The Canadian Botanical Association Bulletin

Bulletin de l'Association Botanique du Canada

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Rhododenron public garden in Japan. ©Keihin Kake, CC-BY-SA-2.0. See article on page 14

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The Canadian Botanical Association Bulletin

The CBA Bulletin is issued three times a year (March, September and December) and is freely available on the CBA website. Hardcopy subscriptions are available for a fee.

Information for Contributors

All members are welcome to submit texts in the form of papers, reviews, comments, essays, requests, or anything related to botany or botanists. For detailed directives on text submission please contact the Editor (see below). For general information about the CBA, go to the web site: www.cba-abc.ca

Editor

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Next issue

Texts for the next issue, 50(2) , must be received by September 1, 2017

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Bulletin de l'Association Botanique du Canada

Le Bulletin de l'ABC paraît trois fois par année, normalement en mars, septembre et décembre. Il est envoyé à tous les membres de l'ABC.

Soumission de textes

Tous les membres de l'Association sont invités à envoyer des textes de toute natureconcernant la botanique et les botanistes (articles, revues de publication, commentaires,requêtes, essais, etc.). Tous les supports de texte sont acceptés. Pour des renseignements détaillés sur la soumission de textes, veuillez consulter le rédacteur (voir ci-dessous). Infos générales sur l'ABC à l'url suivant: www.cba-abc.ca

Rédacteur

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Prochain numéro

La date de tombée des textes du prochain numéro, le no 50(2) , est le 1 septembre 2017

President's Message



Warm greetings from Saskatoon where, during the interim (mid-December to mid-March) since the last *Bulletin* [49(3)], we've truly experienced the extremes of a full spectrum of winter weather. It's been excellent for following the local bird life and recently one of the better seasons for some amateur cross-country skiing. Hopefully the winter in your part of Canada has been enjoyable but now showing signs of finally yielding to spring!

As you start perusing your *Bulletin*, it may become more meaningful to reflect on the fact that this issue marks a momentous occasion for CBA-ABC, as it represents the first part of Volume 50. Back in January, 1968, the *Bulletin* began with its Volume 1, Issue 1, under the editorship of Janet Stein of Vancouver. Since then, notations in past volumes of the *Bulletin* available on our website (www.cba-abc.ca) indicate that there have been no less than 10 more *Bulletin* Editors residing across the country, from Edmunston, NB, and Montreal, QC, through Ontario (Guelph, Ottawa, Peterborough, Waterloo), to Vancouver and Victoria, BC. As an Association, we extend our heartfelt thanks to these volunteers who have taken their editorial responsibilities very seriously such that the *Bulletin* continues today as the Association's vital outlet for the membership.

From its initial version in printed form, commencing with 39(1) in 2006 the *Bulletin* also became available in electronic format. Following on from Janet Stein, in the editorial sequence (with editorial assistants noted in parentheses) leading up to the present, we salute Jack Alex, John Morton, Sylvia Taylor, Luis Oliveira, Usher Posluszny (Jean Gerrath), Joe Gerrath (Jean Gerrath, Frédérique Guinel, Christian Lacroix), Denis Lauzer (Stuart Hay), Martin Dubé, Christine Maxwell, and Tyler Smith for their collective skills over these past 5 decades that have guided the *Bulletin*'s faithful production to this significant botanical point (whether it had presented a thorn, a spine, or simply a prickle!). Thanks are also due to the many contributors of botanical news and articles, whether as regular features or just once-in-a-while, that have made the *Bulletin* what it has been, and continues to be, under Tyler's current role as Editor. Let's do what we can to keep the next 50 years as informative as the first 50!

If you have not already done so, it is not too late to make your plans for travel and participation at the 53rd Annual Meeting of CBA-ABC to be hosted by faculty and students of Wilfrid Laurier University in Waterloo, Ontario, from **July 4-8, 2017**. This year's theme is "The Hidden World of Plants", and the local organizing committee directed by Dr. Frédérique Guinel (CBA-ABC Vice-President) has been working diligently throughout the past year to prepare for us a well-rounded event of scientific, educational, social, and even artistic, flavour! On Page 7 of the *Bulletin* you will find the latest announcement, deadlines such as early-bird registration (May 1, 2017), plus highlights about this exciting meeting's program. It promises to be a lot of fun - looking forward to seeing you there!!

Thank you to all those who have spearheaded or endorsed the various nominations received for consideration of this year's major CBA-ABC awards. Presently these applications are keeping members of the Awards Committee steadily occupied, and I look forward to announcing the various award recipients in Waterloo. Also at that time, the winner of the inaugural competition for the CBA-ABC's Special Project Fund will be presented.

Thanks also to those who have already renewed their annual CBA-ABC membership in a timely manner. Doing so has significant impact for the Association as it generates our operational funds for the year ahead. As I see it, one key advantage of having turned 55 is the opportunity presented to become "a Lifer". Now with my lifetime membership in CBA-ABC, it is comforting to know – as senility sets in – that I shall no longer forget to renew!! Ah, what peace of mind …..

Further about membership, we continue to welcome new members to CBA-ABC and, if you are a faculty member or supervisor of students, please consider sponsoring a first-year membership for those young botanists affiliated with your lab or Department. They are the Association's future. Another vital way to encourage the CBA-ABC's growth is by making financial contributions to the numerous funds in place that yield the Association's prestigious awards for best student publications, for student research, and travel assistance for students to the annual meeting. Full details about membership benefits, how to join, and how to donate to CBA-ABC's many awards are available at the Association's website: www.cba-abc.ca Remember that even as "Lifers", we continue to have this opportunity to contribute to CBA-ABC's future.

There are also opportunities ahead to become even more active in CBA-ABC's activities, as there will be several Board positions (4 new directors, plus 1 student representative) coming full-term and hence vacated at the CBA-ABC's Annual General Meeting on July 7 in Waterloo. Please see the separate announcement from Dr. John Markham (Past-President) on Page 5 of the *Bulletin* and do let us know if you wish to make a nomination or let your own name stand for nomination.

Between now and July's meeting in Waterloo, the next annual "Fascination of Plants Day" is scheduled for **Thursday, May 18, 2017** (or between May 3-31, if May 18 is unsuitable). Putting together a display, program, or other activity focused on the universal importance of plants, including their remarkable features and abilities, would be an excellent way to enlighten the staff and general public on our institutions' campuses, for example. There are many ways that this can be done enthusiastically, including for example the topics of local plants of importance, plant movement, plant reproduction, plants of economic benefit, and so on. And perhaps for an added Canadian touch, there may be opportunities to incorporate something interesting about Canada's sesquicentennial (150th birthday), as July 1st approaches. Check out the website (http://plantday.org/home.htm) which provides examples of activities from around the globe, and please remember to take a photo or two that can be incorporated into a future *Bulletin*, and/or for the CBA-ABC website, later this year. I look forward to hearing about your experiences with "Fascination of Plants Day"!

Finally, did you hear that one about the agile Roman numeral that can actually climb a fence ….. IV. See you in Waterloo!!

Respectfully,

Art Davis, University of Saskatchewan



Rhododendron festival in Tokyo, Japan. ©Peachbird (CC BY SA 3.0). See Ernie Small's article on page 14

ANNOUNCEMENTS

The CBA Needs You!

This year we have openings for five positions on the Board of Directors – four Directors from the regular membership and one Student Director position. Directors attend Board meetings at the annual meeting, and at least one conference call in the winter. Terms are two years. This is a great way to get involved with the CBA/ABC, meet other botanists, and have a voice in botany at the national level. Nominations will be confirmed at the Annual General Meeting, which will take place at the annual meeting in July, in Waterloo. If you would like more information about the role of Directors or would like to nominate someone or volunteer as a Director, please contact the Past President, John Markham, at: john.markham@umanitoba.ca

CBA Auctions! Information Request

Anyone who has attended a CBA meeting will know that one of the highlights is "The Auction", ably run by Hugues Massicotte. Most know that the funds raised from this very lighthearted event go to the Macoun Travel Fund, which helps to bring students to the meetings. I am putting together a short article for the Bulletin, detailing the history of the event. If you have any stories of strange items that Hugues persuaded you to buy, or happenings at the auction that stay in your mind, perhaps you could send me an email (cdmaxw@gmail.com) with the details. Also if any former conference organizers have information of how much money was raised at the auctions, I would be grateful to receive the information which is currently incomplete.

Christine Maxwell

Tenure-track Faculty Position in Plant Biology

The Department of Biology in the Faculty of Science at the University of Waterloo invites applications for a full-time tenure-track faculty position at the **Assistant Professor** level in the area of **Plant Biology** commencing January 2018, or other mutually agreeable date. Although candidates at the Assistant Professor level will be preferred, exceptional candidates at higher ranks may be considered. We are seeking applications from outstanding scholars in evolutionary-ecology whose research investigates broad issues related to systematics, the adaptation of plants to environmental change, or physiological or genetic responses of plants to stress. The research program may target individuals and/or populations. The successful candidate will join our dedicated team of scholars and teachers and will bring innovative and modern pedagogical practices to courses in both the core and plant biology areas of our undergraduate and graduate curriculum.

The successful applicant will have a PhD and a strong track record of innovative research in plant biology with important peer-assessed contributions to the field. Additionally, s/he will demonstrate a commitment to achieve outstanding undergraduate and graduate teaching and to make valuable service contributions within our collaborative environment. Finally, the candidate must either have, or demonstrate the potential to establish and maintain, an independent, externally-funded research program.

The salary range for this position is $95,000 to $120,000. Negotiations beyond this salary range will be considered for exceptionally qualified, or higher ranked, candidates.

The Department of Biology at the University of Waterloo was established in 1964 and has a team of 39 faculty committed to teaching and research excellence across the life sciences. Our department also includes ≈ 90 graduate students, 25 post-doctoral fellows and research associates, along with over 1800 Honours undergraduate students enrolled in either Co-operative Education or Regular Biology-related programs. Our Department fosters a dynamic and thriving research environment with over $5.5 million in annual research, 3 Canada Research Chairs, and 1 University Research Chair. Our graduate programs, including collaborations with other departments in the Faculties of Science, Environment, Mathematics & Engineering and the Water Institute, consistently attract outstanding Canadian and International applicants.

The University of Waterloo is located in the attractive and vibrant two-university Region of Waterloo (population 550,000) in southwestern Ontario, approximately 100 km from Toronto. We are centrally located relative to several other universities having strong Biology research profiles, including the University of Guelph, McMaster University and Western University. The University of Waterloo and the Waterloo region carry strong reputations in innovation and entrepreneurial culture, affording a myriad of collaborative opportunities.

The University of Waterloo respects, appreciates and encourages diversity. We welcome applications from all qualified individuals including women, members of visible minorities, Aboriginal peoples and persons with disabilities. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority. "Three reasons to apply: uwaterloo.ca/watport/why-waterloo."

The closing date for applications is **15 June 2017**. Application packages, which should be submitted electronically as a single pdf document, should include a brief cover letter, full curriculum vitae, statement of teaching philosophy (1-page), research plan (2-pages) and the names and full contact information of at least three references to:

Dr. Hugh Broders, Chair,
Attn.: Monica Beal, m4beal@uwaterloo.ca
University of Waterloo
Faculty of Science, Department of Biology
200 University Avenue West
Waterloo, ON, N2L 3G1

Mycology Section News

In some parts of this country, spring has sprung, and in others, well…spring is just a warming concept. We are hopeful that the morel fruiting call will soon be heard by Mother Nature! Speaking of call, the Mycology section has once again asked for submissions for the competition for the Luella K Weresub Award for best student paper in fungal biology published in 2016. This year, our review committee (Shannon Berch, Hugues Massicotte, Greg Thorn, Faye Murrin) will once again benefit from the willing participation of Dr. Jonathan Cale, a Post-Doctoral Fellow at the University of Alberta. The review committee is always bursting in anticipation of the array of top-quality contributions submitted.

The Mycology section is taking a pause from organizing a symposium but mycological dialogue will certainly continue at many venues. We are delighted to announce that Dr. Greg Thorn, from Western University, has graciously agreed to present our Weresub Lecture this year. Follow the Wilfrid Laurier University 2017 CBA/ABC website for more details as they become available but undoubtedly, Greg's involvement in assessing fungal diversity and functioning in diverse ecosystems will provide a great platform for showcase and discussion.

We look forward to seeing many of you in Waterloo this July!

Shannon Berch and Hugues Massicotte
Mycology Section Co-Chairs



©Art Fredeen and Hugues Massicotte



The Hidden World of Plants

Le Monde Secret des Plantes

Canadian Botanical Association
L'Association Botanique du Canada
Laurier, Waterloo, ON
July 4-8, 2017

Hello CBA/ABC members!

The Laurier Local Organizing Committee looks forward to seeing you in Waterloo July 4-8 for the 53rd annual meeting of the CBA. The conference website and registration page will be live very soon; we are asking for your patience and here we are providing you with some details to entice you to come.

The conference will be held at Wilfrid Laurier University, close to uptown Waterloo. On-campus housing in a dormitory-style or apartment-style residence will be available at a reasonable price. The alternative is to stay at hotels which are relatively close to our campus.

Meeting Deadlines

Abstract submission: Monday, May 15th

Early registration: Monday, May 1st

Conference Highlights

- Plenary public lecture: Dr. Jan Sapp, Professor of Biology and History at York University, Toronto
- The main symposium speakers:
  - Ned Friedman, Arnold Arboretum of Harvard
  - Roger Hangarter, Indiana Molecular Biology Institute, Bloomington
  - Anna Hargreaves, McGill, Montreal
  - Julissa Roncal, MUN, St-John's
  - Frank Stefani, Agriculture and Agri-Food Canada, Ottawa
- Three section symposia:
  - Ecology
  - Plant Development
  - Systematics & Phytogeography
- Round-table discussion on a Ontario native plant from the perspectives of First Nations, botanical artists and plant biologists
- Two teaching workshops:
  - Drawing in the teaching lab
  - Best teaching practices in the lab
- Weresub public Lecture: Dr. Greg Thorn, a fungal ecologist and systematist from Western University, London
- Opening of the Annual juried exhibition of the Botanical Artists of Canada on July 6th
- Banquet at the Royal Botanical Gardens with guided tours
  - Cultivated Gardens with Alex Henderson
  - Carolinian species with Nadia Cavallin
  - Restoration tour with Jennifer Bowman
- Field-trips on Saturday July 8th
  - Inglis Falls & Bruce Peninsula National Park
  - American Ginseng experimental plots & Backus Woods (Norfolk County)
  - Grand River rafting trip, Paris, Ontario

Stay tuned and visit the website (www.conferences.wlu.ca/cba-abc-2017) as soon as it is available!

Bonjour aux membres de l'ABC/CBA!

Le comité organisateur local de Laurier attend avec impatience votre venue à Waterloo du 4 au 8 juillet pour la 53e réunion annuelle de l'ABC. Le site Web de la conférence et sa page d'inscription seront bientôt visibles; pour vous faire patienter et vous inciter à venir, nous vous offrons ici quelques détails.

La conférence se tiendra à l'Université Wilfrid Laurier, près du centre-ville de Waterloo. Des résidences de style dortoir ou de style appartement seront disponibles à un prix raisonnable sur le campus. L'alternative est de demeurer dans les hôtels qui sont relativement proches de notre campus.

Délais de Soumission

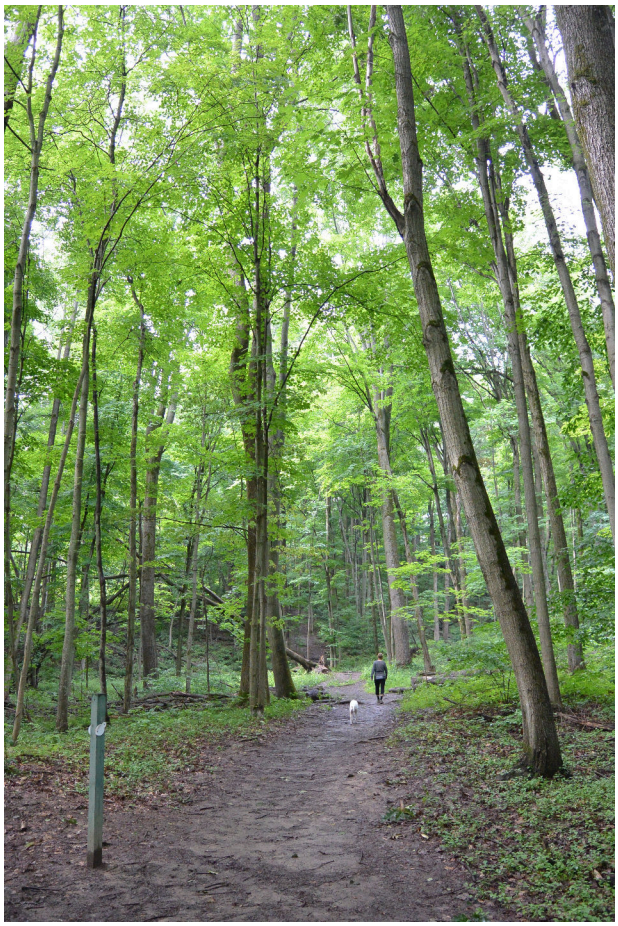
Soumission des résumés: Lundi, le 15 Mai

Inscription précoce: Lundi, le 1er Mai

Faits Saillants de la Conférence

- Conférence publique plénière: Dr. Jan Sapp, Professeur de Biologie et d'Histoire à l'Université de York, Toronto
- Le symposium principal avec
  - Ned Friedman, Arnold Arboretum d'Harvard
  - Roger Hangarter, Institute de Biologie Moléculaire d'Indiana, Bloomington
  - Anna Hargreaves, McGill, Montréal
  - Julissa Roncal, MUN, St-John's
  - Frank Stefani, Agriculture et Agroalimentaire Canada, Ottawa
- Trois symposia autour des sections
  - Écologie
  - Structure et Développement
  - Systématique & Phytogéographie
- Table ronde/discussion sur une plante native de l'Ontario vue par les Premières Nations, des artistes botaniques et des biologistes des plantes
- Deux ateliers d'enseignement:
  - Le dessin dans les travaux pratiques
  - Les meilleurs travaux pratiques en laboratoire de botanique
- Conférence publique Weresub: Dr. Greg Thorn, un écologiste et systématicien des champignons de l' Université Western, London
- Ouverture de l'exposition annuelle des Artistes de Botanique du Canada le 6 Juillet
- Banquet au Royal Botanical Garden avec visites guidées
  - Jardins cultivés avec Alex Henderson
  - Espèces caroliniennes avec Nadia Cavallin
  - Visite d'espaces réhabilités avec Jennifer Bowman
- Excursions Samedi le 8 Juillet
  - Les Chutes Inglis & le Parc National de la Péninsule Bruce
  - Les parcelles expérimentales de ginseng américain et les bois de Backus (Comté de Norfolk)
  - Rafting sur la Rivière Grand, Paris, Ontario

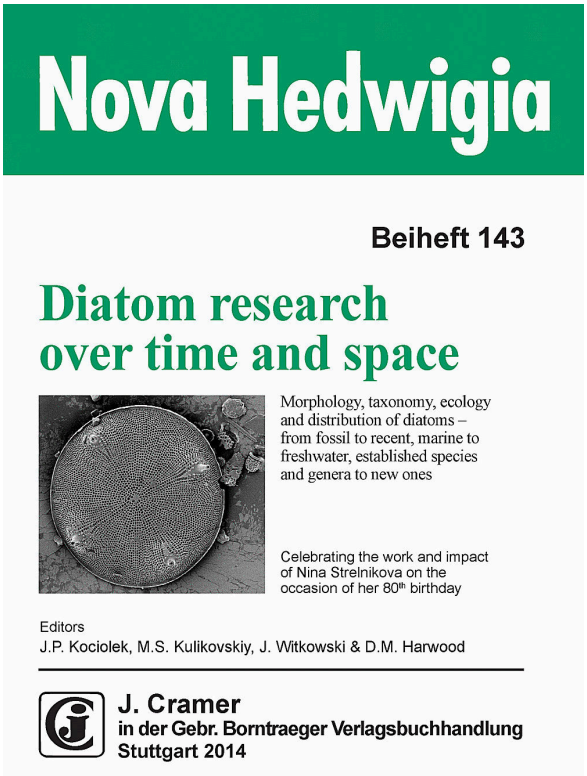
Restez aux aguets et visitez le site web (`www.conferences.wlu.ca/cba-abc-2017`) dès qu'il ouvre!



Carolinian Forest, St. John's Conservation Area, Fonthill. ©Tyler Smith

Review: Diatom research over time and space

Celebrating the work and impact of Nina Strelnikova on the occasion of her 80th birthday



Kociolek, J.P., Kulikovskiy, M.S., Witkowski, J. & Harwood, D.M. 2014. Diatom research over time and space. XX, 518 pages, 1390 figures, 23 tables, 26 plates, paperback, 24x17 cm, ISBN 978-3-443-51065-7, 199.00 EUR. www.borntraeger-cramer.com/9783443510657

This Festschrift of the Nova Hedwigia Beiheft series was published in honour of the renowned Russian leader in diatom research Dr. Nina Ivanovna Strelnikova on the occasion of her 80th birthday. Dr. Strelnikova is well known for her research on the diversity of Palaeogene and Cretaceous diatoms as well as her valuable and extensive collections of fossil diatoms. The book contains 27 articles by 52 authors covering a broad range of diatom research of various aspects related to Dr. Strelnikova's research such as modern and fossil as well as marine and freshwater diatom taxonomy, ecology and biogeography, numerical methods and quantitative morphometric analysis. The articles cover a wide geographical area spanning from Antarctica, South America, Europe and Asia to Russia. In this volume, three new diatom genera and nine species new to science are being described in honour of Nina Strelnikova. As this book includes a broad range of fields in diatom science, it of interest to any diatom researcher.

The book starts with an interesting and thoughtful summary of the 80 years of the extraordinary life and work of Dr. Strelnikova by one of her students Dr. Marina Potapova. In this biography, Dr. Potapova is outlining the difficult childhood Nina Strelnikova had to endure in war-torn Russia, her dedication to a career in biology, her love for fieldwork and her perseverance as a woman in natural science at the time. Dr. Potapova emphasizes that Dr. Strelnikova conducted fieldwork under extremely harsh conditions and that she participated in countless expeditions to remote locations, including the Northern Ural Mountains, Siberia, the Sakhalin and Kuril Islands as well as the Pamir Mountains in Central Asia and the Northern Pacific Ocean. As a Professor at the Botany Department at the University of St. Petersburg she was valued as a demanding but well respected teacher and this is where she still continues her research today. She trained a legacy of Masters and PhD students and published an impressive list of scientific papers, describing 11 diatom genera and 63 species new to science.

The introduction is followed by comprehensive list of genera and taxa described and a compilation of the extensive list of publications by Dr. Strelnikova in chronological order. After the introduction, the articles follow without being laid out in a specific order. Nine articles present diatom research based on fossil material: three marine studies investigate the biostratigraphy of Paleocene records from Central Russia, Eocene records from sub-Antarctica and Oligocene records from various regions in order to reconstruct past environmental changes, diatom biogeography and distribution patterns. One study (Prokopenko et al.) based on fossil freshwater diatoms compares the biostratigraphic records of large lakes from the Baikal rift Zone. Five studies focus on diatom taxonomy of fossil material, and include the description of the two new genera *Strelnikoiviella* and *Saepteifera* as well as seven new species from the genera *Cyclotella*, *Strelnikoiviella* and *Saepteifera.* A study by Buczco et al. reinvestigates the taxonomy and morphology as well as the distribution of the fossil diatom *Navicula haueri* from Miocene lacustrine deposits from the Carpathian Realm in Slovakia and Romania.

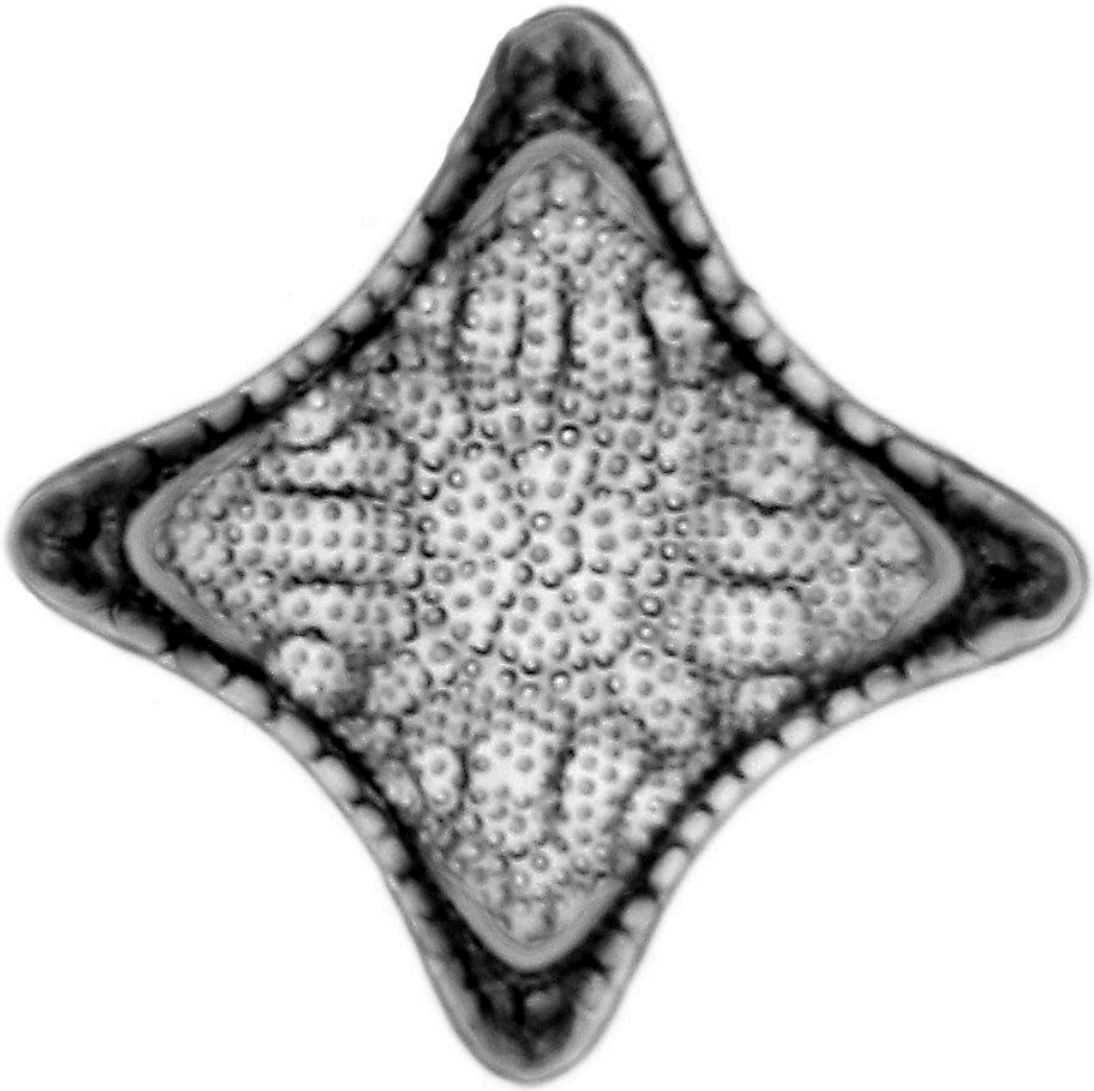
The majority of the articles in the book present the results of studies on diatom taxonomy, ecology and distribution from recent material. Potapova produced a comprehensive freshwater diatom flora of the Bering Island, Kamchatka, Russia. Kulikovskiy and Kociolek investigated the morphology and taxonomic history of two species from the genus *Gomphonema* in Lake Baikal. Other studies on diatom taxonomy and assemblage structure are presented from various environments (freshwater, marine and brackish, lakes and reservoirs) from different parts of the world (Crimea, USA, Vietnam, Albania, and South America). An impressive list of nineteen new species from the genera *Caloneis*, *Craticula*, *Diadesmis*, *Eunotia*, *Gomphonema*, *Navicula*, *Platessa*, *Pinnularia*, *Psammothidium*, *Urosolenia* as well as the new genus *Ninastrelnikovia* were described from these studies.

The clarification of taxonomic issues using morphological characteristics is addressed in six articles for several species including *Aulacoseira gessneri*, *Cyclotella meduanae*, *Gom-*

phonema delicatulum, *G. firmum*, *Placoneis clementis* and *Parapla-coneis placentula* and leads to the typification of *Hantschia amphyoxis* and the lectoypification of *Hemiaulus giganteus*. The review by Pappas et al. presents the history and future of quantitative morphometric analyses in diatom research.

This book gives a comprehensive account of diatom research with large geographic breadth. The authors apply many different tools and approaches used in diatom investigation. The majority of the light, SEM and TEM images of the studied specimens are of good quality, however a small subset of the figures would have benefited from slightly more contrast as well as larger image size. Overall this volume provides a useful resource to anyone involved in diatom research, and should be part of any diatom reference library.

Karin Ponader, Ottawa



Diatom - *Triceratium balearicum*, 400×. ©Picturepest (CC BY 2.0)

BOTANICAL TEACHING WORKSHOP

Workshop Submission Deadline May 15

Please join the Teaching Section's **Botanical Teaching Workshop** at this year's annual meeting of the Canadian Botanical Association/L'Association Botanique du Canada (CBA/ABC) at Wilfrid Laurier University, Waterloo, ON, (July 4 – 8, 2017, see page 7 for details). We invite participants and presenters! Come try or share new or tried and tested lab, field, classroom or even outdoor activities and have fun exploring and experiencing new ways to engage students in the world of botany. We invite new and experienced instructors and extend a special invitation to graduate and undergraduate students! All presenters and participants will leave the **Botanical Teaching Workshop** with valuable feedback and new ideas to continue to transform the teaching of botany. Contributions in English and French are welcome. Les conférenciers et confèrencières sont également invités à offrir les contributions en français.

DATE

The BTW Session will be held on: Thursday, July 6th, 2017, 5:00 – 6:30 PM.

SESSION FORMAT AND GUIDELINES

The Botanical Teaching Workshop will consist of approximately 15 teaching demonstrations that will be simultaneously presented over 1.5 hours. Each teaching demonstrations should be around 5 – 10 minutes in length and will be presented repeatedly as people move around the various lab benches. These demonstrations are an opportunity to share effective approaches to teaching botany. They are not strictly limited to presentations about teaching in a laboratory setting. They may be presented as a demonstration, computer laboratory, classroom or field activity.

Presenters should supply their own materials, including handouts, and are responsible for all conference and travel costs. The conference host can provide general lab equipment (i.e. glassware and microscopes) on request. If you have questions regarding equipment or supplies, contact the Teaching Section co-chairs.

Please fill out the BTW submission form at right and send directly to the Teaching Section co-chairs:

Christine Petersen cpetersen@tru.ca
Rafael Otfinowski r.otfinowski@uwinnipeg.ca

BOTANICAL TEACHING WORKSHOP SUBMISSION

Name

Institution

Years of teaching experience (<1, 1-5, 5-10, >10)

Teaching Activity Title

Brief Abstract (140 words)

Equipment list needed (Microscopes can be provided)

In memoriam: Dr. Hugh Monro Dale

Dr. Paul Cavers, University of Western Ontario

Hugh Dale passed away on January 22, 2017 at the age of 97. He was a founding member of the Canadian Botanical Association, President in the early years of CBA/ABC and a lifelong supporter.

Hugh was born in Toronto, attended the University of Toronto Schools (UTS) for high school and completed his B.Sc., M.A. and Ph.D. at the University of Toronto. He worked as a teacher at St. Andrew's College (north of Toronto), as a faculty member at the University of Toronto and, for 28 years, as a faculty member of the Botany Department at Ontario Agricultural College (OAC), later the University of Guelph. He retired in 1985.

Hugh was a core supporter of the Canadian Botanical Association when it was formed in the mid 1960s. He became a member of the Executive Committee and was instrumental in setting up the Ecology Section, becoming its first Chair. Later, in 1969, he became President of the CBA/ABC. Hugh was noted as an excellent and dedicated teacher. He attended many CBA/ABC conferences, where he specialized in asking helpful questions and comments to many speakers over the years.

My career bears a remarkable similarity to Hugh's in several ways. I also went to high school at UTS and was also a member of the swim team. My specialty was the breast stroke and in the pool at UTS the records for the fastest-ever swims were posted on the wall. When I swam in the 1950s, the only pre-World War II record remaining was for the 40-yard breast stroke by Hugh Dale. I remembered that posting since I had swum in the race where Hugh's record was broken, by Joe McGinnis from Upper Canada College swimming the butterfly (There was a brief period in the 1950s when you could swim butterfly *or* breast stroke in a "breast-stroke" race). I finished second in that race. Hugh's record was once again posted later in the 1950s. Hugh continued to enjoy swimming through most of his life and he participated in events for his age group on several occasions.

Hugh and I met in person after he was appointed to the faculty of the Botany Department at OAC during my second year as an undergraduate at that College. After Hugh learned that he and I had attended the same high school, we had a somewhat detailed conversation, discussing and comparing our experiences at UTS. Hugh asked if I had taken Botany in Grade 13. I replied that I did earn a credit in Botany but then told him that our teacher in that course had just started teaching at UTS after immigrating from Britain and he hadn't realized that Grade 13 Biology included exams in both Zoology and Botany. When only 5 teaching periods were left at the end of the year, he realized that he had not taught us any Botany. I then went on to boast that our class had used the textbook and our notes from Grade 10 Biology to achieve pretty good grades, thus implying that the Botany exam had not been too difficult. Hugh silenced me for some time by responding, with a clear twinkle in his eye, "I set that exam".

The only course taught by Hugh that I took at Guelph was "Botany 411 Plant Geography". I was in the Agronomy option and had to receive special permission to take that course as an elective. Nevertheless, it was a captivating course and it led me to read several papers in plant population ecology, all published in Great Britain. This led to further discussions with Hugh about possible places to take M.Sc. studies. Eventually, I decided to apply to Bangor College of the University of Wales. This was undoubtedly the best place I could have chosen, since I completed a Ph.D. under the supervision of Professor John Harper, later acknowledged as the most outstanding plant population biologist in the world.

During my second year in Bangor, my wife and I were delighted to receive a visit from Hugh and his family. Although Hugh had visited relatives in Scotland, that was their first family visit to Wales. They were much impressed with the mountains, castles and other spectacular scenery of the Bangor area. They have commented over the years about highlights of their trip to Bangor, including the view from the front window of our flat, located on the top floor of an "Ancient Monument", which was virtually unchanged externally from the building displayed prominently in pictures of Bangor drawn in the 1770s.

My academic career was spent at the University of Western Ontario, which provided many opportunities for Hugh and me to continue our botanical interactions. One of the first things Hugh told me was that he was attending a meeting to found the Canadian Botanical Association in 1964. This was about six months after my arrival in London, Ontario and I could not attend. From the beginning, Hugh was a strong advocate of the CBA/ABC.

Hugh went to Guelph with an extensive and varied background as a teacher. As he approached graduation from UTS in 1939, he decided to become a public school teacher. He spent a year at Toronto Normal School and graduated. He taught for one year in a one-room schoolhouse near Marlbank, Ontario. Then, he spent close to four and a half years in the Canadian Armed Forces, much of it in a teaching capacity. As an example, in 1943 he taught microwave radar (in Corpus Christi, Texas) to hundreds of radar mechanics from the RCAF, RAF, US Navy and US Marines. After his discharge from the armed forces in 1946, Hugh enrolled in an undergraduate degree program for teachers at the University of Toronto. He completed that degree in 1948 and immediately enrolled in an MA program in Botany at the same university, which he completed in 1950. Hugh then spent four years teaching high school as the Chemistry Master at St. Andrew's College (Aurora Ontario).

In 1954 Hugh enrolled in the PhD program in Botany at the University of Toronto. He was awarded that degree in 1956. During this period he also worked as a lecturer, teaching a first-year botany course and a third-year course in plant ecology. He was also required to become examiner-in-chief for Grade 13 botany students in Ontario and he had to work

with the curriculum branch of the Ontario Department of Education in planning new courses of study in biology for high-school students.

Hugh came to Guelph to join a Botany Department that had a poor reputation for teaching at the undergraduate level. As an example, one of our required courses was taught by a man with the nickname of "machine gun" since his teaching procedure was to walk in, open his notebook and read his entire lecture without even looking at the class. One morning, one of our top students, who always sat at the top-rear location on the steeply slanted row of seats, fell asleep during the lecture. He then slid right to the front of the room, ending up directly in front of the lecturer. Then, rubbing his head he ascended back to his seat. During all of this the lecturer did not pause or raise his eyes from his notes! It was not surprising that none of our class registered for the Botany option at the beginning of third year. Hugh's teaching, in contrast, was excellent. He soon joined a campus committee that ran science seminars for high-school students entering university and then sponsored top students to spend a weekend at OAC. This allowed Hugh to get to know several of the most highly esteemed teachers at OAC. Later, Hugh became the first elected chair of the Board of Undergraduate Studies at the University of Guelph and he continued to serve on that Board and others involved with undergraduate teaching throughout his tenure at Guelph.

Hugh's interest in research was stimulated during his many canoe trips during and after his school years. In particular, he was attracted to a study of aquatic plants. A focus of his PhD thesis was a study of the water plant, *Elodea canadensis* Michx. (elodea). After a considerable period of research on other topics, Hugh spent much of his final pre-retirement years at Guelph doing research on aquatic plants. He supervised comparatively few postgraduate students but they were of high quality. For example, two were made Fellows of the Royal Society of Canada, another was a top weed researcher on the prairies and a fourth became Ontario's Environmental Commissioner.

One of my major activities in the 1960s was to lead the attempts to establish a Canadian version of the highly regarded series entitled the Biological Flora of the British Isles. It soon became apparent that many Canadian botanists would not support this proposal but there was great interest from Canadian weed scientists in establishing a similar series on the Biology of Canadian Weeds (BCW). Gerry Mulligan and I set up the BCW series in the early 1970s and Hugh Dale was a strong supporter of our efforts. As proof of his interest and support, Hugh published the fifth paper in the series, on wild carrot (*Daucus carota* L.) in 1974.

After Hugh turned 80, and particularly after his move to Collingwood, Ontario, he began to focus on watercolour painting. He was always a keen photographer so he developed a pattern of taking walks in the scenic sites in the Collingwood area, setting up his walker to enable him to start painting in a chosen site, then taking one or more photographs at the site to enable him to complete the painting(s) at his retirement home. As I am sitting at my computer to prepare this account, Hugh's painting of a wild carrot plant in flower on an Ontario farm is on the wall in front of me.

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Top Canadian Ornamental Plants. 16. Rhododendron

Ernest Small[1,2]

Rhododendron (including "azalea") has been called "the king of shrubs," a reflection of the spectacular beauty of the large, colourful flowers which cover the plants when they are in full display. With over a thousand species representing a very wide range of habitats, and tens of thousands of hybrid cultivars, rhododendrons have become indispensable ornamentals for landscaping large public areas as well as private residences, and they are even important as house plants. In testimony to their attractiveness, picturesque gardens dedicated to rhododendrons have been established in many countries, and there are numerous annual festivals in their honour.



Figure 1: Rhododendron public garden in Japan. ©Keihin Kake (CC BY SA 3.0).

Names

Scientific names: The genus name *Rhododendron* is based on the Greek *rhodon*, rose and *dendron*, tree.

English names: Rhododendron, rhody, azalea.

French names: Rhododenron, azalée.

Wild *Rhododendron* species

Taxonomy & distribution

The genus *Rhododendron* is estimated to have over 1,000 species, indigenous mainly to the Northern Hemisphere. Rhododendrons are mostly native to Eurasia, North America and northeastern Australia. The majority are in Asia, especially in the Himalayas and Malaysia. Over 400 species are endemic to China. Twenty-five species are established in North America north of Mexico, eight of these in Canada.

Vireya species

Rhododendrons of section *Vireya*, often simply called vireyas, include about 300 species of Malesia (the Malay Archipelago, Borneo, New Guinea and adjacent regions). These evergreen epiphytes are too tender to grow outdoors in northern regions, where they are raised as glasshouse specimens. Although most of the species are "tropical," the majority are montane plants adapted to fairly cool conditions.

"Azaleas"

Species once placed in the genus *Azalea* are now assigned to *Rhododendron*. In common language the name "azalea" is used in several ways to refer to certain species. Two subgenera of *Rhododendron*, usually distinguished by possession of flowers with only five stamens, are often called azaleas, while the remaining species with ten stamens are called rhododendrons. Sometimes rhododendrons are said to usually be evergreen, and azaleas are claimed to be deciduous. However, evergreen "azaleas" constitute *Rhododendron* subgenus *Tsutsusi*, while deciduous "azaleas" make up subgenus *Penanthera*. There is no consistent character to distinguish an "azalea" and the word has become a source of confusion. Nevertheless, in the horticultural and retail worlds, there is often a preference for "azalea."

Habitats

Rhododendrons occur from the Arctic to the Tropics, and from lowlands down to sea level to alpine sites up to 5800 m (19,000 feet). They occupy quite diverse habitats, including woodlands, temperate rain forests and tropical jungles. The plants are usually in markedly organic soils, in regions with high rainfall and humidity, and in temperate climates. The plants are often on sloping hills so the soils tend to be well drained. Some *Rhododendron* species are invasive (*R. ponticum* is the most serious plant pest in the U.K.). Unfortunately, more than a quarter of the 1,000 or so species of *Rhododendron* are under threat of extinction in their native habitats.

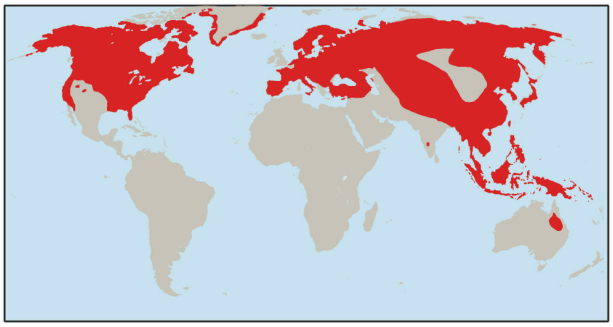


Figure 2: Geographical distribution of *Rhododendron* species. As noted in the text, most species are in Asia. Much of the northern distribution is dominated by the few species in *R.* subsection *Ledum*.

[1]Science and Technology Branch, Agriculture and Agri-Food Canada, Saunders Bldg., Central Experimental Farm, Ottawa ON, K1A 0C6
[2]©Government of Canada. Verbatim redistribution for personal, non-commercial use is permitted.



Figure 3: Left: Pacific rhododendron (*Rhododendron macrophyllum*) in Washington State. Photo (public domain) by U.S. Forest Service. The species is distributed on the North American west coast from southern British Columbia to California. **Right:** Non-circulating $20 silver coin, issued in 2012 by the Royal Canadian Mint, showing Pacific rhododendron flowers with crystals mimicking dew drops embedded on the petals.

Morphology

Rhododendron species are shrubs, small trees, or rarely large trees. Some are tiny prostrate alpine shrubs no taller than 5 cm (2 inches), while others are giant rainforest trees over 30 m (100 feet) in height. The foliage may be evergreen or deciduous, and the leaves may be large (sometimes over 1 m in length) or small (less than 1 mm). About 600 species (subgenus *Rhododendon*) have tiny epidermal "scales," usually visible on the leaf undersurfaces (best seen with a magnifying glass). Species with scales are termed "lepidote," those without are called "elepidote." Most species flower in the spring and/or early summer. The flowers are available in most colours, and there are cultivars with variegated flowers and doubled flowers

Domesticated *Rhododendron* species

Rhododendrons have been known since the times of the classical Romans, but appear to have first been cultivated in Europe in the 17th century. One of the first domesticated species in Europe was *R. luteum*, a shrub sometimes more than 3 m tall. This is the only deciduous-leaved *Rhododendron* native to Europe, and it is widely grown in western Europe.

Many species of *Rhododendron* can be easily hybridized. China and Japan have long been centres of breeding based on Asian species, and beginning about 1825, gardeners in Europe began extensive programs of interbreeding. In the United Kingdom, species from the eastern U.S. were the first subjects of breeding, followed by introductions from the Himalayas, Caucasus and Turkey. Most of the early European hybrids are moderately cold-resistant and are often called "hardy hybrids." In the early 20th century, species from China and the eastern Himalayas were added to breeding programs in Western nations. Over 30,000 hybrids have been recognized, and in many cases the pedigree of cultivars is unknown.

Horticulturally, most cultivars are arbitrarily divided into evergreens and deciduous forms. "Azaleodendrons" are semi-evergreen hybrids (usually sterile) between deciduous "azaleas" and rhododendrons.



Figure 4: *Rhododendron retusum*, one of the cultivated species of section *Vireya*. Source: Lemaire, C.A. (editor). 1855. L'illustration horticole, vol. 2, plate 70.



Figure 5: Cultivars of *Rhododendron luteum*. Source: Witte, H. 1868. Flora. Afbeeldingen en beschrijvingen van boomen, heesters, éénjarige planten, enz., voorkomende in de Nederlandsche tuinen. A.J. Wendel, Groningen, Netherlands.

Houseplants

Some of the evergreen rhododendrons are among the most popular of flowering house plants. "Florist's pot azaleas" are generated by specialty greenhouses. They are slow-growing, and are forced to flower for seasonal sales, especially for Christmas. These are frequently hybrids with *R. simsii*, a species that is not cold hardy, but grows very well in containers and is useful as a house plant. Belgium is the world's leading producer, in some years generating over $100 million in revenue. Belgian pot zaleas are primarily hybrids among *R. simsii*, *R. indicum*, *R. scabrum*, and *R. mucronatum* (all evergreens). Some of these (especially *R. indicum*) are grown as bonsai.

Most indoor azaleas purchased from stores as seasonal houseplants are discarded after flowering, as they are difficult to rejuvenate. To prolong the flowering display, the plants should be maintained in cool temperatures (16–18 °C or 60–65 °F), well-lit areas out of direct sun, and in soil that is maintained damp but not soggy.

Edibility and toxicity

In Asia, *Rhododendron* flowers are occasionally encountered in food, mostly as a sour flavouring herb. Particularly in Korea, flowers have been employed to prepare wine, honeyed flower juice, and griddle cakes topped with blossoms. In the state of Himachal Pradesh, India, the flowers are used to flavour wines. However, culinary use is inadvisable.

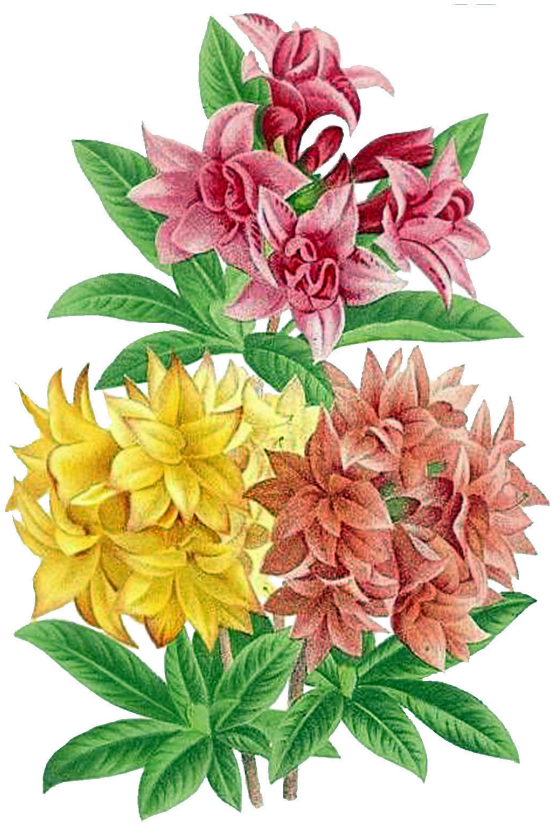


Figure 6: Double-flowered hybrid rhododendrons (identified as "*Azalea rustica* Flore Pleno hybrids," of uncertain origin, bred in Belgium in the late 19th century). Source: La Belgique Horticole, 1893, vol. 19, p. 232.



Figure 7: A *Rhododendron simsii* hybrid grown as a potted house plant. The flowers are so spectacular that the pot is scarcely visible. Source: Pixabay (public domain photo).

Rhododendron and other genera of the Ericaceae family contain a class of toxins called grayanotoxins (named after the Japanese species *Leucothoe grayana*, commemorating the famous 19th century American botanist Asa Gray). Fatal livestock (especially sheep and goat) kills occur, and very rarely dogs and cats are affected. Honey bees are also occasionally poisoned. Caution is advisable to prevent access of domesticated animals to wild and cultivated plants, including houseplants. The relative degree of toxicity of different *Rhododendron* species is unclear, some authors stating that only certain species are significantly toxic, others implying that most if not all species are dangerous. North American evergreen *Rhododendron* species appear to be somewhat more toxic to livestock than deciduous species.

Humans occasionally inadvertently eat honey in which grayanotoxin-containing pollen and/or nectar from Ericaceae species occurs. According to legends, poisoning of soldiers by wild-collected contaminated honey determined the outcome of several wars among the classical Greeks, Romans and Turks. So-called "mad honey" is deliberately produced in some regions of Asia (especially the Caucasus region of Turkey) from plants of the heath family, particularly from *Rhododendron* species, and employed for its alleged medicinal, aphrodisiac, or hallucinogenic properties. (It may be noted that all kinds of honey generally tend to have some medicinal value.) Symptoms of "mad honey disease" in people include low blood pressure, blurred vision, hallucinations and seizures. In the 1700s, mad honey from the Black Sea region was exported to Europe and added to alcoholic beverages to increase intoxication. However in recent times sale of mad honey has been restricted in many jurisdictions.

"Labrador tea" refers to dried leaves employed as a beverage, obtained from natural stands of *R. groenlandicum*, less often from *R. tomentosum* or *R. neoglandulosum* (the three species formerly placed in the genus *Ledum*). This traditional beverage of native inhabitants of North America is a minor commercial herbal product. Consumption should be limited because of the presence of ledol, a toxic sesquiterpene present in the essential oil. The degree to which grayanotoxins are also present is unclear, and indeed it is probable that populations are available with low amounts of ledol and grayanotoxins.



Figure 8: *Rhododendron indicum* grown as bonsai. **Left:** ©Casliber (CC BY SA 3.0). **Right:** ©Sarah Stierch (CC BY 4.0).

Medicinal uses

Despite toxicity, *Rhododendron* species have been widely used in folk medicine systems in Asia, Europe, and North America, notably against gastrointestinal disorders, inflammation, pain, skin problems, and the common cold. In North America, *R. groenlandicum* has been employed by indigenous people to treat diabetes, a usage which has been shown to have some validity.

Cultivation

Rhododendron species and cultivars are highly valued in landscaping, particularly as flowering shrubs and as ornamental evergreens. They are often planted near foundations, and occasionally employed as hedges. Rhododendrons are very popular shrubs in climates that are moist and are not exposed to extreme temperatures, as is the case in parts of southern coastal British Columbia. For the remainder of Canada, see "Key websites for growing rhododendrons in colder regions" presented later. Below, basic horticultural advice is offered. It may be noted that there is not always unanimity of opinion on best practices for growing rhododendrons. Hundreds of articles are available online at the website of the American Rhododendron Society, experts offering opinions ranging from benign neglect to sophisticated analyses of fertilization, pruning, landscaping and other topics.

Purchasing and Propagating

Commercial propagation of rhododendrons is carried out using stem cuttings, seeds, grafting, and micropropagation. Most species of *Rhododendron* that are not named hybrids or cultivars can be propagated from seeds by gardeners. Rhododendrons usually produce hundreds of tiny seeds in their capsules, which are naturally dispersed by wind after splitting of the fruits in the autumn. Seeds lose viability rapidly, but will last if stored dry and cold (Blazich and Rowe 2008).

In practice, nearly all rhododendron cultivars are propagated by cuttings, which are established as young potted plants for commercial sale. Ideally, plants sold locally are the most appropriate cultivars for the locality, but today large marketers often distribute mass-produced biotypes, which are not especially attractive, to be sold over large areas for which they are often not completely suitable. Since rhododendrons can persist for many years, when considering new plantings it is advisable to search for recently bred particularly attractive cultivars bred for the conditions of the local climate, and to contact specialty suppliers (see Key websites).

Planting container-grown rhododendrons

Remove the root ball from the container. If dry, soak until thoroughly moist. If pot-bound, score and loosen the fibrous roots. Place top of root ball slightly higher than the top of the hole (higher than surrounding ground surface). Firm-in soil around root ball. Water-in well.

Soil conditions

Like most species in the heath family, rhododendrons are adapted to acidic soil, preferring a pH of 4.5–5.5 (although good growth often results up to a pH of 6.5, and species have been recorded growing at a pH >8.1). Drainage of water towards the plants from nearby alkaline soils is undesirable (sometimes plants placed near houses suffer from alkaline seepage from the concrete foundations). Porous loam soils rich in organic matter are recommended. Good drainage is essential. If a site has clay and/or quite alkaline soil, raised beds should be considered. Fertile soils rarely require fertilizer, but in infertile soils a complete fertilizer designed for acid-loving plants can be applied in limited amounts early in the season.

Location

Rhododendrons tend to be shallow-rooted, and are best planted away from trees that could provide competition. Most species thrive in partial shade (or full sun during part of the day, preferably in the morning). Although rhododendrons are shade-tolerant, they should not be placed in deep shade. Evergreens are best situated in locations sheltered from wind that might desiccate the foliage. Medium and large rhododendrons can be planted as isolated specimen plants or associated in beds with other shrubs. Low-growing plants are suitable near foundations or in front of taller plants. Rhododendrons bloom for only a few weeks, but cultivars can be chosen so that flowering plants will be visible from spring to mid-summer. Plants should be located where they are not objectionable during the non-flowering period.



Figure 9: "Azalea pancakes" made with flowers of *Rhododendron mucronulatum*, and prepared by pan-frying kneaded dough (a combination of glutinous rice flour and sugar) on a hot frying pan with vegetable oil. In Korea these were traditionally eaten on Samjinnal, celebrated on March 3 in the lunar calendar. ©Greenful (CC BY SA 2.0).



Figure 10: *Rhododendron arboreum*, native to Asia, but widely cultivated elsewhere. In British Columbia, trees older than a century have been grown. **Left:** ©jacinta lluch valero (CC BY SA 2.0). **Right:** Gigantic multi-trunked tree in Cornwall, U.K. ©Carcharoth (CC BY SA 3.0).

Maintenance

Watering should be done only when the soil is moderately dry, but plants should not be subjected to drought. Deadheading after flowering is sometimes practiced. So is pruning, but this is not essential (although diseased and damaged branches should be removed). For protection from severe winters, evergreens can be wrapped in burlap (with minimal contact to foliage). Applying 5 cm (2 inches) of organic mulch (peat moss and wood chips are not recommended by some specialists) under the shrub annually tends to retain soil moisture and suppress weeds (avoid placing mulch near the trunk, as this can promote rot).

Curiosities of Science and Technology

- *Phytophthora ramorum*, an oomycete plant pathogen popularly called "sudden oak death" and "ramorum blight"), has become a devastating disease of woodlands, commercial plantations and nurseries in the last two decades. Probably from Asia (at least the European population), it is now spreading in parts of Europe (especially the U.K.) and North America (especially California). This disease kills or weakens numerous species of trees and shrubs. Rhododendrons are susceptible, but can live for many years in an affected state, spreading spores to other plants. Ramorum blight was discovered in Europe in the early 1990s on rhododendrons, and in the U.K. the highly invasive *R. ponticum* is a very serious vector of the disease. Millions of trees in the Old and New Worlds have been destroyed and ecosystems are being devastated. Control measures are difficult, and it appears that like several other epidemics harming plants, the world's vegetation will be permanently compromised.

- Reflecting the toxicity of rhododendrons, sending a bouquet of flowering stems in a black vase was considered to be a death threat.

- Because of their attractiveness, rhododendron species have frequently been chosen as official emblems of political regions. These include *R. aboreum* (national flower of Nepal), *R. ponticum* (state flower of Kashmir), *R. niveum* (state tree of Sikkim, India), *R. campanulatum* (state flower of Himachal Pradesh, India), *R. maximum* (state flower of West Virginia) and *R. macrophyllum* (state flower of Washington).

- The foliage of large-leaved evergreen rhododendrons that must survive winters often becomes tightly enrolled during freezing weather – a response that has been called a "natural thermometer." This phenomenon, termed "thermotropism" or "thermonasty," is an adaptation lowering water loss and desiccation when the plants cannot replenish the supply of moisture from their roots.

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Figure 11: Thermotropic foliage response of *Rhododendron maximum* to freezing temperatures by curling and folding down. ©Nicholas A. Tonelli (CC BY 2.0).

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Key websites for growing rhododendrons in colder regions of Canada

American Rhododendron Society – www.rhododendron.org [of interest to identify winter-hardy cultivars and to locate Canadian rhododendron societies and Canadian nurseries]

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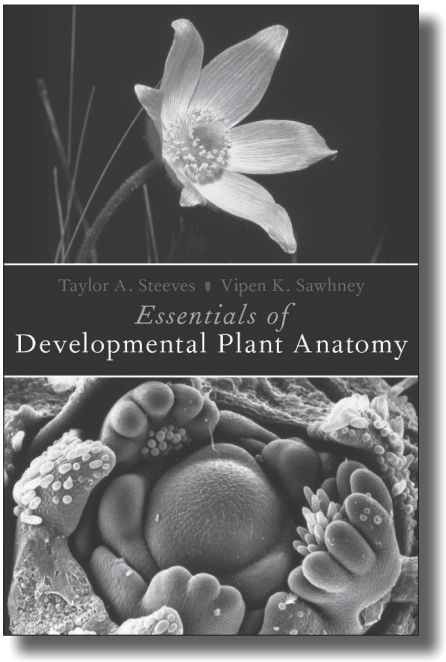
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The late Professor Taylor A. Steeves served as the department head for many years of the Biology Department at the University of Saskatchewan.

Vipen K. Sawhney is Professor Emeritus and former Head of the Biology Department at the University of Saskatchewan.

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