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BioTalent Challenge

Student Guide

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About the Sanofi-Aventis BioTalent Challenge

The Sanofi-Aventis BioTalent Challenge (SABC, formerly the sanofi-aventis biotech challenge) gives high-school students across Canada a chance to engage in 'graduate-level' research, designing and conducting experimental studies in biotechnology under the mentorship of research scientists. All aspects of biotechnology—which uses the processes of life to yield knowledge or produce useful goods and services—are eligible for the Challenge, subject to approval by a professional scientific panel.

The competition mirrors the real world of scientific research by:

- Requiring students to submit research proposals that are evaluated by a scientific evaluation committee;
- Providing funding (up to $200) in advance funding to the approved student projects;
- Assigning mentors to each team to provide expert advice and access to equipment and supplies; and
- Having each student project judged by fellow students (peer review) and by judges representing government, business, academia and the education community.

This award-winning science competition has branched out to 14 Canadian regions – the Greater Toronto Area, Metropolitan Montreal, Eastern Ontario, Southwestern Ontario, Nova Scotia, Newfoundland and Labrador, Saskatoon, British Columbia, Manitoba, Edmonton, Calgary, New Brunswick, Prince Edward Island, and Northern region. More than $100,000 in cash prizes and scholarships—and in some cases summer jobs—is awarded in competitions across Canada. Winning teams in each of the 14 SABC regions will have the opportunity to compete at the national and international levels, gaining confidence, experience and profile. In 2007, three SABC competitors were named among Canada's Top 20 Under 20. The SABC concept is a Canadian success story: it has been echoed by the U.S. sanofi-aventis International BioGENEius Challenge for several years and is now being held in Australia as well.

The first national competition among the first place winners from each regional SABC program was held at the BIO 2002 conference in Toronto June 2002. More than $18,000 in cash prizes was awarded to the competing teams. Prior to 2008, the national competition was held via video-conferencing facilities from the National Research Council of Canada where each first place regional team presented their research to a panel of judges gathered at the NRC headquarters in Ottawa.

In 2008, with increased support from BioTalent Canada the competition was face-to-face where 14 regional winners competed for the National title in Ottawa. The top two winners of the National SABC Competition will compete in the sanofi-aventis International BioGENEius Challenge at the Biotechnology Industry Organization's (BIO) Annual International Convention.

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The SABC is supported nationally by sanofi-aventis, sanofi pasteur, BioTalent Canada, the National Research Council of Canada, Genome Canada, the Canadian Institutes for Health Research, and the Canada Foundation for Innovation. Each regional competition is also supported by over 100 local companies, educational institutions, industry organizations and government agencies that share a common interest in improving the quality of biotechnology education in Canadian schools.

Rules of the Competition

1. The term biotechnology is used to emphasize the application of research ideas in various disciplines of biological science. Therefore, a project is deemed relevant if its content relates to the various applications of biotechnology such as health care, agriculture, forestry, food processing or the environment and/or it applies the knowledge and techniques of the current courses at your school and/or other scientific studies such as biochemistry, molecular biology, cell biology, microbiology and biotechnology.

2. The SABC follows the Youth Science Foundation of Canada's (YSF) document on Use of Animals in Research which states:

> "Projects involving animal experimentation may be conducted under the supervision of research personnel employed by a University, Hospital, Government Organization or Agency, or Industrial Laboratory and where the animal experimentation has been pre-approved by a Scientific Review Board (or equivalent) in the institution employing the supervisor(s)."

For further information on this rule and a detailed outline of this legislation please review the General Safety Guidelines.

3. A participant may not display an identical project at any subsequent SABC competition and must declare in their application how their proposal differs from a previous years' project. Any continuing research must indicate that substantial expansion of the project was performed and the student(s) will be judged on the current year's work only.

4. The project must include scientific experiments that recognize and control all significant variables and demonstrate excellent collection, analysis and presentation of data.

5. Each student team is required to submit a lab journal for part of their project evaluation. The recommended type is a Blueline Hard Cover Flush-cut Composition Book (7 1/4″ x 9 1/4″). They sell for under $10 and are readily available at stores such as Staples or Office Depot. Please see the section in this guide on "Keeping a lab journal".

6. The project should conform to the sections of student activities, applications and possible extensions described in the Pan-Canadian Common Framework for Science Learning Outcomes (http://www.cmec.ca/science/framework/pages/english/11-12Life.html)

7. If a deadline cannot be met due to circumstances beyond control, a request for an extension must be made in writing to the Coordinator at least two days before the set deadline.

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Student Participation Guidelines

All students who are accepted into the SABC program are expected to do the following. If the student(s) requires any assistance on any of these tasks they are encouraged to contact the Regional Coordinator at any time.

1. Be prepared to get creative and work independently as an individual or group with minimal supervision.

2. Just like scientists working in industry, universities and research institutions, students are required to submit a project outline describing their proposed research to a scientific evaluation committee. To assist you with this process, please review the Proposal Writing Guidelines SOP. Your Regional Coordinator maintains a list of expertise in your area. Knowing the different types of expertise available to you may assist you with your choice of research.

3. Contact your mentor to set up an initial meeting once your regional coordinator has provided you with his or her contact information

4. Set up a time line and schedule to work on your project in the mentor's research facility.

5. Where required, complete Workplace Hazardous Materials Information System training (WHMIS). Contact your Regional Coordinator for assistance.

6. Submit a project budget to the Regional Coordinator in order to receive approval for project funding. Funds to the students will be released upon receipt of expense claims with photocopies of receipts, up to the budget amount from the student, teacher, or mentor. Cheques will be issued to the student(s') school and directed to the student(s)' supervising teacher, who can arrange for the school to reimburse the student(s).

7. Maintain close contact with and report progress and challenges on a regular basis to mentor.

8. Keep a detailed lab journal of all work that is completed throughout the duration of their project and receive mentors' signature once project is complete. Please refer to the Proposal Writing Guidelines SOP

9. Prepare an oral and poster presentation for the day of the competition in accordance to the regulations laid out by the SABC and the Regional Coordinator. Be prepared to have a PowerPoint presentation on-hand for the National Competition.

10. Report to your supervising teacher and the Regional Coordinator on a regular basis on your progress and any challenges you are experiencing.

SABC Team Size and Composition

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1. The competition is open to secondary school students (youth under 21, grade 9-12 and CEGP in Quebec). Some regions have a junior level competition (Montreal, Saskatoon, and Manitoba).

2. Team members must be enrolled in or have completed a biology or science course.

3. Teams may be comprised of up to 4 students or each region may limit teams to a smaller size. Check with the Regional Coordinator before submitting your application.

4. Team members do not have to be in the same grades or from the same school.

Online Application

The online application can be accessed on the SABC website at sanofibiotalentchallenge.ca under the "Online Application" section.

Proposal Writing Guidelines

The proposal must be submitted by the regional deadline using the online application form found under the "Students and Teachers" section on the SABC website: sanofibiotalentchallenge.ca

The proposal must be 1500 words or less and should be in the following format:

Proposal Title (scientifically informative title)

a. The title should touch on what is being accomplished in the investigation and what question is trying to be answered.

Introduction

a. The introduction should include the question you will be asking, why you are asking it and what you expect the answer will be.

b. It should also include any pertinent background information on the organism(s) or process(s) that will be investigated. You should include pertinent references using a standard referencing format such as APA.

c. This section should not be more than one or two short paragraphs.

Relevant Application

a. Explain how the idea was derived.

b. Provide justification as to why your idea is relevant and would be important to investigate.

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Experimental Design

a. Include a detailed description of how you plan to execute your project.

b. If you are unsure please provide an educated guess based on the research you have done.

Results and Interpretation

a. Include an explanation of how you plan to analyze and present your results if known.

b. Predict what you think you results might be and why.

Appendices

Materials, Methods, and Funding:

a. Please include a detailed explanation of the methods and techniques required for proposed research project if known.

b. Please provide a list of materials, instruments and equipment that your school will be able to provide toward this project if necessary.

c. Students whose projects are approved may receive up to $200 if they submit a reasonable budget. Funds to the students will be released upon receipt of expense claims with photocopies of receipts, up to the budget amount from the student, teacher, or mentor. Cheques will be issued to the student(s') school and directed to the student(s)' supervising teacher, who can arrange for the school to reimburse the student(s).

d. Students can seek funding outside of the $200 grants through other fundraising initiatives. In this case, the extra funding support should be acknowledged in the final work.

Timeline of project

a. Please include a brief outline of how you plan to complete your project in time for the competition in late April - early May. Please check with your regional coordinator for the competition date.

Mentorship support

a. If you have already found a mentor please include their name and contact information.

b. If you have someone in mind who you would like to act as your mentor please include their name, contact information and how you discovered their work. Your Regional Coordinator will contact them on your behalf.

c. In any other case please indicate that a mentor is required.

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Next Steps

When a proposal is submitted it will first be reviewed by the Regional Coordinator. If it is deemed appropriate for the competition it will be reviewed by the Scientific Evaluation Committee. If a project is accepted into the program the student will be notified by mail, phone, or email. The Regional Coordinator will do their best to provide a mentor.

Progress Reports

Just like scientists working in industry, universities and research institutions, students are required to submit a progress report in February describing the work they have done so far.

Progress reports from the students are intended to advise the Regional Coordinator that projects are proceeding as planned and will be presented at the final competition. The decision to require progress and/or final reports is at the discretion of the Regional Coordinator.

This format can be circulated as a guideline.

Report Period
Project title
Student Team
Mentor Name
Title of project
Team/Mentor Meetings
Lab visits (date)
Project summary
Scientific highlights
Future work to do
Project Outcome expectations

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Requirements for a final report

The requirement of a final report is at the discretion of the Regional Coordinator.

The report should be between 4-6 pages. It should be a shortened version of what is on the display board during the presentation.

It should include the following headings:

1. Project No., Title, Student name(s) and School Name
2. Project Introduction - include background, rationale, possible applications, etc.
3. Materials & Methods
4. Results – may include graphs, photographs, tables, descriptions etc.
5. Discussion and Conclusion
6. References
7. Acknowledgment to Principal, Teacher, Advisor/Mentor and others deemed appropriate

Requirements for an abstract

1. Students are to summarize their experiments in a single paragraph of not more than 250 words.
2. Write in third person and use the past tense.
3. Use one sentence to describe the general topic to be investigated and why it is important. Describe in one or two sentences, the specific question or relationship that you are investigating.
4. Students should state how the investigation was conducted in one or two sentences, avoiding a detailed description of procedure.
5. Explain in one or two sentences the main point(s) of what was found out.
6. Write a single sentence that summarizes the conclusions about the general topic, question or relationship that was investigated.

Lab Journal Information

For a scientist the lab book is a record of everything connected with his or her research. It is a record of the procedures, observations and results of ongoing research and it is a place to record those ideas that

occur to a scientist as he or she thinks about the work. It is a record of when ideas were born in case there is a dispute over patents or intellectual property.

There are some expectations as to the kinds of content expected.

Keeping a Lab Journal

1. Record all experimental data, conceptions, drawings, calculations, and other observations on a daily basis.
2. Number every page of your lab book consecutively in the upper right hand corner of each page; do not leave out any pages.
3. Date every page of the book as you use it and every entry if doesn't start on a new page.
4. Writing must be done in ink. Pencil should not be used for anything!
5. If you make a mistake, cross it out with a single stroke and initial it. Do not use white out or liquid paper.
6. Never tear or cut pages from a laboratory notebook.
7. Do not leave empty pages between experiments.
8. Start a new page for each different experiment or project.
9. Glue a copy of the experimental procedure or protocol in the notebook the first time you use that procedure so you can refer to it later.
10. Glue diagrams and photos in at the appropriate place and sign or initial the corner of the photo or diagram.
11. List all materials and apparatus required.
12. Say exactly what was done, why, when and by whom.
13. Notes should be clear enough to enable someone else to do the same thing at some future date.
14. Indicate results clearly, adding comments when necessary.
15. Define all abbreviations and acronyms when first used.
16. Number figures and tables separately and refer to them in the text by their number, i.e. “Figure1 shows that the activity.... “ or “The activity decreases after five minutes (fig. 1)”.
17. Have your mentor sign you lab book for completion.

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Lab Journal Checklist

Judges will use a checklist like the one below to assess your lab books.

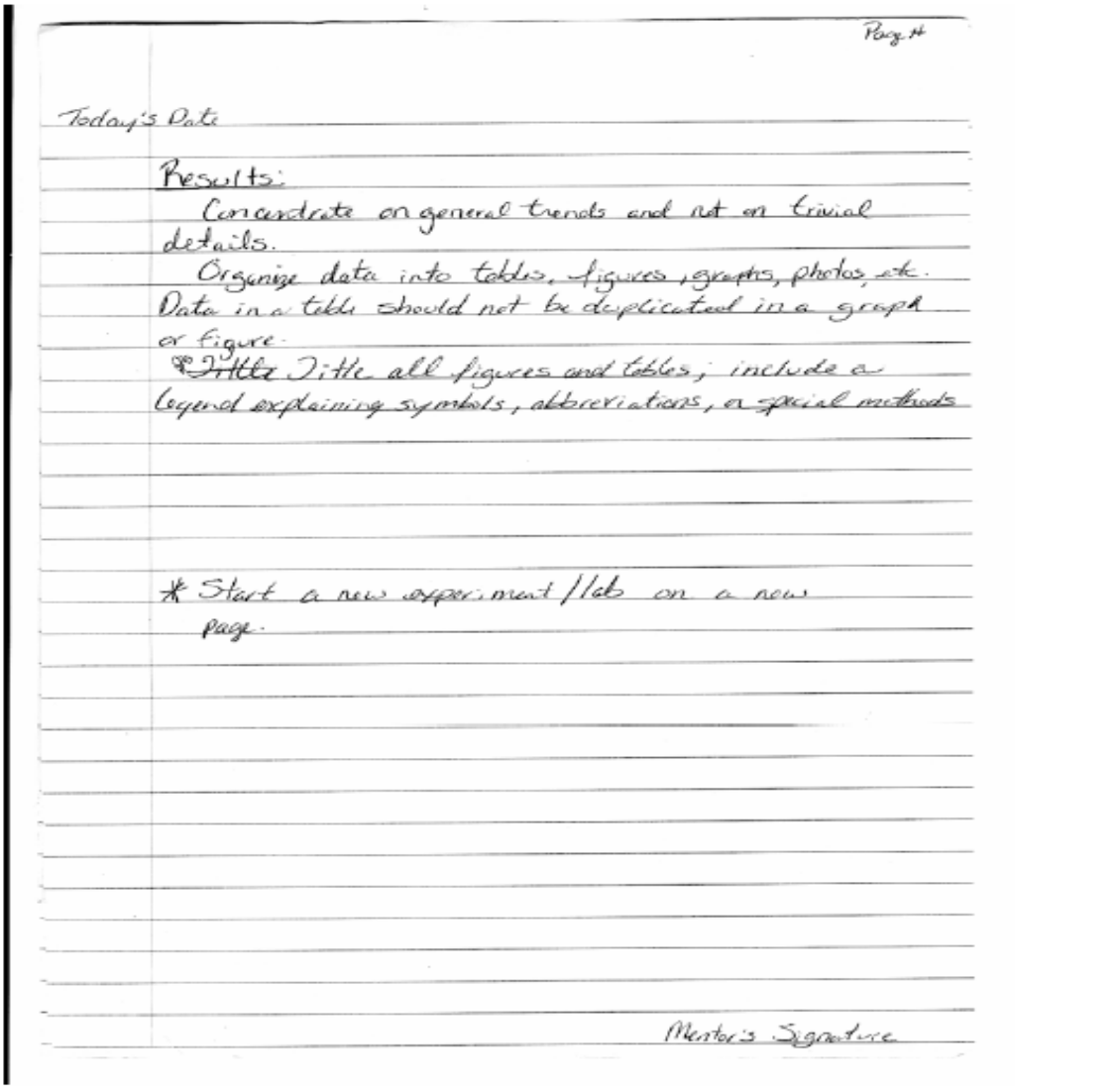
LAB JOURNAL CHECK LIST

Content:			
Entries dated with legible data organized in tables	E	S	NS
Well-detailed procedure clearly outlined including detailed diagrams	E	S	NS
Observations detailed in note form with diagrams where applicable	E	S	NS
All relevant predictions included with detail	E	S	NS
Conclusions clearly detailed and supported by relevant interesting facts	E	S	NS
Detailed and insightful personal reflections included	E	S	NS
Procedure:			
Pages numbered and dated	E	S	NS
Experimental procedure or protocol attached appropriately	E	S	NS
Entries signed by mentor	E	S	NS
Mistakes appropriately acknowledged	E	S	NS
Diagrams and photos attached appropriately	E	S	NS

Key:
E= Excellent S= Satisfactory NS= Not Satisfactory

Lab Journal Sample

LAB JOURNAL SAMPLE



Page #

Today's Date

Results:

Concentrate on general trends and not on trivial details.

Organize data into tables, figures, graphs, photos, etc. Data in a table should not be duplicated in a graph or figure.

* ~~Title~~ Title all figures and tables; include a legend explaining symbols, abbreviations, or special methods

* Start a new experiment/lab on a new page.

Mentor's Signature

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Presentations

TIPS ON PRESENTING

The following are some helpful tips/advice for your oral and poster presentations:

Oral Presentation:

- Keep in mind that you have only 10 minutes to present and 5 minutes for questions
- Please present your project according to the following:
  - *Project Objective* – What did you set out to do?
  - *Introduction*- what do you know about the topic and the objectives you set out to do?
  - *Materials and Methods* – how did you d it?
  - *Results* – what have you obtained as experimental data and how did you analyze them?
  - *Discussion/Conclusion* – what have you learned from your experiment? What are the potential applications of your work in biotechnology?
- Be concise, to the point and factual. Speak clearly in simple, jargon-free terms.
- Think of potential questions that may be asked and practice answering them.
- Practice, practice, practice. It will help you remember your material better and ease nervousness.
- To figure out if you have explained your topic and findings well, practice in front of someone who doesn't know about the topic. Have them stop you if they don't understand.
- Speak loudly and clear enough with enthusiasm to hold the judges' attention. Do not talk too quickly. Slow down so they have time to hear you.
- Try to maintain eye contact. This will help them stay focused on your presentation.
- Know your material. Be sure to present accurate information, respond to controversies in an appropriate way and try your best to answer all the questions.
- Don't try to bluff your way through questions you can't answer. Be honest.
- Try not to overwhelm them with needless detail.
- Avoid passing things around, it can be distracting.
- State your final conclusions and end on time.

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Poster Presentation

- The average poster board is usually freestanding, three panels and 4” high x 6” wide.
- Your project should contain the following information:
  - Project number, title and student name(s)
  - Project Introduction
  - Materials and Methods
  - Results
  - Discussion/Conclusion
  - References
  - Acknowledgement to principal, teacher, mentor(s) and others deemed appropriate.
- Your poster should include the title, project ID number , student name(s) and a description of the research, highlighting the major elements covered in the abstract.
- No reference of the school should be displayed.
- Don’t have a lot of dense text.
- Use bullets to break up text-heavy sections and make them easier to read.
- Use colour visuals such as pictures, tables and figures. Be sure they are not too complicated and point to them during your presentation. They can act as a guide to keep you on track and as a reference if you lose your place.
- Use large type or make sure your lettering is done neatly.

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Regional Competition Judging Criteria

a. Originality and Scientific Merit - 30%

In this section the judges will evaluate the project's overall relevance to the life sciences, as well as the degree of originality and creativity demonstrated by the students. Critical to this will be an assessment of the extent to which the ideas have been generated by the students. Judges must also assess the level of science represented by the project, (e.g. grade level, university level, etc.).

- Relevance to biotechnology ("life sciences ") - 10%
- Originality and innovation - 15%
- Level of science - 5%

b. Project Execution - 30%

Judges will evaluate the project's experimental design, protocols, data collection and analysis. The students' command of techniques and skills will be assessed along with the validity of their conclusions.

- Experimental design and protocols - 10%
- Results: Data collection and analysis - 10%
- Command of techniques and skills - 5%
- Validity of conclusions - 5%

c. Communication - 40%

Project display

Judges will evaluate the display as a summary of the project and its conclusions. They will also evaluate the display in terms of its layout and clarity in illustrating the scientific techniques involved in the research.

- Project Summary - 5%
- Clarity and layout - 5%

Oral Presentation

The judges will assess the students' oral presentation in terms of the level of scientific knowledge demonstrated and their ability to explain and defend their conclusions.

- Demonstration of scientific knowledge - 10%
- Ability to explain and defend conclusions - 10%

Lab journal

The judges will evaluate the lab journal for its completeness and its representation as a chronological record of the research progress.

- Lab journal - 10% (Please refer to the appendix for a journal check list)

Exhibit displays

The following regulations must be followed:

1. SABC reserves the right to assign available display space to exhibitors equally and to exclude exhibits that may be dangerous to exhibitors, visitors and the premises.

2. Regional coordinators will provide student teams with a safety checklist as shown in the General Safety Guidelines SOP.

3. The SABC regional coordinator or designated safety inspector has the authority to disqualify a display.

4. The display should be a presentation of results, not a demonstration of the experiment.

Dimensions

All exhibits, including all accessories, must comply with Youth Science Foundation Canada's Project Displays Policy, complete details are contained in Policy 3.1.2.5, available for download at www.ysf-fsj.ca/members/pdirectory3.aspx. Briefly, the display must be:

1 confined to a table or floor space not to exceed 0.8 metres, front to back;

2 1.2 metres side to side;

3 3.5 metres maximum height from the floor;

4 All measurements will be made from the outermost points, including framework and

appendages, and will be verified during the safety check; and

5 Exhibits exceeding these dimensions must be modified or will not be accepted (see Exceptions below).

Exceptions

From time to time, an exhibitor may wish to go beyond the normal limits of the regulation project display space to demonstrate an aspect of their project. This can only be done with the approval of the SABC Regional Coordinator in your region. Any consideration given may not give the exhibitor an unfair advantage.

The following guidelines will govern these circumstances:

1. Any demonstration that exceeds the regulation project display space may be limited to the judging sessions, or to the public viewing, at the discretion of the SABC Regional Coordinator.

2. All material should be contained within the designated space when it is not being demonstrated. Students may not bring supplementary material to the display solely for the demonstration. To do so may give them an unfair advantage.

3. Safety of people in the exhibit hall and of other exhibits must not be jeopardised by the demonstration.

4. Where project work utilises materials or devices that exceed the regulation space, students may represent such devices through models, drawings, videos, etc. It is not necessary to replicate research results for the judges.

Materials

1.Display boards, all supporting framework and presentation media attached, are to be constructed of materials that are unlikely to ignite and in the presence of fire will not allow flame to spread readily or produce toxic fumes.

2. Metal, glass and plexiglass/acrylic materials are acceptable as are cardboard, wooden and foam core boards that are commonly available at craft or office supply stores.

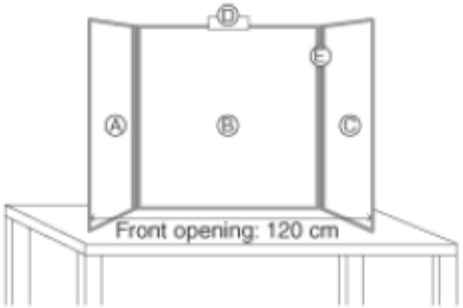
3. Pages should be attached singly and flat to the display board. If multiple pages are necessary, they should be bound and available as a booklet in front of the display.

Damage waiver

Although every effort will be made to prevent damage to exhibits, SABC and its sponsoring organisations or co-operating groups will accept no responsibility for loss or damage to any

exhibit or part thereof.

Acceptable Display Figure



A- Display area: 69 (L) x 119 (H) cm
B- Display area: 93.5 (L) x 115.5 (H) cm
C- Display area: 69 (L) x 119 (H) cm
D- Area reserved for CDLS
E- Shaded areas must be left empty.

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National Competition

Competition Structure

The regional winners compete in front of a panel of national experts with extensive backgrounds in science and business. Each student/team makes a maximum 15 min PowerPoint presentation followed by 10 min of question and answer by the judges. None but the judges, CBERC staff and the students' chaperone are permitted in the room where the judging is taking place. The student(s) display is available to the judges during the time of the presentation. Please refer to Exhibit Poster Display SOP.

Judging Criteria

The judging criteria is slightly different at the National Competition such that it does not include a lab journal
component.

1. Scientific Merit and Creativity 35%

• Relevance to the life sciences " biotechnology" /10
• Originality and creativity /15
• Level of science /10

2. Project Execution 35%

• Experimental design and protocols /15
• Results: Data collection and analysis /10
• Command of techniques and skills /5
• Validity of conclusion /5

3. Communication 30%

a) Project Display
• Project summary /5
• Clarity and layout /5

b) Oral Presentation
• Demonstration of scientific knowledge /10
• Ability to defend and explain conclusions /10
Total: /100

The score sheets will not be made available to the students. The Judges' decision is final. CBERC has always maintained the view that any ranking of team scores beyond the top five is unnecessary. As William Mak once suggested, all remaining teams come in "sixth."

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Awards Ceremony

The results of the National are announced at an awards ceremony consisting of invited guests such as industry experts, business executives, dignitaries, mentors, teachers, students, and regional coordinators. A keynote address usually by a government official (Ministers of HRSDC, Health, Industry, and Environment) is preceded by the awards presentations in the following order:

Commercial Prize	($1000)
Fifth Prize	($1000)
Fourth Prize	($2000)
Third Prize	($3000)
Second Prize	($4000)
First Prize	($5000)

Intellectual Property

The Sanofi-Aventis BioTalent Challenge follows the guidelines on intellectual property as set out by the Canada Wide Science Fair.

For commercially relevant research, protection of the ideas and technology arising from the research, or the intellectual property is key to retaining the commercial value. The protection of intellectual property through patenting provides the inventor with the sole monopoly to practice the invention. In essence it protects the ideas and products of applied research. In the area of biotechnology there are many patents granted each year in Canada, the United States and worldwide. To obtain a patent in Canada the inventor applies to the Commissioner of Patents at the Canadian Intellectual Property Office in Ottawa. There are three basic criteria for eligibility for a patent: novelty, utility and obviousness:

- Novelty means that the ideas have not been publicly disclosed through publication or presentation prior to the application for a patent.
- Utility means that the invention works, is useful, or in essence does what you say it does.
- Obviousness means that if the invention is merely a variation on an existing invention, it is not patentable.

This is a very brief explanation of intellectual property and students should read further if they feel their research contains patentable technology. Students are referred to the following web sites, which provide comprehensive guidelines to the patenting process in Canada and the United States.

Canada: http://www.cipo.gc.ca
United States: http://www.uspto.gov

To help the students understand the issues of Intellectual Property rights, the SABC asks the mentors to do three things:

1. During the course of your interaction with the students, discuss IP and how it is handled in your particular institution. Even if you don't foresee anything coming from the project, it is nonetheless a valuable thing for the students to be made aware of.

2. Occasionally wish to pursue an extension of their project in a second year. If you or your institution also intend to do further investigations arising from the project or to claim intellectual property rights, please make the students aware of this in writing.

3. As the project is nearing completion, fill out the two-page Mentor Contribution Form and give it to the students or the Regional Coordinator. They will be required to present it to the judging panel at the regional competition.

General Safety Guidelines

Suitable precautions must be taken to prevent the possibility of personal injury, property damage, and the legal action that could result from a lack of concern for safety. All SABC students are advised to complete WHMIS training.

Ensure that:

1. Exhibits must be of a safe design, with moving parts firmly attached and approved for safety. Each exhibit must be self-supporting.

2. Pressurized vessels should have a safety valve.

3. Compressed gas cylinders are not allowed.

4. Aisles and exits should not be obstructed.

The exhibits must comply with all of the conditions regarding the use of humans and use of animals as outlined in this document and consistent with the policies of the Youth Science Foundation (http://www.ysf.ca/Members/pdirectory4.aspx).

Chemical Safety

1. Containers of toxic or flammable chemicals are not allowed.

2. Hazardous materials and equipment (e.g. toxic and corrosive chemicals, lasers, etc.) that may have been used in the project research May only be simulated at the SABC

competition.

3. Dangerous chemicals are not allowed at the competition site. This includes prescription drugs and over the-counter medication.

4. Substitutes for toxic and corrosive chemicals must be used. When chemicals are simulated, they should be labeled with the names of the substance they represent preceded by the word "simulated". No project will be penalized because the key (but potentially dangerous) components were not on display.

5. Volatile materials must be handled and transported pursuant to the federal Transportation of Dangerous Goods Act and provincial legislation. The person handling the material must be properly trained.

Fire Safety

Certain restrictions have been defined on the construction of displays to reduce the possibility of accidental fire during the fair, and in the event of fire, to allow for safe evacuation of the building.

1. Combustible material must not be used near a heat source.

2. Open flames must not be used.

3. Smoking is not permitted in the exhibit area.

4. Packing material must not be stored in the exhibit hall.

Electrical Safety

1. As low a voltage as possible must be used.

2. Electricity (AC 110 Volt, 60 Hertz) will be supplied, if requested, but no gas or water outlets will be provided. Switches and cords must be of the approved variety and circuits must be protected by fuses or circuit breakers. Cell or battery fed circuits should be both safe in design and operation.

3. Only CSA approved extension cords and electrical appliances in good repair shall be used.

4. The length of extension cords is to be kept to a minimum and out of the way to eliminate tripping hazards. Use tape for securing.

5. A ground fault interrupter for electrical leaks and faults must be used. SABC will ensure that such units are installed on the main electrical control panel serving the entire exhibit area.

6. Where practical and necessary, it is recommended that pilot lights be used to indicate that the voltage is on.

7. Electrical devices must be protectively enclosed as far as it is practical.

8. Any enclosure must be non-combustible. All non-current carrying metal parts must be grounded.

9. No exposed live parts over 36 volts are allowed. Current (amperage) must be low so as not to cause any discomfort or danger if touched.

10. At the end of the day or the viewing period, all electrical exhibits must be disconnected, and power bars switched off.

Microorganism Safety and Biohazards

The following hazardous biological and chemical materials are forbidden for display at the SABC competition.

Living animals

1. Living cultures cannot be part of your display. This would include cell cultures or microorganisms of any type.

2. Cells and animal parts (including organs, tissues, plasma or serum) purchased or acquired from biological supply houses or research facilities may be used in the research aspect of the project, but may not be displayed at the competition. Evidence of the source of the materials (e.g., bill of sale) must be available at the display.

3. Plant tissues that have been infected with viruses.

4. Biological toxins
5. Toxic and corrosive chemicals

6. Radio-isotopes or compounds containing radio-isotopes at activities above normal background

Restrictions on Subject Material or Organisms

The primary concern at the SABC competition is that of public safety. Many subject organisms and materials that may be used acceptably in your research under the supervision and approval of your mentor and his/her institution are not permissible for exhibition purposes at the SABC competition. Simulations or photographs can be substituted.

The following are regulations regarding hazardous biological and chemical materials that must be adhered to:

1. Live microorganisms and vertebrate or non-vertebrate animals must not be included in the display, although appropriate photographs may be available in the report.

2. Cells and animal parts (including organs, tissues, plasma or serum) purchased or acquired from biological supply houses or research facilities may be used in the research aspect of the project, but may not be displayed at the competition. Evidence of the source of the materials (e.g., bill of sale) must be available at the display.

3. The only parts of vertebrate animals that may be displayed are those that are either naturally shed by an animal or parts properly prepared and preserved. Soft tissue specimens are not acceptable even if they are preserved in formaldehyde, a dangerous chemical excluded under the chemical safety section of these guidelines. Sealed tissue samples on microscope slides are permissible.

4. Plant tissues that are known to possess allergens or have been treated with herbicides/pesticides or infected with viruses must not be displayed.

5. Chemical agents in the following categories must not be at the competition site.

6. Biological toxins

7. Toxic and corrosive chemicals

8. Radio-isotopes or compounds containing radio-isotopes at activities above normal background

Research Involving Animals

The use of animals in the SABC follows the Youth Science Foundation policies found here: http://www.ysf.ca/files/PDF/governance/policy/en/4.1.2_Animals.pdf

Specifically:

Non-Vertebrate Animals

Students may do experiments on non-vertebrate animals, and exhibit their work at the SABC fairs. Lower orders of life - bacteria, fungi, protozoa, insects, plants and invertebrate animals - can be used in experimentation to reveal valuable basic biological information.
The use of invertebrate animals is generally acceptable. However, ethical issues pertain to all living animals and consideration must be given to the scientific and educational value of the study being undertaken. The SABC reserves the right to disallow a project

Vertebrate Animals

Vertebrate animals (birds, fish, mammals, reptiles, amphibians) are not to be used at the SABC except with the following four exceptions:

i) Observation of wild animals, animals in zoological parks, farm animals and pets is permitted. Vertebrate animals are not however to be used in any active experiments which may be deleterious to the health, comfort or physical integrity of the animals.
Observation of wild animals falls within the definition of hunting in some jurisdictions. Students should obtain advice and permission from conservation authorities to ensure that they are not interfering with the animal's life, and to ensure that their project is permissible. A permit may be required.

ii) Behavioral experiments with positive rewards are permissible only if the animal is not placed in a stress situation. Training an animal to travel through a maze to receive a food reward is allowed as long as the animal is not stressed, e.g., by withholding food well beyond normal feeding times.

iii) Projects involving animal experimentation may be conducted under the supervision of research personnel employed by a University, Hospital, Government Organization or Agency, or Industrial Laboratory and where the animal experimentation has been pre-approved by a Scientific Review Board (or equivalent) in the institution employing the supervisor(s). A copy of the Letter of Approval from the SRB must be included in the documentation submitted to the the Regional Coordinator. All projects so approved are eligible for the Canada Wide Science Fair, and do not need further approval by the Ethical Committees of either the Regional Science Fair or the YSF.

iv) Experiments on embryos are subject to the same rules that apply to the animal producing the embryos. If embryos are incubated until the end of the gestation period, the offspring must be reared normally. Otherwise all embryos must be destroyed by freezing or other approved methods before 85% of the normal incubation.

Cells and animal parts, including organs, science fair projects may be used in SABC projects. They can be obtained:

i) from biological supply houses;

ii) from registered institution/laboratory

iii) salvaged from the food industry. Evidence available at the project display

Regulations

Any experiments involving cell or tissue cultures from human beings and other vertebrate animals will be passed through the SABC Scientific Evaluation Committee to ensure compliance with the regulations and restrictions in their jurisdiction, some of which are listed below.

If necessary, SABC will refer the project to appropriate authorities cognisant of current regulations and relevant aspects regarding scientific merit, for guidance and suggestions for performing the work.

The Evaluation committee will reject any submissions that propose the use of vertebrate animals (birds, fish, mammals, reptiles, amphibians) as subjects in experiments that may in any way be

deleterious to the health, comfort or physical integrity of the animals. Valuable biological information that is relevant to the higher orders of life can be obtained by investigating lower orders (bacteria, fungi, protozoa, insects, plants and invertebrate animals).

Exhibit Safety Checklist

The primary concern at the SABC competition is that of public safety. Many subject organisms and materials that may be used acceptably in your research under the supervision and approval of your mentor and his/her institution are not permissible for exhibition purposes at the SABC competition. Simulations or photographs can be substituted. The display is a presentation of the results, NOT a demonstration of the experiments. In some cases, working models may be used with permission of the SABC regional coordinator or designated safety officer.

1. General

a. Exhibit is of a safe design, with moving parts firmly attached and approved for safety.
b. The exhibit is self-supporting.
c. Packing material is stored under the table.
d. Aisles and exits are not obstructed.

2. Fire Safety

a. Open flames are not used.

b. Combustible material is not near a heat source.

c. Synthetic backboard material is of an approved fire retardant type (UL approved).

d. Sheets are attached to display board singly and flat.

3. Biological organisms

a. Living cultures are not part of the display.

b. Cells and animal tissues are displayed but are properly sealed in plastic or on microscope slides.

c. Living animals (either vertebrate or non-vertebrate) are not part of the display.

d. There is no evidence (e.g. video or photographic) of harm or distress to animals.

e. The only parts of vertebrate animals that may be displayed are those that are either naturally shed by an animal or parts properly prepared and preserved. Specimens preserved in formaldehyde are not permitted.

f. Evidence of the source of the biological materials (e.g., bill of sale) used in the research is available display.

4. Plants

a. Plant tissues that have been infected with viruses are not part of the display.

b. Plant tissues that are known to possess allergens or have been treated with herbicides/pesticides or infected with viruses are not part of the display.

5. Hazardous materials

a. There are no containers of toxic, corrosive or flammable chemicals as part of the display.

b. Hazardous materials and equipment (e.g. toxic and corrosive chemicals, lasers, etc.) are simulated.

c. Dangerous chemicals (including herbicides, pesticides, prescription drugs and over -the-counter medications) are not part of the display.

d. Biological toxins are not part of the display.

e. Radio-isotopes or compounds containing radio-isotopes at activities above normal background are not part of the display.

6. Electrical Safety

a. Only CSA approved extension cords and electrical appliances in good repair are used.

b. Electrical devices are protectively enclosed as far as it is practical.

c. All enclosures are non-combustible.

d. All non-current carrying metal parts are grounded.

7. Mechanical Safety

a. Moving parts, such as in a working model, are designated to be safe or are enclosed with proper shielding.

b. Pressurized vessels have a safety valve.

c. Compressed gas cylinders are not present.