



Bulletin

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The evolution of the GSC bulletin

With the retirement of our able editor Barbara Spyropoulos and after seven years, we felt it might be a good time to give the GSC bulletin a minor face-lift. With this edition we unveil our new format and note that we are now publishing in full colour!

We plan to keep spirit of the bulletin alive with timely articles on the happenings in the genetics research community in Canada including tips for research, teaching and career development as well as reporting on the annual GSC meetings, awardees and other happenings.

We are also going to be moving to e-mail delivery of the Bulletin. With the advent of electronic delivery we can now offer:

- **Reduced delivery time**
- **Full colour!**
- **Savings on the cost of postage to our members**
- **Hyperlinks to on-line information**
- **Tighter integration with the GSC website**
- **Ability to cut-and-paste information into your teaching slides etc.**

• **For now, a limited number of paper copies will be available for postal delivery.**

• **If you wish to continue postal delivery of the Bulletin, please contact:**

Dr. Andrew Simmonds
Acting Editor – GSC Bulletin
Department of Cell Biology
Faculty of Medicine and Dentistry
University of Alberta
5-14 Medical Sciences Building

The GSC/SGC Bulletin has a new (acting) editor

For the next few issues, I have volunteered to be the acting editor of the GSC Bulletin. However, if any of our members have literary aspirations and would be willing to edit the Bulletin on an ongoing basis,

Thanks to Barbara

We would like to officially recognize all the efforts of Barbara Spyropoulos to produce the Bulletin year after year. Our new team hopes to carry on this tradition –Thanks!

The GSC Bulletin is published quarterly as the official newsletter of the Genetics Society of Canada/Société de Génétique du Canada. We encourage contributions from all members of the society.

Submission information:

We request that articles be submitted in an electronic format (e.g. MS Word –doc or docx or Openoffice –xml). Photo or other graphical data can be submitted as JPEG or TIF format.

Articles can be e-mailed to:

Dr. Andrew Simmonds
Acting Editor – GSC Bulletin
Department of Cell Biology
Faculty of Medicine and Dentistry
University of Alberta
5-14 Medical Sciences Building
T6G-2H7

andrew@ualberta.ca

We invite all types of articles that are of general interest to members but in particular encourage:

- Brief reviews of books on genetics or related topics
- Commentary or tips regarding teaching genetics or cytology
- Announcements of upcoming meetings or courses.
- Job postings
- Reviews of scientific software or hardware

Submission deadlines for articles are February 15, May 1, August 15 and September 15 / Dates limite pour soumission des articles pour le Bulletin sont Février 15, Mai 1, Août 15 et Novembre 15.

The opinions expressed herein are entirely those of the authors and do not necessarily represent official policy of the Genetics Society of Canada nor the respective institutions with which the authors are affiliated

Editor's Notes



With this edition of the Bulletin we are trying several new experiments relating to how the Bulletin is produced and delivered. The most noticeable of these is our moving to an on-line delivery model. Many members of the Society have expressed misgivings relating to this particular change. However, the GSC is not at all alone in moving to a solely digital format. Much larger groups like the American Society of Cell Biology now rely exclusively on an electronic delivery format for almost all their publications including their society Journal, Molecular Biology of the Cell. By eliminating the costs of printing and postal delivery we can save approximately \$3,500.00 per year. While not an extraordinarily large sum, these savings will allow us to undertake some new initiatives like revamping the GSC/SGC website. Also, with the advent of eBook readers and Blackberrys we feel that the demand for a digital format will only increase.

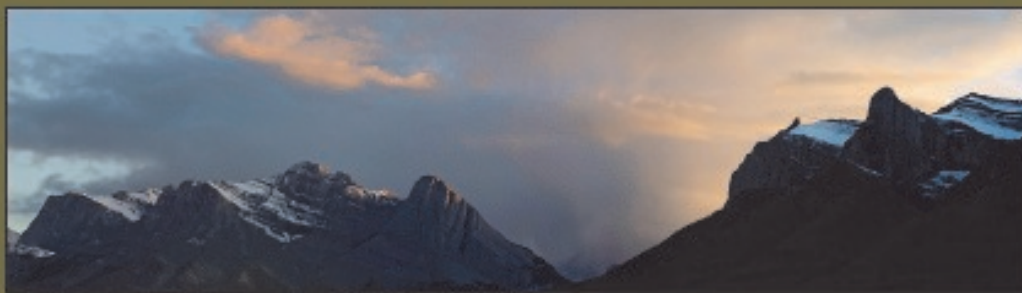
Obviously, during any period of change, there will be things that we can do better the next time. I can assure you that putting this edition together has taught me a few lessons already, the first of which is that we have some wonderfully creative people in the society who are more than willing to step up and help. To all of them I say an em-

phatic “thanks” and I encourage all of you to read their excellent contributions.

Finally, I would like to make a impassioned plea to the entire GSC/SGC membership. Get involved! I understand that many of you are members of multiple organizations and have more and more demands on your time but in a environment of larger/global organizations, the GSC/SGC stands out for many reasons. As your local, Canadian Society, we act as a unifying force tying many of the far-flung research laboratories in this big country. Your contributions to the GSC/SGC are an effective way to reach out to your Canadian colleagues and to introduce yourself to those in Canada that might not otherwise get to know you. For students especially, contributing to the Bulletin is a great opportunity to hone your writing skills.

While a necessary part of the Bulletin is a forum for the administrative information of the Genetics Society of Canada, there is absolutely no reason we can not have additional lively content that is provocative and entertaining. These articles can be written in either of Canada's official languages, or even better provide a translation into both!

- Andrew



FIRST ANNOUNCEMENT

CANFLY 2009
JASPER, ALBERTA



Edan Foley
Harriet Harris
Sarah Hughes
Kirst King-Jones
Andrew Simmonds

**The CanFly 2009 organizing committee invites you to attend
the 10th Biennial Canadian Drosophila Research Conference**

June 1-3, 2009

Sawridge Inn and Conference Center Jasper



Chuck D

The membership of the GSC has recently been swelled by legions of students that were encouraged to join at the last GSC meeting in Banff. This got me thinking, “what are the career prospects of these up and coming scientific stars?” Whenever a student comes and asks me what “careers” are available to a holder of BSc., MSc. or PhD. Degree in Genetics, or a related field, I realize that the first one that jumps to mind, that of an academic scientist, is probably not what most of them are interested in hearing about — although it is probably the one with which they are most familiar.

Is it a warped instinct related to increasing our societal “genetic fitness” that as academics, we focus solely upon creating even more academic scientists? Given the current state of the growth in major funding

agencies in this country, both public and private, simple mathematics dictates that a single laboratory can not graduate more than one or two academics without causing a n unsupportable “population explosion”. Thus, while many of our excellent trainees have a keen interest in careers outside academia, there is still a particular resistance to providing information regarding so-called “alternate” careers at most major Canadian Universities. Why the hostility to the corporate world?

Some professional societies have now taken to including sessions on “career development” in their annual meetings. I wonder if it might be time for the GSC to do the same. Of course, the major problem is what career paths to include? Through the years I have seen colleagues take up everything from medicine and law to starting successful (or not) biotech companies.

Another major problem with any career advice I care to offer is that it often takes four or more years

of training to finish a degree and a career that is “hot” today may be obsolete by that time. So, as mentors, we often retreat from offering specific advice, in fear of being wrong and damaging the career of a trainee. Some of the problem may stem from the fact that there is often conflicting opinions about what is the “best” career choice. It may simply be that there is no one best choice out there. Everybody is a little different and what may excite some is not at all interesting for others. Rather than providing focused career advice, the best approach may be to simply provide as much information as possible so that students can make informed choices.

So, I guess the answer to my original question regarding career paths is: “there are a large number of things you can do after training in genetics, but for the most part you are on your own finding out what they are.” We, as present and future mentors in the field of genetics, need to do better. We need to speak out candidly and truthfully about all of the rewarding career options available. Students, help us to help you, what career advice are you interested in?

chuckd.bulletin@gmail.com

Editor’s Note— Chuck is a new contributor to the Bulletin and plans to favour us with a topical rant regarding some of the issues facing the GSC/SGC as well as Genetics and Science in general. —Chuck D is a pseudonym

The lighter side of the web.... WIRED News—Check yourself for genetic abnormalities

[http://howto.wired.com/wiki/Check Yourself for Genetic Abnormalities](http://howto.wired.com/wiki/Check_Yourself_for_Genetic_Abnormalities)

Wired.com, home of the technology hipster, offers a helpful how-to for checking yourself for those pesky mutations that might cause trouble. Includes step-by-step instructions (Option 3) to performing PCR based lab tests at home.

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in the GSC-SGC Bulletin!**

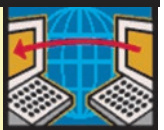
- Get direct access to Canadian trainees in Genetics
- As a service to our members, we are currently publishing advertisements for Canadian positions at no charge.

The lighter side of the web....

Tim Lee—Pam Anderson Illustrates Genetics?

<http://www.youtube.com/watch?v=lydcSuhWoW0&feature=user>

From his biography: "Tim wasn't supposed to be a comedian. A biologist by training, he graduated magna cum laude from UC San Diego with honors in biology. He went on to complete his PhD at UC Davis. He spent years developing simulation and analytical models of population dynamics before he discovered that this bored him to tears. When he tried comedy for the first time the tears stopped"



Shell Picking Along The Genetic Shore.....

Editors Note: This is another new column format, originally proposed by Dr. Xuhua Xia, where we encourage colleagues to submit summaries of their recent research to be published in the Bulletin. The purpose of these summaries is a virtual “meeting” where the research of various GSC/SGC members can be highlighted to other members across Canada. The summaries should appeal to general audience and if there is sufficient demand, we could publish two or three such summaries in each issue. Proposed columns or ideas can be submitted to the editor or to Xuahua Xia Xuhua.Xia@uottawa.ca

Trade-off in evolution at the molecular level

— Dr. Xuhua Xia

CAREG and Biology Department
University of Ottawa

URL: <http://dambe.bio.uottawa.ca>

Many fitness-related traits cannot be independently optimized. For example, for multicellular organisms, growth and reproductive age cannot be maximized without negative impact on the rate of reproductive output and vice versa. So trade-off is now almost a trademark of evolutionary studies, especially in the field of life history evolution.

Trade-off at the molecular level received attention of evolutionary biologists only recently, and here I present such a case involving translation initiation and elongation (Carullo and Xia 2008; Xia et al. 2007). In unicellular organisms and mitochondria, it is generally believed that highly expressed genes should have their codon usage evolving to adapt to the tRNA pool. Take the AAR codons (coding for lysine, with

R standing for either A or G) for example. If the anticodon of tRNA^{Lys} is UUU matching AAA codons, then highly expressed genes should code lysine by AAA codons, not by AAG codons (which would be selected against if generated by mutation because wobble-translation is error-prone). On the other hand, if mutation process is so AT-biased that AAA codons are far more abundant than AAG codons, then we would expect the anticodon of tRNA^{Lys} to adapt to codon usage and become UUU.

However, this simple rule is broken when we look at the methionine codon family (coded by AUA and AUG) in vertebrate mitochondrial genome. AUA is far more frequent than AUG, but the anticodon of tRNA^{Met} is not UAU but CAU matching the less frequent AUG codon. Vertebrates have to keep a set of enzymes to modify the CAU anticodon so that it can translate AUA codon as well. One might ask why natural selection did not make it simpler by simply changing the CAU

anticodon to UAU anticodon to maximize the translation elongation. One explanation involves the trade-off between translation initiation and elongation. AUG is not only the most frequently used initiation codon, but also the most efficient initiation codon. Translation initiation is often the limiting step in protein production. This presents a conflict between translation initiation and translation elongation. An AUG-matching anticodon would increase the translation initiation rate but decrease the translation elongation rate because an overwhelming majority of methionine codons are AUA in vertebrate mitochondrial genomes. The fact that all known vertebrate tRNA^{Met} genes feature an AUG-matching anticodon implies that nature has chosen to maximize the translation initiation rate (Carullo and Xia 2008; Xia 2005; Xia et al. 2007). The hypothesis that invokes a conflict between translation initiation and translation elongation to explain the usage of the CAU anticodon in tRNA^{Met} is now known as the translation conflict hypothesis.

Two consequences can be derived from the translation conflict hypothesis. First, we should expect a relative reduction of AUA usage because the AUG-matching anticodon imposes selection against the use of

(Continued on page 95)

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AUA codons as AUA would need to be wobble-translated. To fix ideas, let us focus only on AUR (methionine) and UUR (leucine) codon families. The reason for choosing UUR instead of any other R-ending codon families is because other R-ending codon families do not have a middle U and the middle nucleotide in a codon is known to affect the nucleotide at the third codon position.

For the 12 CDSs that are collinear with the AC-rich L-strand of vertebrate mitochondrial genome, the mutation favors A-ending codon. For UUR codons, because the anticodon wobble site is U and form Watson-Crick base pair with A, we also expect UUA codon to be preferred against UUG codons. Thus, both mutation bias and the tRNA-mediated selection favor the use of UUA against UUG codons. However, for the methionine codons, the AUG-matching tRNA^{Met} anticodon would favor the AUG codon against the

AUA codon, i.e., the tRNA-mediated selection and the mutation bias are in opposite directions. Thus, we expect proportion of AUA within the AUR codon family (PAUA) to be smaller than the proportion of UUA within the UUR codon family (PUUA). PAUA is indeed significantly smaller than PUUA, not only in vertebrate mitochondrial genomes (Xia et al. 2007), but also in fungal mitochondrial genomes (Carullo and Xia 2008).

What would happen to codon usage in the methionine codon family if a mitochondrial genome codes two different tRNA^{Met} genes, one with a CAU anticodon and the other with a UAU anticodon? While vertebrate mitochondrial genomes all have just one tRNA^{Met} gene, two different tRNA^{Met} genes are present in the mitochondrial genomes of urochordates and bivalves. In urochordate mitochondrial genomes, one tRNA^{Met} has a CAU anticodon and the other has an UAU anticodon. Among bivalve mitochondrial ge-

nomes, some have both tRNA^{Met} genes with a CAU anticodon, but some others have an anticodon CAU in one of their tRNA^{Met} genes and an anticodon UAU in the other tRNA^{Met} gene. The presence of the UAU anticodon in the tRNA^{Met} gene in urochordate and some bivalve mitochondrial genomes implies that the selection against AUA codon should be weaker than that in vertebrates. So we expect (PUUA - PAUA) to be smaller when tRNA^{Met} with a UAU anticodon is present than when it is absent. This is supported in both urochordate data and the bivalve data (Xia et al. 2007).

In the time when evolutionary studies are dominated by the neo-Darwinian mentality, people often declare that evolutionary theory is in crisis whenever they find a trait that does not follow the prediction from a model of unconstrained optimization. It is the finding of trade-offs and conflicts that have put the neo-Darwinism behind us.

References

- Carullo M, Xia X (2008) An Extensive Study of Mutation and Selection on the Wobble Nucleotide in tRNA Anticodons in Fungal Mitochondrial Genomes. *J Mol Evol* 66:484-93
- Xia X (2005) Mutation and selection on the anticodon of tRNA genes in vertebrate mitochondrial genomes. *Gene* 345:13-20
- Xia X, Huang H, Carullo M, Betran E, Moriyama EN (2007) Conflict between Translation Initiation and Elongation in Vertebrate Mitochondrial Genomes. *PLoS ONE* 2:e227

Genetics Web Resources

DNA from the Beginning: An Animated Primer on the Basics of DNA, Genes and Heredity

<http://www.dnafb.org/dnafb/>

This is an excellent resource that covers both classical genetics as well as molecular genetics and gene control. It is produced by the Dolan learning centre at Cold Spring Harbor. The concepts are explained simply and would be suitable for the general public but would equally be appreciated by a beginning genetics class.

Got a useful Genetics/Science site to share? - Send it to andrew@ualberta.ca



Obituaries

Beatrice C. Boyes

Wife of the late Professor John Wallace Boyes of McGill University (1945-1972), died on May 27, 2007.

A graduate of the University of Saskatchewan, she was an active participant in the McGill Genetics Department. During the International Genetics Congress at McGill in 1958, she helped in many ways, including being chair of the Ladies' Committee.

She was an active participant in her husband's research collecting insects, carrying out caryological analyses, and in the preparation of manuscripts. Following evening

seminars held at their home, Bea provided her famous seminar buns. Her four children (Philip, Barbara, Allen, Margaret) survive her.

References

Boyes, J. W., Van Brick, J.M., and Boyes, B.C. 1971. Chromosomes of Syrphinae (Diptera: Syrphidae). Miscellaneous Publication of the Genetics Society of Canada, Ottawa, Ontario. 158 pages.

Boyes, J. W., Van Brick, J.M., Boyes, B.C. and Vockeroth, J.R. 1980. Chromosomes of Eristalinae and Microdontie (Diptera: Syrphidae). Miscellaneous Publication of the Genetics Society of Canada, Ottawa, Ontario. 137 pages.

—William F. Grant (McGill)

The GSC/SGC website

At the last annual general meeting, a new sub-committee was struck to determine the feasibility of improving the web-presence of the GSC/SGC. This committee has completed a survey of the websites of similar associations and have come up with a basic set of guiding principles of what we envision the GSC/SGC website could be. These include: getting a dedicated domain name such as <http://GSC-SGC.ca> or something similar, making the site more interactive and worth visiting on multiple occasions. This could involve setting up members-only interactive pages where members could contact each other for help regarding experimental protocols or even a mentoring forum. If the GSC/SGC is going to re-establish itself as the official voice of Canadian researchers in the field, some type of real-time communication between members is imperative.

We would like to move forward with an update of our website in the fall. Our current website is <http://evol.mcmaster.ca/GSC/>. If you have any suggestions, or would like to be involved, contact the web sub-committee: Dr. Andrew Simmonds, Anne Formaz-Preston and Dr. Kirst King-Jones or our current webmaster Dr. Brian Golding.

International Congress on Human Genetics—2011



Drosophila **dispatches**

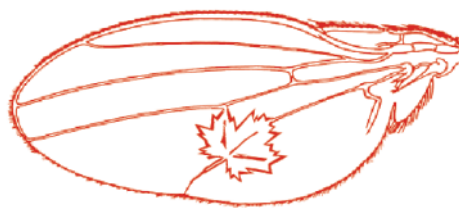
This is a forum for announcements or news of particular interest to Canadian laboratories involved in fruit fly research.

Welcome two more new Canadian *Drosophila* labs!

The [Faculty of Medicine and Dentistry](#) at the [University of Alberta](#) has recently welcomed two brand new *Drosophila* researchers to our ever growing local fly community.

[Dr. Sarah Hughes](#) is a newly appointed assistant professor in the Department of Medical Genetics. Dr. Hughes' laboratory is using *Drosophila* as a model for Neurofibromatosis type 2.

Dr. Francois Bolduc has joined the Department of Paediatrics as an assistant professor. His laboratory will explore the molecular basis of cognitive dysfunction using *Drosophila* classical olfactory conditioning. His group studies the molecular



components responsible for normal intelligence development and, conversely, intellectual disabilities.

Canfly 2008

The *Drosophila* group at University of Alberta will be hosting CANFLY 2009 in Jasper, Alberta located directly west of Edmonton. This appears to be the 10th version of CANFLY so we are entertaining ideas about how best to celebrate our centenary. If you have any ideas please let us know!

Members of the GSC/SGC working in other model systems/sub-disciplines are encouraged to send announcements/news items and we will be happy to establish similar columns.

Corrections

On page 79 of the June 2008 version of the Bulletin, a photo was mistakenly labelled as being Dr. Jeb Gaudet. This photo is actually of Oliver Hobert.

Meeting Announcements

Fourth Biennial Conference of the International Biogeography Society Mérida, México January 8-12, 2009

Invited symposia will feature talks on the biogeography of disease, patterns and processes in biotic transition zones, disjunct distributions in Asia and America, and the biogeography of species extinction. Attendees are invited to submit abstracts for oral and poster presentations. The conference will also include workshops, field excursions, and social events.

Registration, contact, and additional information may be found at: <http://www.biogeography.org>.

Officers of the GSC/SGA

PRESIDENT

Paul Lasko

Department of Biology
McGill University
1205 ave Docteur Penfield
Montreal, QC H3B 1B1
Phone: (514) 398 6401
Fax: (514) 398-5069
paul.lasko@mcgill.ca
Date of Election: 2006

PAST PRESIDENT

Rama Singh

Department of Biology
McMaster University
1280 Main St. West
Hamilton, ON L8S 4K1
Phone: (905) 525-9140 x 24378
Fax: (905) 522-6066
singh@mcmaster.ca
Date of Election: 2003

TREASURER

Julie Brill

Program in Devel. Biology & Stem Cell
Research Hospital for Sick Children
MaRS/TMDT Building
Room 13-307
101 College Street
Toronto, ON M5G 1L7
Phone: (416) 813-8863
Fax: (416) 813-8823
julie.brill@sickkids.ca
Date of Election: 2007

SECRETARY

Bernie Duncker

Department of Biology
University of Waterloo
200 University Avenue West
Waterloo, ON N2L 3G1
Phone: (519) 888-4567 x 3957
Fax: (519) 746-0614
bduncker@sciborg.uwaterloo.ca
Date of Election: 2008

DIRECTORS

Arthur Hilliker

Department of Biology York University
Toronto, ON M3J 1P3
Phone: (416) 736-5243
Fax: (416) 736-5698
hilliker@yorku.ca
Date of Election: 2005, 2008

Andrew Simmonds

Department of Cell Biology
University of Alberta
Edmonton, AB T6G 2H7
Phone: (780) 492-1840
andrew.simmonds@ualberta.ca
Date of Election: 2005

George Haughn

Botany Department
University of British Columbia
6270 University Blvd
Vancouver, BC V6T 1Z4
Phone: (604) 822-9089
Fax: (604) 822-6089
haughn@interchange.ubc.ca
Date of Election: 2006

Jianping Xu

Department of Biology
McMaster University
1280 Main St. West
Hamilton, ON L8S 4K1
Phone: (905) 525-9140 x 27934
Fax: (905) 522-6066
E-Mail: jpxu@mcmaster.ca
Date of Election: 2007

Kirst King-Jones

Department of Biological Sciences
University of Alberta
CW-405 Biological Sci. Bldg
Edmonton, AB T6G 2E9
Phone: (780) 492-8605
Fax: (780) 492-2216
E-mail: kirst.king-jones@ualberta.ca
Date of Election: 2007

Xuhua Xia

30 Marie Curie, Room 278
Department of Biology and Center for
Advanced Research in Environmental
Genomics (CAREG)
University of Ottawa
Phone: (613) 562-5800 x 6886
Fax: (613) 562-5486
E-mail: xxia@uottawa.ca
Date of Election: 2008

STUDENT DIRECTORS

Martin Mallet

Department of Biology
Queen's University
Kingston, ON K7L 3N6
Phone: (613) 533-6000 x77141
E-mail: malletm@biology.queensu.ca
Date of Election: 2006

Ann Formaz-Preston

Dept Biochem & Mol Biology
University of Calgary
2212 Health Sciences Centre
3330 Hospital Dr NW
Calgary, AB T2X 1A1
Phone: (403) 220-7989
Fax: (403) 270-0737
E-mail: aformazp@ucalgary.ca
Date of Election: 2007

GSC OFFICE

Lisa Snider

59 Aulac Road
Aulac, NB E4L 2V6
Phone: (902) 488-9876
Fax: (902) 484-5694
Email: gsc@thesnidersweb.com

ARCHIVES

William F. Grant

Department of Plant Science
Box 4000, Macdonald Campus
McGill University
Ste Anne de Bellevue, QC H9X 3V9
Phone: (514) 398-7863
Fax: (514) 398-7897
william.grant@mcgill.ca

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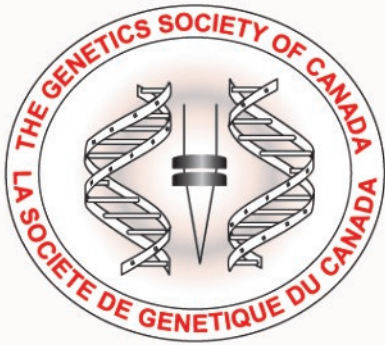
Arthur Hilliker

Department Biology
York University
4700 Keele Street
Toronto, ON M3J 1P3
Phone: (416) 736-2100 x77876
Fax: (416) 736-5698
E-mail: hilliker@yorku.ca

GENOME CO-EDITOR / WEB MASTER

Brian Golding

Department of Biology
Life Sciences Bldg. Rm 538
McMaster University
1280 Main St. W.
Hamilton, ON L8S 4K1
Phone: (905) 525-9140 x 24829
Fax: (905) 522-6066
brian@helix.biology.mcmaster.ca



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National Awards for Poster and Platform Presentations

National Thesis Awards

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Eligability to attend the GSC annual meeting

The GSC e-Bulliten - a newsletter focused on events relavent to the Canadian research community

Eligibiltiy for Student awards

<http://evol.mcmaster.ca/GSC/mem.html>

Enduro™ Modular Vertical Gel System

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Enduro™ Vertical Gel System

SPECIFICATIONS & Ordering Information

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Gel Dimensions	10 x 10 cm	NA	8 cm long
Capacity	2 gels/run*	3 gels/transfer	10 tubes/run
Maximum samples	20 per gel	NA	10 (1/gel)
Tank (WxDxH)	19 x 13 x 15 cm	19 x 13 x 15 cm	19 x 13 x 15 cm
Buffer volume	250 mL	1200 mL	500 mL
Included items**	2 ea 10 x 10 notched plates 2 ea 10 x 10 plates w/spacers 2 ea 1 mm comb, 12 wells PAGE Module, casting base	3 ea blotting cassettes 6 ea fiber pads Blotting module, PAGE System (also Available without the PAGE Components)	20 ea capillary tubes 20 ea tube supports 10 ea blocking plugs IEF module

*Can run 4 gels by stacking the plates.

**Each system includes buffer tank, lid, leads and cooling pack.
The Blotting and IEF Systems also include the PAGE components.

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- Loading guides aid in well visualization



Gel Tray Details

SPECIFICATIONS & Ordering Information

	Enduro7.7	Enduro7.10	Enduro10.10	Enduro15.10	Enduro15.15	Enduro20.20
Gel (W x L cm)	7 x 7	7 x 10	10 x 10	15 x 10	15 x 15	20 x 20
Unit (W x L x H cm)	9 x 21 x 9	9 x 21 x 9	12.5 x 22 x 9	17.5 x 26.5 x 9	17.5 x 26.5 x 9	23 x 39.5 x 9
Buffer volume	225 ml	225 ml	300 ml	500 ml	500 ml	1200 ml
Max sample capacity	32	64	100	140	210	450
Supplied combs	8 tooth (2)	8 tooth (3)	10* tooth (2)	16* tooth (1) 20 tooth (1)	16* tooth (1) 28* tooth (1) 20 tooth (1)	20 tooth* (2) 40 tooth* (2)
Cat. #:	NLE1007-7	NLE1007-10	NLE1010-10	NLE1015-10	NLE1015-15	NLE1020-20

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*Multichannel compatible

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