"THE CREVICE"

In memory of Eswyn

Newsletter of
The Alpine & Rock Garden Special Interest Group of the
Qualicum Beach Garden Club

Issue # 12 October 2012

From the Editor:
--Well the rain has finally arrived. I hope you were better prepared for it than I was – the extension to my crevice bed is still "under construction", alas, and the queue of plants waiting installation is still growing.
--It is not too late to submit seeds to the SRGC or AGCBC seed exchanges – prepping the seeds is a good rainy day job.
--It is exciting to hear from John Mitchell (report below) that construction of the Royal Botanic Garden Edinburgh's New Alpine House is underway, though fundraising to purchase the tufa blocks as well as seed collection & propagation of the alpines needed, is still ongoing. If you would like to help out, visit:
http://www.rbge.org.uk/supportus/donate/appeals-projects/alpine-house-appeal
NB: The Royal Horticultural Society's magazine, **The Garden**, Oct 2012, p. 9, reports:
"The RBGE is soon to unveil hidden gems from its ***world-leading collection of alpine plants***, many of them going on public display fro the first time … ." WOW.
--If you have anything to submit or suggestions/critiques, please contact me at:
melanson.valerie@gmail.com
Happy rock gardening,
Valerie

ROYAL BOTANIC GARDENS EDINBURGH
THE NEW ALPINE HOUSE

Report and photos by John Mitchell,
Garden Supervisor, Alpine Section, RBGE

September 28, 2012

Work has started on building the new Alpine House at RBGE. The construction of this new alpine house will allow an even wider range of alpine plants to be cultivated in a more naturalistic setting, particularly cushion alpines which have the reputation of being extremely difficult to cultivate. This style of planting will also encourage or allow visitors who would not

normally have the opportunity to visit the high mountain areas of the world, the opportunity to see and have explained the survival adaptations of these high alpine plants and their importance as indicator plants in a period of climate change.

It will complement rather than replace, the existing wooden Alpine house that was constructed in the 1970's. The existing house uses traditional techniques of plunge planting container-grown plants which are cultivated in the back-up collection and displayed when in flower. The Garden has an acknowledged expertise in the cultivation and has an extensive collection of alpine plants. This new facility will keep the Garden at the forefront of the cultivation of this group of plants.

The concept for the new alpine house is that it will provide protection from the worst of the normally wet Scottish winter. Heat is not required to cultivate this group of plants however key elements for successful alpine plant cultivation are; protection from wet [particularly winter wet], good air movement all year round [again particularly during the winter] and especially extremely good light transmission.

The new house will sit within a complementary landscape made of rocks, particularly tufa, and the two Alpine Houses will be accessible to each other via a gently sloping path. The house will be set back from the road and aligned with the existing Alpine House and will not interfere with the fine view down the slope to the Victorian Temperate Palm House.

The new Alpine House project is being funded by the Scottish Government, Biff award, RBGE Membership appeal, RBGE Commemorative and Legacy Donations, the Alpine Garden Society and the Scottish Rock Garden Club Web. www.rbge.org.uk

The Royal Botanic Garden, Edinburgh. Its mission

" exploring & explaining the world of plants for a better future"

TRIP TO THE U.K.

THE TUFA WALLS AT WISLEY

Report and photos by June Strandberg

There are two walls both built with large blocks of tufa and both running the whole length of the alpine houses. One is on the shady side of the Landscape House, the other on the sunny side of the Display House. I have followed them from the time the first (shady) one was built and there were so many tiny plants growing in the rock. The next time I went there were two walls and the plants on the first one were getting very interesting.

Shady Wall

Sunny Wall with *Physoplexis comosa* & lots of saxifrages

There are now *Saxifrage, Ramonda, Campanula, Dianthus, Erigeron, Asperula, Corydalis, Daphne, Hepatica* and, I think, *Paraquilegia* - all growing along with ferns, mosses and toadflax (and very attractive these last three are too!). *Phyteuma comosum* grows equally well on both shady and sunny sides and I have read that *Cyclamen coum* has been seeded in though I saw no sign of it. I don't see how a corm can grow in tufa but it would probably be in the cracks between the rocks, which are where most of the ferns like to grow. I am sure there are many genera growing there that I did not spot on a cold morning in early May. Next time I go I hope the weather will be warmer so I can really take a good look and see what else is established. I Love them!


Shady Wall – *Physoplexis comosa* aka *Phyteuma comosum* on left, a Campanula on right
The *Physoplexis* likes both sunny and shady tufa walls.


Daphne *Asperula*

I don't think any of us will aspire to a wall but we can do much with the pieces we buy from Borden's in Victoria - $15-$20 for a nice sized chunk, well shaped and very dry. The last piece I bought was just over 60c per lb.

At Jan's, Gordon mentioned contacting the Wolfendens in Brisco - to see how much it would cost to have a load shipped over for sharing around (I think it will be too expensive) The cost of the tufa is not so bad, it is the shipping that causes the problems!! Eswyn and I got our first load of tufa from Brisco and it cost 12c lb plus PST (1999). If we had bought over 1000lb it would have cost 10c lb but we could only get 700lb in our truck! Most of that tufa is now on the Nanoose rock garden.

If any of you drive to Calgary and badly want tufa you can make a detour to Brisco probably on the way home. From Hwy 1 turn left on to Hwy 93 through Kootenay Park to Radium Hot Springs and from there take Hwy 95 up the Columbia valley to Golden. Brisco is not very far after your leave Radium, right hand turn to the farm. It does about double the distance you would normally travel.

REPORTS ON ALPINE SIG DOINGS

CREVICE IN A TROUGH SEMINAR WITH GORDON MACKAY

Report by Valerie Melanson
Photos by June Strandberg, Elaine Bohm, Valerie Melanson

The weather was perfect, the setting was ideal, the company was convivial and the presentation and plants fascinating. Thank you to Jan & Toad Phillips for opening their lovely, tranquil garden to us, and thank you to Gordon for the inspiring talk and plants … and for donating such great prizes for our draw.

Gordon Mackay of Alba Plants with his finished demonstration trough

Plants from Left to Right:
1 x *Ceanothus greggii,* 1 x *Erigeron trifidus*, 1 x *Daphne x susannae* 'Lawrence Crocker' , crevice with drift of 3 x *Solidago virgaurea var. minuta*
In front amongst the crevices are sown a drift of fresh Sorbus reducta seeds.

Gordon sends the following additional notes*:*

"*Solidago*, the one I have is *Solidago virgaurea var. minuta* and the *Daphne* is usually listed under *Daphne x susannae 'Lawrence Crocker'* and is a hybrid of *D. collina* and *D. arbuscua*,

introduced and named by none other than Lawrence himself of Siskiyou Rare Plant Nursery who I believe found it in his own garden."

A great venue for the workshop at Jan & Toad Phillips'

Mike Miller's trough in a dish under construction (L) and finished (R)

Margaret & Richard Mann's crevice garden under construction (L) and finished (R)

Elaine Bohm's crevice garden in process

Valerie's start on a Scottish crevice garden

Congratulations to Barbara Kulla who won the draw for Gordon's demonstration crevice garden in a trough.

IDENTIFICATION OF MIKE'S MYSTERY PLANT FROM WHISTLER

Bernie Guyader identified it as *Stellaria longpipes* (long stalked starwort).
Bernie cites Lyon's Trees, Shrubs and Flowers to Know in BC and Washington, page 169.
And have a look on the internet at the Red Butte Canyon Research Natural Area, Utah, website:http://redbuttecanyon.net/diversity/s_longipes.html
Red Butte got their image from the Memorial University of Newfoundland, Todd Boland presumably was the photographer.

THE APUAN ALPS

By Zdeněk Zvolánek

It was idea of Moravian explorer Mojmír Pavelka to visit Apuan Alps, on our way to Spain in August 2012. His vision was to see *Moltkia suffruticosa* in nature.

Moltkia suffruticosa in flower from another trip

Moltkia suffriticosa subsp. Bigazziana

The Apuan Alps (Alpi Apuane) are a mountain massif distinctly separated from the Tuscan Apennines in Italy. They show an elliptical shape about 55 km long and 25 km wide; the main axis is oriented NW-SE. The highest peaks (Monte Pisanino, Monte Cavallo, Monte Tambura, Pizzo d'Uccello) reach almost 2000 metres above sea level. The great variety of rocks and soils is one of the most interesting characters of the Apuan Alps, which are well known also for the marble quarries since Roman times. Marbles from the Carrara region are very fine for carving (from a huge block Michelangelo made his statue of naked warrior David in 1504). The climate too is very variable, both over the seasons and at the different altitudes and aspects. Therefore, flora and vegetation have many diverse facets that have been known to botanists for a long time.

Google Earth and the internet was a great help to me when I prepped an easy trip to approach a maximum height or elevation with our city car VW Sharan. We travelled from Sedl□any (south of Prague) via Austria and Germany to Carrara at the Tyrrhenian coast on the Ligurian gulf. It took 12 hours and we slept in our tents in a camping place on the seashore. Beer, which is essential for our partner Mirek Stan□k, was not good there, as is generally typical for Italy.

Next morning we, with one mistake in my navigation, found the narrow road SS446d in the NW corner of Carrara and travelled via the village Gragnana to the village Castelpoggio, where there is an asphalted road called Strada Provincionale 59, leading to Campo Cecina at 1300 m. Before reaching Rifugio Cai Carrara (a cabin pub with cheaper but nice red wine) at elevation 1100 m we saw pretty mats of *Globularia incanescens* decorating vertical limestone walls. Some of them, in south exposures had ripe seeds.

Globularia incanescens

Globularia incanescens in seed

Mojmír was surprised how dwarf and compact is this species with lovely bluish grey-green spathulate leaves. The best plants in cultivation are grown in tufa holes. I had troubles with this species in my too dry open soil. This species occurs towards the elevation of 1700 meters and plants there are really small treasures.

Campo Cecina is open area with dirty road leading to the big active marble quarry under Monte Sagro. It is place famous for impressive vistas above Carrara. Above a small old quarry is the limestone peak Monte Borla, 1470 m above sea level. Here we saw promising endemic *Centaurea montis-borlae* at the southern slopes above the quarry during our cooler evening trip.

Centaurea montis-borlae

Monte Borla

All plants were about 5-7 cm high, with decorative lanceolate leaves and pink flowers, 3-4 cm in diameter. Some had started to form seeds. It is a saxatile alpine suitable for cooling crevices in sedimentary rock or tufa cultivation. Mt. Borla showed us marble fissures filled with pretty flat shrub- with small glaucous leaves *Rhamnus glaucophylla*. We saw flat cushions of *Moltkia suffruticosa* subsp. *bigazziana*, which apparently lost seed production from some unknown reasons. Stunning dwarf *Paeonia officinalis* was photographed for the web in a crevice.

Tiny marble crevices below Monte Borla

Somewhere near the summit there were pine trees, but we had no time to climb the summit and did not try to find it. The peony is not listed in the available list of the local flora,

so it is risky to look for it. Some listed plants I didn't recognise because of the short time for exploration together with my age and alcohol content: *Daphne alpina*, *Polygala carueliana, Phyteuma scorzonerifolium, Salix apennina, Ranunculus pollinensis, Scabiosa holosericea, Santolina leucantha, Senecio brachychaetus* or *Silene pichiana*.

Androsace villosa is not listed there, but hundreds of compact plants showing chocolate brown seed was at Campo Cecina. One heap of marble grit hosted beautiful pure white *Arenaria bertolonii* and I saw a few flowers of the all blue *Aquilegia bertolonii.* We climbed two thirds of Monte Sagro (a 1750 m tall peak). On the route up we found *Moltkia suffruticosa* with some very small seeds. It makes cushions of dark green narrow leaves, about 40 cm in diameter. Its flower stems are up to ten centimetres high. It needs baking on the surface of the marbles. We looked at *Saxifraga lingulata* subsp. *lingulata* rosettes and recognised *Helianthemum croceum* and *Hypericum coris*. It was a very hot tropical day and we have to stay many hours in the shade of trees of the Rifugio Cai Carrara. After the evening trip we bivouaced at Campo Cecino, which was busy all night with lovers of night vistas and lovers of each other! In the early morning the heaviest trucks started to transport marble blocks down the narrow road to Carrara and it was not romantic at all, so we travelled via an extremely warm France to the even hotter countryside above Barcelona.

USEFUL LINKS

UBC Botanical Garden POTD on Harewood Plains, Nanaimo, wildflowers:
http://www.botanicalgarden.ubc.ca/potd/2012/09/harewood-plains.php

NEW REFERENCE MATERIALS

Sky TV with Kew and David Attenborough, has produced a new three part series,
"Kingdom of Plants", in 3D and now available on DVD;
This was filmed mainly at Kew and is available at: http://shop.kew.org/books-dvds/cd-dvd.html
There is even an app available for iPhones and iTablets. A promo for the app shows how you can pan around the Davies Alpine House.

NON-SIG EVENTS TO NOTE

October 23rd – VIRAGS – Paul Spriggs speaks on "A Great Scot: David Douglas, The Man, The Legend and His Plants". See http://www.virags.ca/
November 7th - AGCBC – Harvey Wrightman speaks on "Growing Alpine Plants".
See http://www.agc-bc.ca/

SUZY'S BOUQUET

FROM these two gardens

The Eswyn Alpine & Rock Garden at Nanoose

Eva Grodt's lovely garden

TO this

TO these

PLANT PORTRAIT

Ipomopsis aggregata

By David Sellars,
President of The Alpine Garden Club of B.C.

Ipomopsis aggregata flowering in October in the garden

An unusual flower in the October garden this year was *Ipomopsis aggregata* or Scarlet Gilia. The plant came from seed we collected on Mount Kobau in 2011 which we planted in the Fall and germination was excellent in early Spring of this year. The plants have formed attractive rosettes in the garden and one plant produced a long flower spike. With our recent extended sunshine it decided to start flowering in October. If the other plants survive the winter they are likely to flower early next spring. *Ipomopsis aggregata* is normally monocarpic but sets lots of seed so it can easily be started again. According to information on the web, the plant is not always monocarpic in the garden and multiple flower spikes in subsequent years are possible so we won't give up on the plant too quickly!

Ipomopsis aggregata occurs in dryland areas in much of the western United States and in

the interior of BC. It is very drought tolerant and needs very good drainage in the garden. We grow it in Sechelt Sand with a small percentage of humus.

Left: *Ipomopsis aggregata* garden rosette, Right: *I. aggregata* in theWenatchee Mountains

NEWS FROM ESWYN'S ALPINE & ROCK GARDEN, NANOOSE

Sunday, October 21st, 2012 – Master Gardeners from the Nanaimo conference will visit Eswyn's Alpine & Rock Garden shortly after 2:30 p.m. I (Karen Unruh) have arranged that we can have the meeting room next to the garden and I will set up a display of Eswyn's pictures, notebooks, notes etc. and have information on the construction of the crevice garden by Paul Spriggs. I invite any Alpine Special Interest Group members to join me in welcoming the BC Master Gardeners and especially to share their friendship with Eswyn. I would appreciate help with a discussion of the plants in the garden and helping to answer questions.

Now that we are closer to Sunday, October 21st, please consider volunteering to help me show the garden, and enjoy a cup of tea and conversation with this group of interested gardeners. The garden will receive a $5 contribution for each of the tour members, and I expect that we will have a maximum of 20 persons on the tour. Please let Karen know if you can help, by e-mailing her at kjunruh@shaw.ca

A WEEDING PARTY AT THE ROCK GARDEN

Report and photos by June Strandberg

We weeded on Saturday afternoon, 22nd September so that Daphne Trelawny could come along with us - she used to help Eswyn with her Qualicum Beach garden. Lots of weeding and trimming was done but it still needs one more session, we are waiting for rain so we can move some larger things to the back and plant out our new arrivals. Kirsten came for a visit and brought Dorothy Eaton along to look at the garden. Dorothy was a member of QBGC before she moved to Vancouver.

L to R: Karen Unruh, Gladys Kinsman, Daphne Trelawny, Elaine Bohm, Dorothy Eaton, June Strandberg. Photographer: Kirsten Juergensen

We found these two plants on the crevice garden – the *Campanula alsinoides* is looking very lively and does have a name but we wondered who had donated it? The little rosette is perfect - bright and so green, we would very much like to know what it is and who gave it to us?

Campanula aisinoides

Mystery *Saxifraga*

We do need more plants for the crevice garden but have decided to only put out well rooted and grown-on things – anything else we will keep in pots till larger. A few of the tiny plants have found it difficult getting through this dry part of summer/fall so consequently we have some lonely labels scattered around!!

OTHER PHOTOS FROM THE ESWYN GARDEN – SEPTEMBER 22nd

Campanula 'Tiny Tim'

Campanula x haylodgensis 'Marion Fisher'

A BIG THANK YOU TO PAUL SPRIGGS

for donating 5 plants for the Eswyn Alpine & Rock Garden Crevice Garden: *Erigeron linearis, Primula marginata*, another *Primula sp., Penstemon rupicola alba* and *P. rupicola ?blue*.

Daphne ? 'Lawrence Crocker'

In Roy Elliott's book **Alpine Gardening** (1963), he talks about the genus *Daphne* as being the most elite of the rock garden shrubs that alpine enthusiasts of the time would favor. He goes on to say "*Daphne was the daughter of the River God, Peneus. It is a curious thing about ancient mythology, but every charming girl is always being chased by someone, and Daphne was no exception. She was pursued by Apollo, and only avoided a fate which is classically (and one suspects erroneously described as being worse than death, by turning into a shrub.*
The main difficulty in growing Daphnes is that they like plenty of sun to ripen the wood, but at the same time they like their roots moist, and it has been our experience that a great deal of grit and peat in the compost is of far more importance that the old debatable point of whether or not they need lime."

June Strandberg has nurtured a Daphne cutting from Eswyn's original plant for some time and since planting it in the crevice portion of Eswyn's Alpine & Rock garden it has flourished and bore its first flowers in September. The original plant didn't have an identifying label so June is not sure of the species. She is referring to it as *Daphne ? Lawrence Crocker* but would like to know if anyone can confirm if it's the following plant that appears on the web as ***Daphne x susannae* 'Lawrence Crocker' – *D. arbuscula x D. collina***.

The story line is that this little Daphne just gives and gives. Very fragrant, purple/mauve flower clusters bloom from spring thru fall once the plant is established. Leaves are evergreen and narrow, about 2" long. The plant is a nice little shrubby thing growing only to 12"x12". It is the perfect addition to a rock garden or container. Sun, part shade – zones 6-9

UPCOMING ALPINE SIG EVENTS

OCTOBER 29th - REGULAR SIG MEETING - LIONS ROOM, Q.B. CIVIC CENTRE, set up from 12:30, SLIDE SHOW STARTS at 1 p.m. JUNE STRANDBERG will be showing SLIDES OF WISLEY & KEW and THE ENGLISH GARDEN TOUR she went on in May 2012. Meeting finishes at 3 p.m.

NOVEMBER 14th – ROAD TRIP TO AGCBC MEETING at VAN DUSEN GARDENS, VANCOUVER, to hear CHRIS CZAJKOWSKI talk on ALPINE FLORA OF THE REMOTE B.C. COAST RANGE. If you are interested in participating, please contact June Strandberg, normjune@shaw.ca

NOVEMBER 26TH – REGULAR SIG MEETING & *OUR AGM* – Christmas Lunch – Date TBC & Venue TBA. AT THE AGM WE WILL BE ELECTING OUR EXECUTIVE MEMBERS. NB: the current Executive is willing to stand again: President – June Strandberg, Vice-President – Barbara Kulla, Treasurer – Mike Miller, Secretary – Lori Pross, Newsletter – Valerie Melanson. But if you would like to run for the Executive or can help in another capacity, please contact June Strandberg, normjune@shaw.ca

TENTATIVE CALENDAR FOR FIRST ½ of 2013:

JANUARY 28TH – REGULAR SIG MEETING
FEBRUARY 25TH – REGULAR SIG MEETING
MARCH 25TH – REGULAR SIG MEETING
MID APRIL – ROAD TRIP TO VIRAGS SPRING SHOW & PLANT SALE
APRIL 29TH – REGULAR SIG MEETING

MONDAY, MAY 27th, 2013 – CHRIS CHADWELL, PLANT HUNTER, SEED COLLECTOR, AND SECRETARY OF THE HIMALAYAN PLANT ASSOCIATION, will be visiting us for garden visits and a seminar. Topic & Venue TBA
TUESDAY, MAY 28th, 2013 – ROAD TRIP TO VIRAGS – CHRIS CHADWELL, PLANT HUNTER, on "Paradise on Earth".
TBC WEDNESDAY, MAY 29th, 2013 – We are invited to attend a seminar with Chris Chadwell at Alba Plants Nursery, Cowichan Bay, on "Starting Himalayan Seeds". **DATE AND TOPIC TBC. Reservations will be a must.

WHAT'S NEW IN MY GARDEN – VALERIE MELANSON

My ***Androsace armeniaca v. macrantha*** made a second attempt at flowering. As reported in the August issue the first attempt saw the flowers open in the rosette and no stem form, due to lack of water. After the one good rain we had and a few doses of water by yours truly, a successful stem has occurred. Now to see if seed is set and the plant lives or proves monocarpic.

1st attempt – Aug 3, 2012

2nd attempt – started beginning September and continuing October

grown from AGCBC Exchange Seed (courtesy of June Strandberg), started Jan 8, 2012, and potted into clay late June 2012

***Calceolaria integrifolia 'Saalegold'*, purchased in June from Owl & Stump and still blooming**

***Campanula fenestrellata* has bloomed all summer**

***Campanula 'Pink Octopus'*, second blooming**

Convolvulus sabatius aka c. mauritanicus
Purchased from Allsbrook, blooming all summer

***Edraianthus serpyllifolius* has put out the occasional blooms all summer**
Plant from Beaver Creek Greenhouses Spring 2012

Chaenorrhinum origanifolium
'Blue Dreams', blooming all summer grown from Chiltern Seeds, seed sown Feb 5, 2012

JOHN INNES MIXES

information compiled by Valerie Melanson

Since so many of the alpine gardening books we reference were written in England and recommend use of the J I Mixes, it seems like to good idea to find out their raison d'etre and what goes into them so we can create our own versions here in Canada.

HISTORY OF J I MIXES

Quoted from: http://www.johninnes.info/about.htm, the website of the John Innes Manufacturers' Association:

"The composts were developed at the John Innes Institute, named after one John Innes, a nineteenth century property and land dealer in the City of London. On his death in 1904 he bequeathed his fortune and estate to the improvement of horticulture by experiments and research. The result was the establishment of the John Innes Horticultural Research Institute initially at Merton in Surrey, but now located at Norwich.

Before the introduction of John Innes Composts, gardeners generally used a different compost for each species of plant. Usually the soil was not sterilised or heat pasteurised and consequently plant seedlings were often attacked and destroyed by soil-borne diseases and insects. Also the plant foods being added to the traditional composts were usually unbalanced, causing the plants to be either too "soft" in their growth and liable to diseases, or very "hard" and slow growing.

In the 1930's two research workers at the John Innes Horticultural Institute, William Lawrence and John Newell, set out to overcome these problems and to formulate composts that would give consistently good and reliable results. After six years of experiments they determined the physical properties and nutrition necessary in composts to achieve optimum rates of plant growth. They also introduced methods of heat sterilising the soil that eliminated pests and diseases, but did not cause any checks to plant growth.

The result of this work was the introduction of two standard composts, one for seed sowing and one for potting. These "John Innes" composts revolutionised not only the ways in which composts were produced, but also the growing of plants in pots. Now, after being used very widely for over 50 years, the basic formulae remain the same - tried and tested and still popular amongst discerning gardeners for growing the best quality plants with the minimum of attention. Naturally, the plant nutrients have been updated to gain the benefits of improved fertiliser technology."

FORMULATION OF THE MIXES

Reference: Duncan Lowe – **Cushion Plants for the Rock Garden**
(London, B T Batsford, 1995, ISBN 0-7134-7425-4), p. 106

John Innes No. 1:
By volumetric measures:

7 parts sterilized loam (preferably with a pH near to 6.5)
3 parts peat
2 parts grit or sharp sand
Add to each bushel of this mixture (=37 litres):
¾ oz (18g) ground chalk or limestone
4 oz (100g) John Innes base fertilizer

John Innes base fertilizer, all by weight =
2 parts superphosphate of lime
1 part sulphate of potash
2 parts hoof and horn meal (not bonemeal)

John Innes No. 2 has twice the amount of base fertilizer
John Innes No. 3 has three times the amount of base fertilizer

From W. R. Hecker, **Auriculas & Primroses**
(London: B. T. Batsford & Newton Centre, MA: Charles T. Branford, 1971), p. 103

Recipe for **John Innes Potting Compost for Seeds**:
By volume:
2 parts of sterilized loam
1 part of peat moss
1 party of coarse sand or grit
To each bushel of this is added 1 ½ oz of superphosphate (18% phosphoric acid) and ¾ oz. chalk.