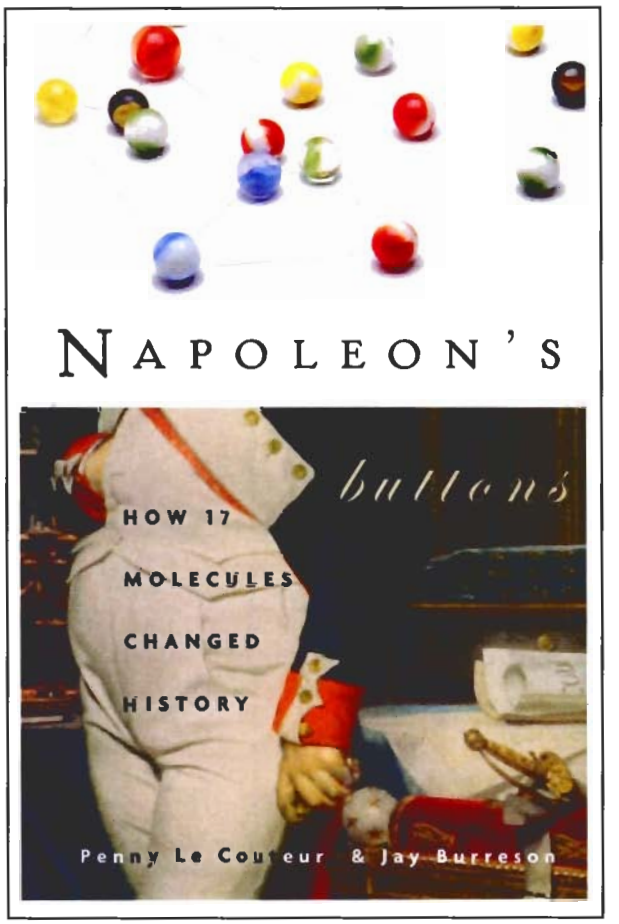
C_3 NEWS

Newsletter of College Chemistry Canada/La Chimie Collégiale au Canada

DECEMBER 2003 C_3 NEWS

The Emperor Needed New Buttons

A Review by Bob Browne
Douglas College



Three years ago Penny Le Couteur, a long-time member of C3, and currently Dean of Arts and Sciences at Capilano College, set out to correct a situation which she noticed while scanning the "Science" section of her local Chapters: no chemistry books. There were physics, astronomy, biology, and ecology books, but no chemistry. After three years of hard work, and one sabbatical leave, the result is "Napoleon s buttons, How 17 Molecules Changed History".

The first thing you notice on picking up the book is the rather strange cover art. A headless Napoleon surmounted by some marbles looking for a Chinese Checker board. And what s with the title? The reference, of course, is to Napoleon s defeat in the winter of 1812 and subsequent retreat from Moscow. It was so cold that the tin buttons on his soldier s uniforms underwent a phase change which reduced them to powder and no doubt caused many of his men to perish. But tin isn t even one of the 17 molecules! Well, both the art and title are designed to catch your attention, and judging by the brisk sales so far, the strategy seems to be working.

The molecules Penny has chosen may not be on everyone s list, but there is little doubt that these particular ones had a tremendous effect on world exploration, the development of trade and commerce, and human migration and colonization. The chapters (and molecules) include spices (peppers, nutmeg and cloves), ascorbic acid, glucose, cellulose, nitro compounds, silk and nylon, phenol, isoprene, dyes, wonder drugs, the pill, morphine, oleic acid, and chlorocarbon compounds.

Each chapter sets the historical context for the molecule about to be introduced, and then the chemistry of the compound is explained, complete with structural diagrams and equations. The chapter then concludes with a nice summation showing the connections between the history and the molecule. Throughout the book, Penny carefully explains the concepts the reader will need in order to understand the chemistry. From organic structures and bonding, through isomers, to hydrogen bonding, it s all here. There is no attempt to dumb down the chemistry.

I will concede that as a physical chemist, I ve forgotten a lot of organic chemistry, so I may have gained more from reading this book than I should admit. Not only did I get to brush up on my organic, but I now have a collection of stories and anecdotes to use in teaching the organic section of first year chemistry. Like the story behind aspirin,

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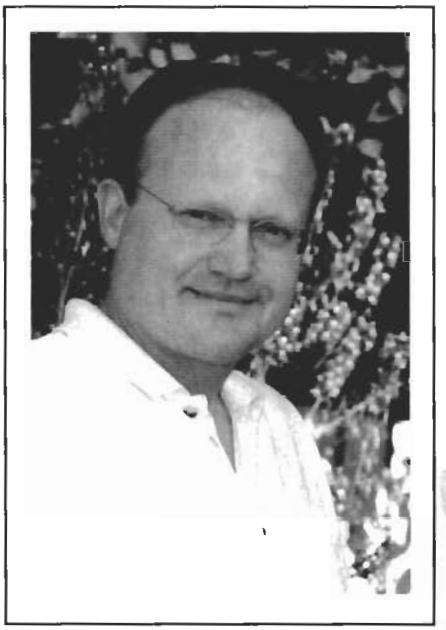
President's Message

C_3 NEWS



When our new editor Lawton Shaw told me that he was thinking of altering the style of C3 News, I was not prepared for the professional new look of the newsletter that I received in my October mail. Wow! I am now quickly looking though the C3 Constitution to see if we can extend the Editor's term from 2 years to lifelong. (Psst. Don't tell Lawton.)

On a more serious note, I would like to ask for your help in identifying innovative and excellent chemistry teachers in our ranks. College Chemistry Canada is essentially an organization of chemists dedicated to education and teaching. Over the years of attending conference presentations and through personal contacts with C3 colleagues across Canada, I have seen many first-rate examples of devoted, creative, and excellent teachers. Unfortunately, last year we did not present The C3 Award in Chemical Education, because we had no nominations.

I would like to challenge you to take a little time and consider nominating colleagues around you who deserve this award. The complete description and nomination process can be accessed from the awards page of our web site (www.c3.douglas.bc.ca/pages/awards.html).

The award shall be offered annually to honour a person who has made substantial contributions to chemical education at the College level. It shall be presented at the annual College Chemistry Canada Inc.(C3) Conference with the appropriate ceremony and publicity. The award shall consist of an appropriate scroll and $600 to assist the award winner to attend the annual C3 conference. The award winner must be a member of C3 in good standing and have been a member of C3 for the past five (5) consecutive years. Nominations must be submitted in writing to the Secretary of C3 by 1 January 2004.

So, get your award nomination into our Secretary (Susan Morante) and plan on joining us for the 2004 conference in Kelowna hosted by Okanagan University College.

Dietmar Kennepohl

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College Chemistry Inc.

President: Dietmar Kennepohl

Editor:
Lawton Shaw
Mount Royal College
4825 Richard Road SW
Calgary, AB, T3E 6K6
Fax (403) 440-6095
lshaw@mtroyal.ca

Layout:
John Wecels
Mount Royal College

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The Teaching Corner

with Bob Perkins, Kwantlen University College

Low Cost Chemistry Experiments

Analysis of Unknowns using a Spectronic 20

As the cost of chemicals and supplies continues to increase faster than our operating budgets, the pressure from our administrators to cut costs also continues to increase. Rather than cut back on the number of "wet" labs that the students undertake, the replacement of some costly chemicals with less expensive alternatives is a better option. I will provide brief descriptions of two such replacements: one in this issue and one in the next issue of C3 News.

The use of Beer's Law plots is an important technique for the beginning chemistry student; however, the first exposure can be a frustrating experience as the students must take great care in the preparation of the standard solutions as well as learning how to operate the instrument. This spectrophotometric analysis is especially useful for the quantitative determination of trace metals in water, but the purpose of this experiment is to introduce a student to the technique but not the complexity of the procedures involved.

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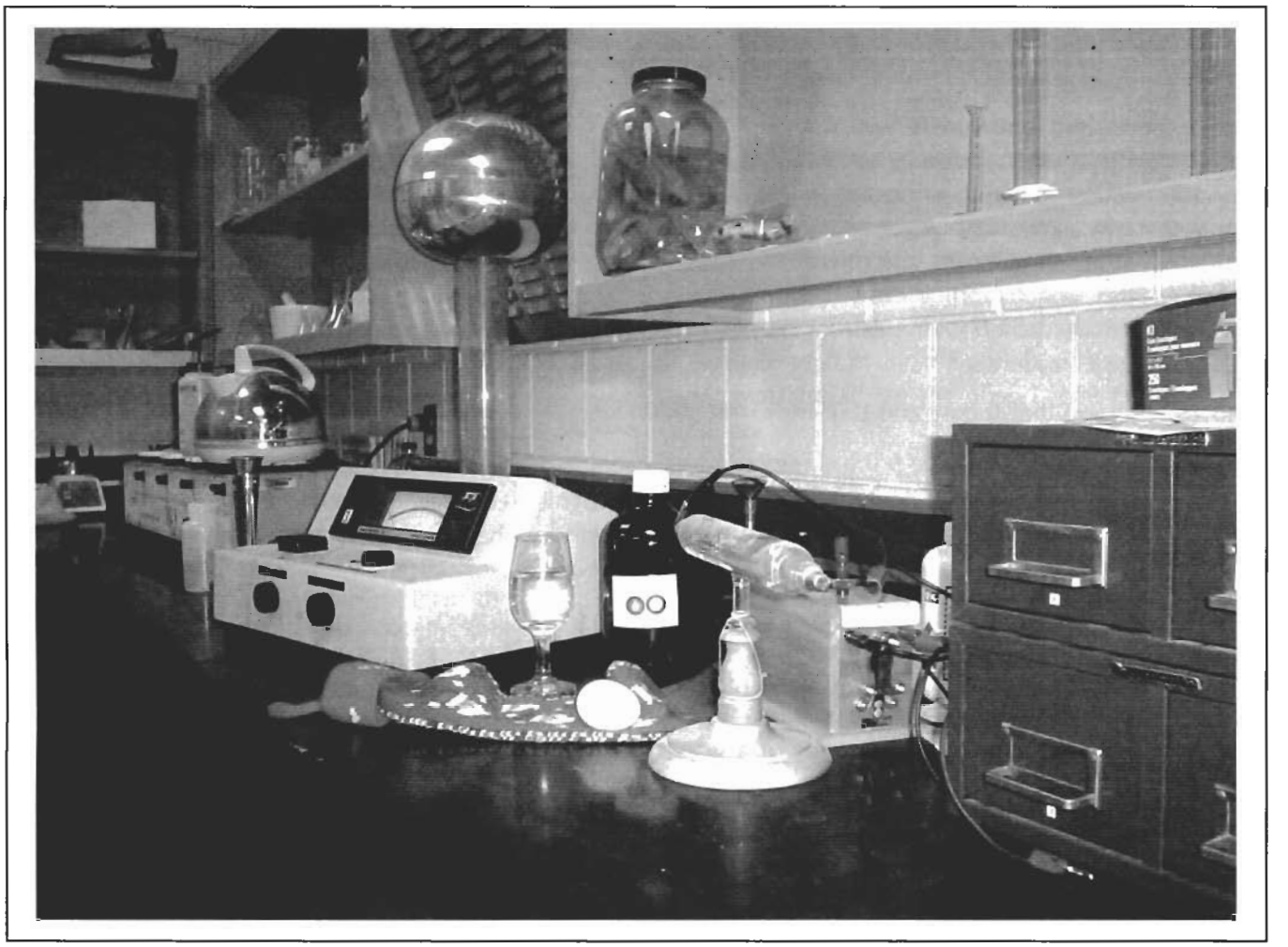
One day in Lab Stores...



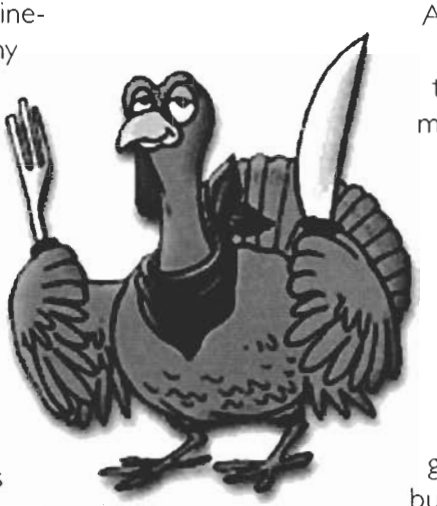
Count the number of things in this picture that do not belong with a Spec 20. Answers on page 7.

Photo: L. Shaw & D. Eley

Lost Your Appetite? Read This:

by Mike Bosdet, University of Calgary

With the joyous time of year fast approaching, we all have far too much to concern ourselves with to get stressed over choosing the perfect wine for Christmas dinner. As such, I thought that I would provide a little advice to expediate the process. For the merry spread, I can suggest a red wine or a white wine. The red should by soft, with good body and easy tannins. The white should be young, fragrant and full. We want a wine that is not too harsh, but still lively and festive to compliment the season. Too technical? Not sure what this 'wine-speak' means? Let me help you, my fellow chemists, through this ordeal ..



Wine experts and enthusiasts will always stress that when it comes to pairing wine with food, complimentarity is the key. Aside from the obvious glucose and alcohol in the concoction, there are a great many other elements that should be considered.

Chances are good that turkey, and thus tryptophan, is on the menu. Tryptophan, the infamous amino acid, is just that, an acid. Clearly nothing basic will do! The vanillic and gallic acid acids in a New Zealand Pinot Noir should match up nicely. Stronger acids such as tannic acid will also work, and these can be found in a glass of French Syrah; perhaps a C tes du Rh ne or an older Gigondas. If white wine is your preference for this feast, certainly you'll want to imbibe in a little malic acid and phenyl acetic acid, compliments of a good Viognier.

The compounds 2-methyl-3-furanthiol (a product of the Maillard reaction) and 2,4-didecaenal contribute to that pleasing roasted turkey aroma, and to match with these, I suggest a furan-based aldehyde, 5-hydroxymethylfurfural. This compound contributes to the characteristic flavour of blackberries, and is also found in that bottle of Syrah.

And let s not forget the cranberry sauce! After all, the topping of any dish can be the major determinant of the overall flavour. To match with the bitter phenolics of the cranberries, consider that both Pinot Noir and Syrah are good sources of equally bitter flavanols. Additionally, the quinic and citric acid content in cranberries bodes well for a pairing with the ---aforementioned acids in these red wines.

Anthocyanins also impart a slight bitterness to the wines, in addition to contributing colour. Malvidin-3-monoglucoside, is the predominant anthocyanin in Pinot Noir. And what's this? It just happens to be functionalized with a sugar group. Perfect for further complimentarity with your candied yams and that sweet succulent ham!

Yes, we can't forget the ham. A great source of 3-hydroxy-2-butanone! Undoubtedly, the honeyed phenethyl acetate in Viognier, or the raspberry aroma compound p-hydroxy-phenyl-butan-2-one, often present in Pinot Noir, will work nicely.

Mmmm, dessert! Be it pie, shortbread or chocolate, can be all the sweeter with the right vino. Clearly, we need an infusion of saccharides, and the high levels of residual sugar in a good German Riesling Auslese will round out the feast exquisitely.

Happy Holidays!

New Buttons...continued from page 1

and the legal battles which the Bayer company engaged in to protect the name once the patent had expired. Did you know that they also developed a "super aspirin" which was the diacetyl derivative of morphine? It was sold as a cough suppressant and remedy for headaches, asthma, and even tuberculosis. Bayer has never gone to court to protect the copyright on this name: heroin.

This is a book which can be appreciated on a number of levels, from the novice science reader, to the chemical educator. My organic chemistry colleague at Douglas informs me that he enjoyed the book, and even though the chemistry was no challenge for him, found material that he'll be able to use in his classes. And judging by the reviews, you don't have to be a chemist to be able to understand the chemistry.

Napoleon's Buttons certainly sets chemistry in a larger context, and provides evidence to support the thesis that the prime motivation for trade is "highly desired molecules unevenly distributed throughout the world". I can't help thinking that there must be an equivalent inorganic book waiting to be written (think about precious metals, gems etc), but I'm not sure about my area, physical chemistry. How about "How 17 Equations Changed History"? Well, maybe not. Anyway, this is a book which should be on everyone's shelf. And if nobody gives it to you for Christmas, Penny tells me it will soon be out in paper back.

Napoleon's Buttons: How 17 Molecules Changed History
By Penny Le Couteur and Jay Burreson

Teaching Corner...continued from page 3

One way of reducing the slope of the learning curve is to allow the students to become proficient with the instrument by using more easily prepared "standard solutions". Instead of analyzing water samples,. a student can study the dyes responsible for the colours of Crepe Paper (make certain you using the variety that is not colour-fast). Solutions of the dyes can be prepared by taking a given length of the crepe paper and extracting the dye using 100 mL of distilled water in a beaker. The absorbance of the resulting solution at various wavelengths can be determined using a spectrophotometer.

The students in the class can perform the analysis in pairs and then combine their results with others in the class to "discover" the answers to the following questions.

1. What is the λ_{max} for the solution resulting from each colour of crepe paper?

2. Do some of the solutions contain more than one λ_{max}, suggesting that more than one dye is present in the Crepe Paper?

3. Make a selection of solutions using different lengths of the same colour of Crepe Paper in the same volume of water. A good starting point would be 1 cm of paper with 100 mL of water. The students will soon discover that some of the dyes are more intense than others. Do the absorbances of these solutions result in linear Beer's law plots? In each case your plot should be the absorbance (y axis) of the solution versus the length (x axis) of crepe paper used to prepare the solution.

4. Could the plots in part (3) be used to determine the length of crepe paper used to prepare a solution of unknown "concentration"? You should check at least two unknowns by interpolation and two by extrapolation and report the % deviations in each case.

5. Repeat the procedure in part (3), but this time use two different colours of Crepe Paper. Could this process be used to determine the length of each colour of Crepe Paper used to prepare a solution of unknown "concentration"?

College Chemistry Canada Cryptic Crossword

Fax the editor your correct solution to the puzzle. Each correct solution will be entered into a draw for an unspecified prize to be given out at the C3 conference in Kelowna in June. One entry will be accepted per person per puzzle. Fax this page to (403) 440-6095.

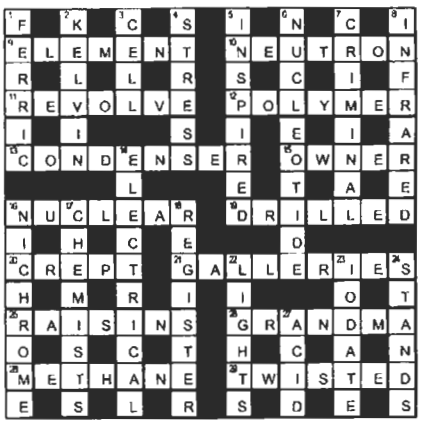
Across

1 Laundry woe isn't as bad (6)
5 He without appropriate attire mistakenly constituted lost octet (6)
10 Actinium, iodine sounded a catchy tune about pH (7)
11 Battery is not a wet one (3,4)
12 Basically caustic (6)
15 Acid puzzled ClA, etc.. (6)
16 Organic compound sounds eeny meeny (7)
17 Mixed clay functionality (4)
18 Simple Sam's on the balance (4)
19 Illegibly, Poet Dan writes on it (7)
20 Speed judge (4)
23 Sean confused hydrocarbon suffixes (4)
25 Element as symbol (7)
27 Lithium must change an indicator (6)
28 Amu chemist? (6)
31 Can dissolve, perhaps, malignant lobules (7)
32 Omit from elimination impure aromatic amine (7)
33 More duck sounds are complex (6)
34 Ernst I processed a powdery metal (6)

Down

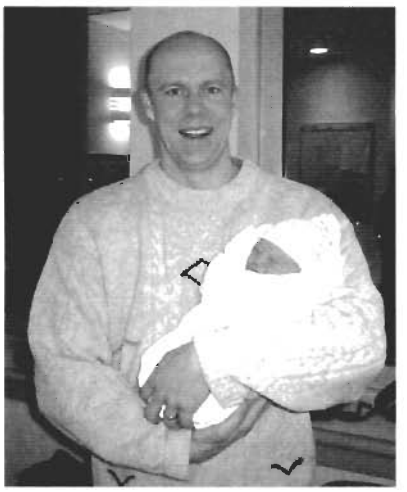
2 How to spread viscous calcium hydroxide? (7)
3 Confused Cecilia lost a piece of solid H_2O (6)
4 Assayer missing ear poorly speaks (4)
5 The point of a poem on nitrogen (4)
6 Arid cold is actually colder, when it's -79 degrees (3,3)
7 Colours ruin carpets (7)
8 C3 Nation (6)
9 Faulty capsule missing uranium sounds like space stations (6)
13 Bad donor is not outside (7)
14 Morning measurer detects current (7)
15 Edible buffer a base (7)
22 To savour atomless isotherma/ is confusing (6)
24 Told on bad dilettante who lost one German (7)
25 An ion writes, "NO!," to negative one (7)
26 French blood, er, makes a Nobel laureate (6)
29 Building up gold beginning and end (6)
30 Mistaken action is postive (6)
32 Hydrogenate unhealthy source of calories (4)
33 Experimental locations (4)

Bill Blann, the winner of the last issue's inaugural crossword challenge, presumably looking at a crossword puzzle in the wilds. Bill will be awarded his prize at the C3 conference in June. Other correct solutions were received from Suzanne Pearce and Mike Bosdet.



Solution to previous crossword

MEMBER NEWS



Allow the editor the indulgence of printing a picture of himself with his new baby boy, Nathan Anthony Shaw, born November 21. The "little" guy weighed in at 9 lb. 4 oz. And, yes, mom Tanya is doing fine.

C_3 Contact Information

Executive

President
Dietmar Kennepohl
Athabasca University
1 University Drive
Athabasca, AB T9S 3A3
dietmark@athabascau.ca

Secretary
Susan Morante
Mount Royal College
4825 Richard Road SW
Calgary, AB T3E 6K6
smorante@mtroyal.ca

Treasurer
Jacky McGuire
11327 79th Ave.
Delta, BC V4C 1S6
jmcguire@direct.ca

President-Elect
John Olson
Augustana University College
4901-46 Ave.
Camrose, AB T4V 2R3
olsonj@augustana.ca

Conference Coordinator
Pat Baird
Okanagan University College
9983 Okanagan Centre Rd W
Okanagan Centre, BC, V4V 2J3
pbaird@ouc.bc.ca

C3 News Editor
Lawton Shaw
Mount Royal College
4825 Richard Road SW
Calgary, AB T3E 6K6
lshaw@mtroyal.ca

Regional Directors

Atlantic Region:
Sudhir Abhyankar
Sir Wilfred Grenfell College
University Drive
Corner Brook, NF A2H 6P9
sudhir@beoghuk.swgc.mun.ca

Quebec:
Patrick Draper
Champlain Regional College
C.P. 5003
Lennoxville, PQ J1M 2A1
pdraper@lennox.champlaincollege.qc.ca

Ontario:
Don Todd
Loyalist College
P.O. Box 4200
Belleville, ON K8N 5B9
dtodd@loyalistc.on.ca

Prairies:
Bill Blann
Keyano College
8115 Franklin Ave.
Fort McMurray, AB T9H 2H7
Bill.Blann@keyano.ca

BC/Yukon:
Bruno Cinel
University College of the Cariboo
900 McGill Road, PO Box 3010
Kamloops, BC V2C 5N3
bcinel@cariboo.bc.ca

Other

CSC Liaison
Bob Perkins
Kwantlen University College
12666 - 72 Avenue
Delta, BC V3W 2M8
Bob.Perkins@kwantlen.ca

ZYC3 Liaison
Shahid Jalil
John Abbott College
21275 Lakeshore Road
St. Anne de Bellevue, PQ H9X 3L9

Webmaster
Bob Browne
Douglas College
P.O. Box 2503
New Westminster, BC V3L 5B2
browneb@groupwise.douglas.bc.ca

CALL FOR ARTICLES!

C3 News is looking for articles on "green chemistry" in teaching undergraduate chemistry for a special issue. This includes green chemistry in labs, and instructing students how to apply green chemistry principles to organic synthesis and environmental chemistry. Submissions should be 400-600 words in length. Interested authors should contact the editor via email at lshaw@mtroyal.ca.

Answers to bad photo: On shelf, a jar containing some kind of fish in formaldehyde (we'll never understand these zoology types); On shelf, a muffin in a sandwich baggie; Christmas stocking; An egg!; van der Graff generator; Cathode ray tube; Wine glass with clear liquid next to an amber bottle... containing... what?; Electric kettle on hot plate; Water squeeze bottle on hot plate. Ah, the things you can find in lab stores.

A Taste of Chemistry

C3 Conference June 10 - 13, 2004

a look at the Wine Industry,

The beautiful Okanagan Valley in southern British Columbia is home to 78 licensed wineries (95% of BC wineries) where the industry is rapidly becoming known as a world class producer of truly great wines. Growing of quality grapes (especially in the south Okanagan, where continuous sunshine is the norm) is the basic ingredient for more and more VQA (Vinter Quality Alliance) awards being won by British Columbia wineries in competition with producers around the world.

The valley stretches 125 miles from north to south and is situated between between the Monashee Mountains to the east and the Cascade Mountains to the west.
The surrounding mountains that reach elevations of more than 14,000 feet prevent westerly flows of cooler, wetter weather systems from moving east. The Okanagan Valley lies in a huge "rain shadow" which creates substantially warmer and drier conditions for vineyards located in this region -- factors that determine the varieties and success of wine-grape growing.

The Okanagan begins in a true desert environment in the south, with less that 6 inches of rainfall per year, moves through a variety of microclimates, and ends to the north with about 16 inches of rain per year where cool-climate viticulture is favored. Weather in these regions is more extreme than that further west along the coast.
In contrast to European wine cultivation areas on the same latitude, the entire Okanagan Valley is not classified as a "cool-climate" growing region.

The cooler vineyard sites in the mid and northern regions of the valley, where deep topsoil and clay are found, grows Pinot Blanc, Pinot Noir, Pinot Gris, Riesling, and Gew rztraminer. Some grapes are left to freeze on the vine for the region's famed icewines. Okanagan Icewine is a rare jewel and one of the finest dessert wines in the world.

The southern valley with the hot, sandy, desert soils grows the Cabernet Sauvignon, Chardonnay, Merlot, Pinot Gris and Pinot Noir grape varieties. More and more red wine grapes are being grown in the southern Okanagan Valley, where the hot, desert climate (low humidity) and long, northern-latitude growing season create microclimates well suited for many red varieties. Cool nights in these warmer areas prevent the breakdown of acids caused by constant heat.

Facts courtesy of the BC Wine Institute and the web site WinesNorthwest.com.
submitted by Pat Baird, Okanagan University College.