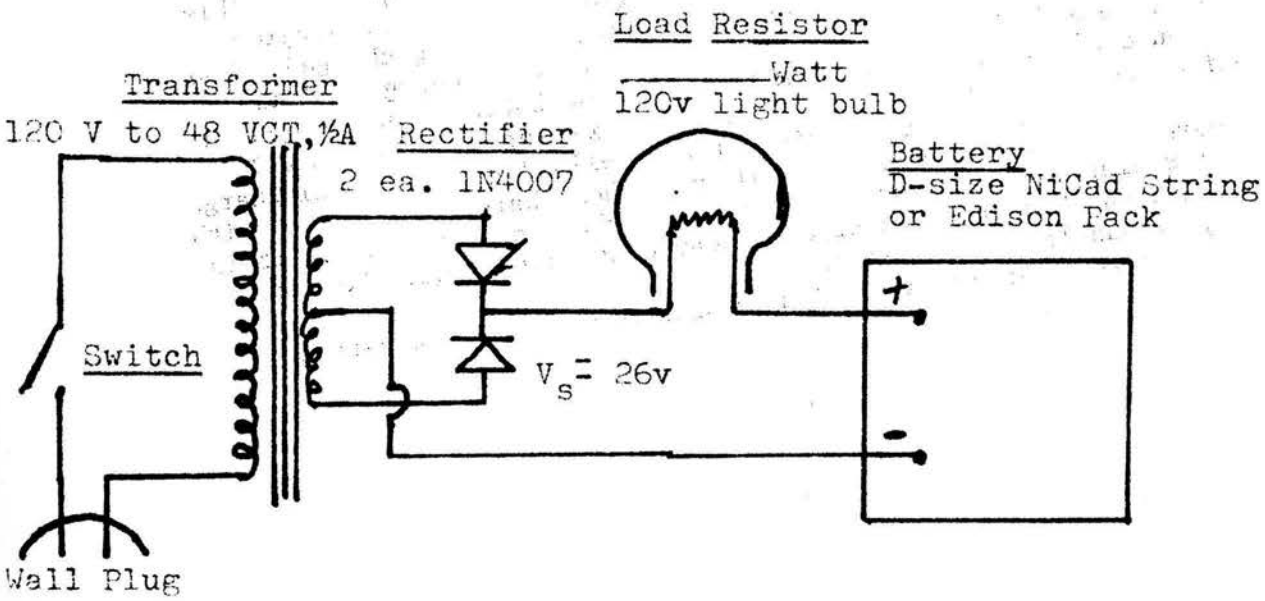
Some simple battery charging systems useful for electric cavers



A) Constant Voltage Charging System, requires power supply closely matched to battery voltage. Its advantage is that you don't have to keep track of charging time.



B) Constant current charging system, Cheap, will work with a variety of different batteries, or numbers of cells. You must keep track of charging time to prevent overcharging.



C)A simple and cheap Constant Current battery charger.

current charging system. The transformer steps down the line voltage to a safe level, and isolates the output from the line. The rectifier converts the current to DC, and the light bulb serves as a convenient ballast resistor. Actually, a light bulb is especially useful for current regulation; because of its non-linear resistance characteristics, it will supply a nearly constant current over a wide range of power supply voltages. With a 24v supply, as we have here, a 60 watt lamp will give a load current of about 0.25 A, a 100W lamp about 0.4 A, and a 150 watt lamp about 0.5 A. The power supply was designed to use a cheap transformer available locally but a 24v transformer and full wave bridge rectifier will work fine; ask about alternate circuits where you buy the parts. Total cost of this circuit at this time should be less than $5 if you mount the parts on a board.

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COME ONE!!! COME ALL!!! TO THE 1977 NORTHWEST REGIONAL MEET!!!

AN OPEN LETTER TO NORTHWEST CAVERS
by Terry Boorman, VICEG.

Greetings, Fellow Cavers:

This is an open invitation to all cavers and their families to come to this year's NWRA Regional Meet on Vancouver Island.

The meet will be held over the weekend of July 1, 2, 3, and 4, 1977, at a privately owned and presently being constructed campsite on the farm property of Bill Bourdillon, in Campbell River.

Bill tells me that he's going to have camping space for 75 cavers, with spaces suited for tents, campers, vans and trailers... There will be overflow space available for more camping if needed.

...We have quite a few pretty and challenging caves to guide you to [The descriptive list, not printed here, includes 25 major limestone caves within a few hours of the campsite, including 4774-foot Coral Cave which definitely interests yr editor.] For those of you who came to the NWRA meet in 1972, at Horne Lake, and wish to revisit those caves, it's still only 1 1/2 hours drive south from the campsite.

Since we want to let every caver explore as many caves as possible, it has been decided that our "banquet" should be a giant "Cavers' Breakfast". This will enable everyone to get ready for caving at the same time for a full day of caving, with no time limits on the length of the field trips.

The NWRA campsite is within walking distance, one mile, of the Oyster River, and the ocean at beautiful Saratoga Beach. Eight miles north is the salmon fishing centre of Canada's west coast, the city of Campbell River.

If you decide to come here for the NWRA weekend, why not plan to stay on the island for a while after the meet and let some of our members show you other caving areas? Maybe you'd like to tour around to some of our parks and beaches?

All of us in VICEG really hope that you'll come this year and that we'll be seeing you in July.

* * * * *

Available in some numbers for convention-goers are: 1) pre-registration forms, 2) ferry acces rate & information sheets, 3) maps showing how to find the campsite and other points of interest once in the Campbell River area. Copies of the descriptive cave list also available on demand. Apply to Bob Brown, Bill Halliday, Anne Ruggles, Curt Black, or yr editor. Let's make this the biggest NWRA convention ever, to make up for the last two years!

TRIP REPORT SECTION

Expedition II to Ole's

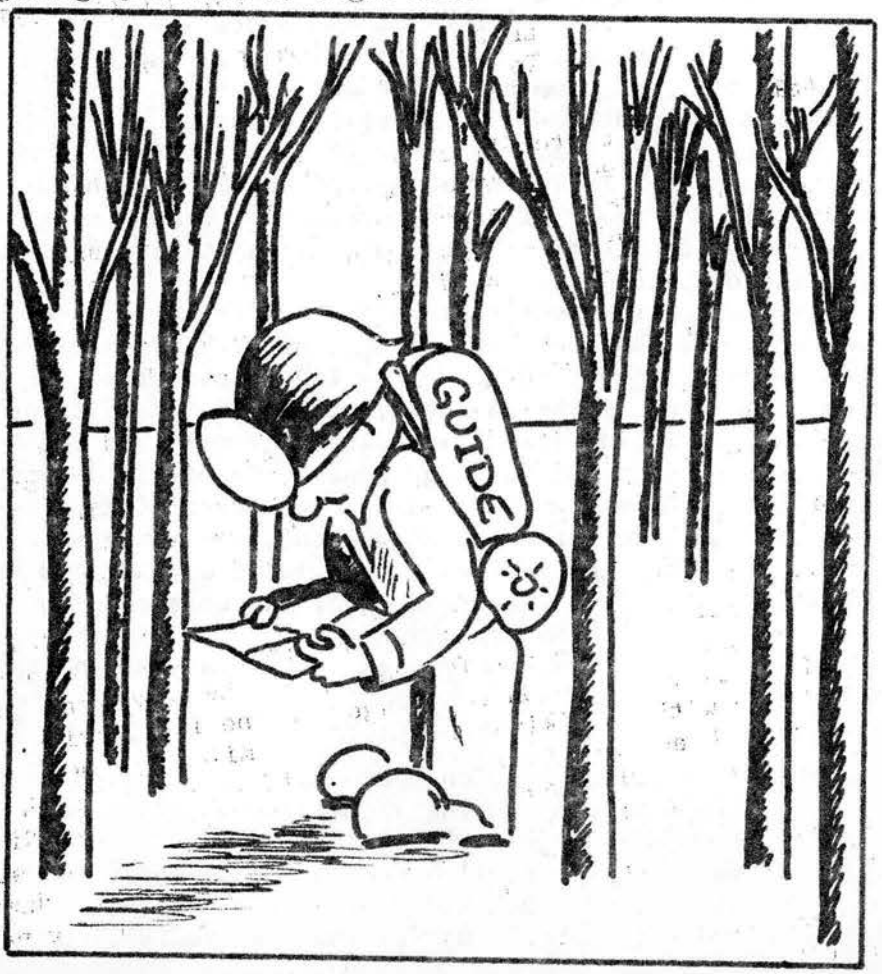
by Chuck Coughlin

With: Clint, Marianne, Cathy & Kent Howard; Eric, Bobbie & Scott Bremner

We left 5 AM, March 19 on my second annual experience as a cave guide for successful bidders in the Pacific Search magazine fund raising auction. Our first stop was the Country Cousin restaurant south of Chehalis--the first place I've ever found on this route worthy of a recommendation. We also stopped at Re se's store near Cougar where we found things unchanged since Mr. Re se's death. Bought up most of the cave postcards that were in focus. Mrs. Reese said her sons will print up some more this summer.

The car made it nearly all the way to the trailhead. There was about 4" of snow on the road, but we were halted by water over the road. Hiking was easy, but I quickly lost the trail where it was covered with snow. We found ourselves up on the flow too far west, but after wandering around for an hour (it's very embarassing being a lost guide), we found the correct trail and eventually the lower entrance. The eight of us were underground about 4 hours during which time it seemed like I was continually adjusting carbide lamps. Nonetheless, a goot time was had by all. We even found George Washington. Between the two upper entrances we spotted a good number of long-eared bats (Plecotus townsendi), 50 by actual count. Most were hanging singly although there were clusters of up to 6 or 7.

The trip out of the cave and home was enjoyable but uneventful except for the sighting of a herd of eight elk.

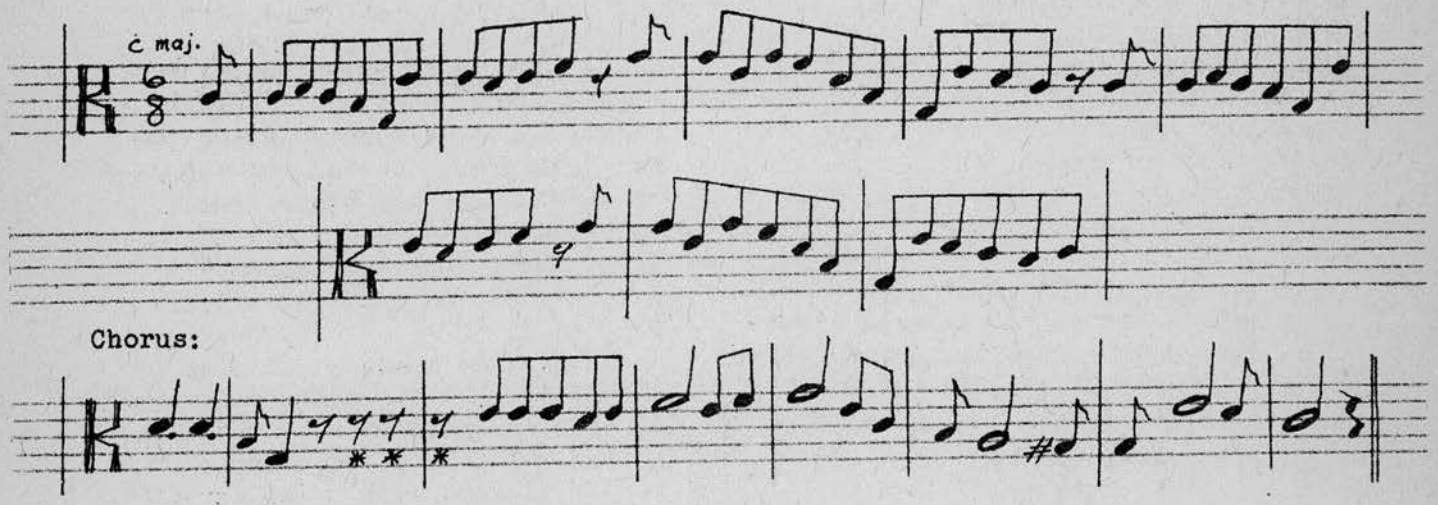


HERE WE ARE AGAIN--LOST

Two issues ago, I promised that I would some day reprint "The Wild Caver" with the correct tune which I got from Phil Whitfield at the Seminar in February. Well, here it is.

In transcribing the tune, I found it convenient to use the rather unconventional alto clef. Many readers more familiar with the usual treble and bass clefs may not recognize the alto clef; in this clef, the center line is middle C (the note which is midway between the treble and bass clefs). The asterisks (*) used in the chorus denote hand claps. The apparent last two notes of the stanza go with the first two words in the chorus (And it's...). Each note goes with one syllable, and vice versa.

THE WILD CAVER



1.
My first day at Cambridge, a freshman so neat,
Some boozy old cavers I happened to meet.
I asked to go caving; they answered me "Nay,"
"Such ouigees as you we can find any day."

Chorus:
And it's No, Nay, Never;
[Pause, 3 claps]
No nay never no more,
Will I play the Wild Caver,
No never, no more.

2. I drew from my pocket a chequebook so bright,
The treasurer's eyes opened wide with delight;
"With pleasure we'll greet you as one of our rank
As soon as your cheque has been cleared by the bank."

3. They sold me a light at exorbitant price,
And a little brown helmet--'twas ever so nice.
I went with them caving--P8 was the place--
There were only two killed and three lost without trace.

4. I've been down to Yorkshire, to Mendip and Wales,
I've been down the pots and I've sampled the ales,
And now I'm returning with stories to tell
Of waters that rose and of boulders that fell.

5. Now all I have left is a tatty wetsuit,
A clapped-out Nife cell and a half of a boot;
My clothes are so ragged, my beard is so long,
Thank God that's the end of my horrible song!

Cascade Grotto Store
Bill Capron, Keeper: Phone 784-8497
Price List, October 1976

Cave Packs	$1.50
Carbide	50¢/lb.
Judson kneepads, pair	4.50
Helmets	*
Chin Straps	.85
Premier Carbide Lamps	8.75
Lamp Brackets	1.00
Lamp Felts	2/15¢
Lamp Tips	.20
Lamp Flints	3/25¢
Lamp gaskets	.10¢
MSA Edison cell headlamps	*
Gibbs ascenders (spring)	8.50
Gibbs (quick release)	10.50
Bonaiti D carabiners	2.50
Bonaiti Locking D	3.25
Cascade Grotto Patches	1.50
NWRA Patches	1.50
Cascade Grotto decals	.25
NSS decals	.20

*Contact keeper for information.

Quantities are limited in some cases. If you want any caving-related equipment not listed here, please ask for it. The store is here to serve you, so take advantage of it. B. C.

Recent Meetings

The March meeting, the last at the Hallidays', was attended by 17 people. Plans were made for a trip to Paradise Glacier which eventually fizzled, why yr ed. knoweth not. Yr ed. announced that room 325, SPL, was definitely arranged for the April meeting. Bob Brown and others discussed the possibility of a seminar on practical caving, to be held in Seattle and complement the scientific seminar in Vancouver (referred to as "bugs & rocks".)

At the April meeting, successfully held in the Library, there were 21 bodies. A vote of thanks was unanimously passed for the Hallidays' patience in putting up with us for all these years. Separate motions were made to amend the bylaws in reducing regular dues to $4.50 and family dues to 50¢.

At the May meeting, also at the library, both amendments passed. 16 were in attendance. Rob Stitt showed a lot of slides from a lot of places, with a few caves thrown in.

The Cascade Caver
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Seattle WA 98195

Take
Nothing
But
Pictures
Leave
Nothing
But
Footprints