Summary

St. Boniface Hospital Research opened the RBC Youth BIOlab Jeunesse (Youth BIOlab) to students in February 2013 and the laboratory was officially opened by the Premier of Manitoba in October 2013. This 3000 square foot biomedical teaching lab represents the Research Centre’s commitment to science education and health literacy, and expands on the full-time outreach programming we have supported through community partnerships since 2005. The Youth BIOlab is designed to connect science, research and medicine at St. Boniface Hospital and the Albrechtsen Research Centre to science curriculum and classroom learning through authentic, hands-on science experiences for students from Grade 4-12.

The Youth BIOlab was built with funding from the Province of Manitoba and the St. Boniface Hospital Foundation through major donations from RBC and Canada Safeway. Operating costs are supported by partnerships with school divisions and through a 3-year $198K PromoScience (2019-2021) grant from the Natural Sciences and Engineering Research Council of Canada. The lab also received generous donations this year from an anonymous donor, the Manitoba Métis Federation and the Canada Post Community Foundation. The Louis Riel School Division continued their long-standing partnership with St. Boniface Hospital Research, and the DSFM, Seine River, Lord Selkirk, Winnipeg, Hanover, Red River Valley and 7 Oaks School Divisions also continued as partners in the BIOlab in 2019-2020. Several other Manitoba school divisions participated in programming along with the Manitoba First Nations Education Resource Centre and other community and education groups. We also maintained connections with Manitoba First Nations students, through mentorship of projects for the Manitoba First Nations Science Fair and continuing work on a long-term project with students in Cross Lake First Nation. Anjelica Bodnaryk joined the Youth BIOlab in January 2020 to support our outreach efforts for Indigenous youth.

The COVID-19 pandemic response had a significant impact on Youth BIOlab operations this year, but we were still able to welcome many students in the period from September 2019-March 2020. Prior to the school suspension and Research Centre shutdown, over 3000 Manitoba students participated in over 140 sessions of programming at the Youth BIOlab, with another 887 students participating in programming in schools. During the shutdown, we wrote and published a COVID-19 print resource for youth with La Liberté, and began developing online and in-school programming options for fall 2020 to prepare for future COVID-19 related impacts on the education system.

2019-2020 was our 15th year of partnering with our community for science and health education and the 7th full year of operation for the Youth BIOlab. Since our start in classrooms in the fall of 2005, the Research Centre has now connected with over 70,000 Manitoba students! This represents students from hundreds of Manitoba schools and includes more than 30,000 student visits to the BIOlab since 2013.

On the cover: friends from the Rossbrook House Leadership Program working with cells in the BIOlab.
Scope of Report

This report focuses on the activities of the Youth BIOlab in the period from September 2019 to June 2020. The Youth BIOlab runs in parallel with the Albrechtsen Research Centre’s long-standing partnership with the Louis Riel School Division, It’s All About Me. Students and teachers from Louis Riel School Division participate in both BIOlab visits and in-school programming as part of It’s All About Me.

The majority of school visits to the Youth BIOlab run as half-day sessions. Numbers are reported as student attendees per session. For example, if one student attended 3 sessions of a multi-day program, they are counted as 3 students.

Overall participation numbers for both BIOlab visits and in-school visits decreased this year due to the COVID-19 pandemic response.
Goals

As part of St. Boniface Hospital Research’s commitment to science and health education and the Manitoba government’s Action Plan for Science Education in Manitoba, the Youth BIOlab is designed to support health and scientific literacy in Manitoba.

The goals of the Youth BIOlab are:

- To provide a safe and authentic biomedical teaching laboratory for Manitoba teachers and students.
- To promote understanding of the science behind health and disease and to build capacity for greater understanding of science and health within our community.
- To connect Manitoba youth to healthcare and medical research in Manitoba through curriculum-linked laboratory experiences.
- To develop a framework to include students in extending their personal understanding of health, the nature of science, scientific inquiry and design.
- To create and maintain collaborative partnerships with Manitoba school divisions to facilitate communication and sharing of resources between schools and the St. Boniface Hospital and Albrechtsen Research Centre.

St. Boniface Hospital Research

St. Boniface Hospital Research encompasses 3 free-standing medical research facilities – the St. Boniface Hospital Albrechtsen Research Centre, the Dr. Andrei Sakharov MRI Centre, and the I.H. Asper Clinical Research Institute – all built with funds raised in the community and operated with a combination of peer reviewed research grants, industry contracts, fund raising, and through affiliation with the University of Manitoba. The Albrechtsen Research Centre is home to the Institute of Cardiovascular Sciences, Division of Neurodegenerative Disorders, Canadian Centre for Agri-Food Research in Health and Medicine and Clinical Research. Generously supported by the St. Boniface Hospital Foundation, St. Boniface Hospital Research has gained a world-wide reputation for excellence in biomedical research.

The end of the 2019-2020 school year marks the completion of 15 years of full-time outreach programming and the achievement of over 70,000 students reached! In 2005 we developed a partnership with the Louis Riel School Division to create a model for full-time outreach that became the It’s All About Me program. This program, largely based in schools, has now provided hands-on medical science experiences in classrooms to over 40,000 students. Since opening in 2013, The Youth BIOlab has extended this model of community partnership to 31,000 students from across Manitoba and enhances our ability to provide authentic science experiences to youth. Steve Jones, a certified teacher with a background in cardiovascular research, runs the Youth BIOlab and has directed these full-time outreach efforts since 2005. Meghan Kynoch has run all French language BIOlab programming and the majority of in-school programming full-time since 2015. Anjelica Bodnaryk joined the Youth BIOlab in January 2020 to support Indigenous outreach efforts and Natalie Landry, a PhD student in Dr. Ian Dixon’s laboratory continued on a casual basis as our cell-culture technician.
Partnership Model

Outreach activities of the Youth BIOlab are based on a model of partnership with school divisions. Our goal is to meet the diverse needs of students, teachers, schools and communities by working with school divisions to support student health and science learning. By approaching this at the divisional, rather than individual class level, we can develop relationships with schools and teachers that support both teacher development and student learning in the health sciences. Partnerships with school divisions include funding for a set number of Youth BIOlab sessions and include a one-day teacher training and orientation session that typically occurs in the fall.

The Louis Riel School Division and St. Boniface Hospital Research have partnered since 2005 to connect research and medicine at St. Boniface to classroom learning. This lead partnership continued in the 2019-2020 school year, combining in-school visits with visits to the Youth BIOlab. Seine River and Lord Selkirk School Divisions entered their sixth year of partnership with the BIOlab in 2019-2020, the Winnipeg, Hanover and 7 Oaks School Divisions entered their fifth year and Red River Valley School Division entered their fourth year of partnership. 2019-2020 was our third year with the Division scolaire franco-manitobaine (DSFM) as partners. We also worked in partnership with the Manitoba First Nations Education Resource Centre to mentor, for a third year, high-level research projects for participation in the Manitoba First Nations Science Fair and continued the development of our long-term project in partnership with the Cross Lake Education Authority.

Funding

The operating budget for the Youth BIOlab is $230,000/year, including salaries and benefits, equipment, consumables and promotion. Funding for the Youth BIOlab comes from St. Boniface Hospital Research, St. Boniface Hospital Foundation, school division partnerships and other self-generated sources. In 2018-2019, we received a 3-year renewal of PromoScience funding from the Natural Sciences and Engineering Research Council of Canada (NSERC) at $66K/year. This year saw significant investments towards Indigenous outreach efforts through an anonymous donor ($264K), the Manitoba Métis Heritage Fund ($75K) the Manitoba Métis Federation ($75K). These donations, generated by the Foundation, support a new full-time employee, and will hopefully support lab expansion efforts in the future, dedicated to furthering our work with Indigenous youth and other groups that are traditionally underrepresented in medical research. We also received a $13K grant from the Canada Post Community Foundation for the purchase of a portable phase-contrast microscope and laptop that will support visits to northern and remote communities.
Participation

Schools were suspended in Manitoba and the Albrechtsen Research Centre was closed on March 23, 2020. Despite the closure, in the period from September 2019-March 2020, over 3000 students participated in programming at the Youth BIOlab. Sessions in English and French were planned and developed in collaboration with classroom teachers and Research Centre staff.

In addition to partner school divisions, several other groups participated in Youth BIOlab programming this year, including: Manitoba First Nations Education Resource Centre, Cross Lake Education Authority, Rossbrook House, the Canadian Medical Hall of Fame Discovery Days, Bioscience Association Manitoba and the Special Area Groups of Educators Conference for the Science Teachers Association of Manitoba.

<table>
<thead>
<tr>
<th>School Division</th>
<th>Schools</th>
<th>Sessions</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRSD</td>
<td>8</td>
<td>28</td>
<td>703</td>
</tr>
<tr>
<td>WSD</td>
<td>18</td>
<td>17</td>
<td>405</td>
</tr>
<tr>
<td>DSFM</td>
<td>8</td>
<td>18</td>
<td>335</td>
</tr>
<tr>
<td>LSSD</td>
<td>6</td>
<td>13</td>
<td>301</td>
</tr>
<tr>
<td>HSD</td>
<td>5</td>
<td>18</td>
<td>292</td>
</tr>
<tr>
<td>7 Oaks</td>
<td>7</td>
<td>15</td>
<td>269</td>
</tr>
<tr>
<td>Other (MFNERC, Rossbrook, etc.)</td>
<td>11</td>
<td>19</td>
<td>267</td>
</tr>
<tr>
<td>SRSD</td>
<td>4</td>
<td>14</td>
<td>253</td>
</tr>
<tr>
<td>RRVSD</td>
<td>5</td>
<td>8</td>
<td>186</td>
</tr>
<tr>
<td>Cross Lake First Nation</td>
<td>1</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Teachers</td>
<td>1</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Independent</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>74</strong></td>
<td><strong>156</strong></td>
<td><strong>3057</strong></td>
</tr>
</tbody>
</table>

COVID-19 Pandemic Cancellations

All labs in the Albrechtsen Research Centre were closed on March 23 and school visits to the Youth BIOlab were suspended on March 16, 2020, one week ahead of the provincial school suspension, due to the risks involved with bringing students into the healthcare setting during the COVID-19 pandemic. A total of 79 half-day sessions for 52 classes were cancelled. The Research Centre, including the Youth BIOlab, began reopening in stages beginning June 1, 2020. We were in regular contact with all teachers affected by the cancellations and provided web content and COVID-19 resources to share with students in the month of May and during our return to the lab in the month of June.
Research Laboratory Participation

Again, this year we saw a high level of participation from laboratories and individuals from around the Research Centre. These ranged from quick meet-a-scientist chats to longer research presentations. The following people and labs volunteered their time and graciously shared their expertise with students in the BIOlab:

- Dr. Grant Pierce, Executive Director of Research, St. Boniface Hospital
- Dr. Bram Ramjiawan and Dr. Pram Tappia, Clinical Research
- Dr. Ian Dixon and the Molecular Cardiology Lab
- Dr. Chris Siow and Suvira Prashar, Innovative Therapy Research Lab
- Dr. Mike Czubryt and the Molecular Pathophysiology Lab
- Dr. Ben Albensi, Aida Adlimoghaddam and the Synaptic Plasticity and Cellular Memory Dysfunction Lab
- Dr. Heather Blewett and the Nutritional Immunology Lab
- Cameron Eekhoudt, Sonu Varghese, David Cheung, Cardiovascular Imaging Lab
- Weiang Yan, Keshav Alagarsamy, Abhay Srivastava, Cardiac Regeneration and Tissue Engineering Lab
- Dr. Samantha Pauls and Anne Mendonca, Nutritional Lipidomics Lab
- Crystal Acosta and Danielle Lee, Vascular Biology Lab
- Chris Oldfield, Physical Activity and Chronic Disease Prevention Lab
- Aleksandra Stamenkovic, Cell Biology Lab
- Zach Meikle, Vascular Development Lab
- Matthew Guberman, Cardiac Gene Biology Lab
- Reza Aghanoori, Cell Biology of Neurodegeneration Lab

Grade 9 and 10 students from across the Winnipeg School Division, November 2019. This group got to meet Pram, Heather, Mike, Cameron, Sonu and David over their 4 days at the Research Centre.
Programming

The 2019-2020 school year was the seventh full school year of Youth BIOlab operation and saw the development of many new activities connected to the Manitoba science curriculum. Sessions were designed based on our previous work in classrooms and in collaboration with teachers.

Sessions are typically offered as half- or full-day, depending on grade level, programming and school distance from the Research Centre. Before entering the Youth BIOlab, each school group receives a safety orientation and tour of a research floor to observe real scientists and their labs in action.

A sample of representative Youth BIOlab programming is below. Sessions were often designed in collaboration with classroom teachers to meet individual class needs; the following are examples of typical student experiences. Connections to learning outcomes in the Manitoba science curriculum are provided.

<table>
<thead>
<tr>
<th>Grade Cluster</th>
<th>Specific Learning Outcomes Addressed</th>
<th>Programming</th>
</tr>
</thead>
</table>
| Grade 4 Science Cluster 2: Light | 4-2-01  
4-2-13  
4-2-16 | − Experiment with stethoscopes and microscopes to experience how scientists and healthcare workers use sound and light to understand the body. |
| Cluster 3: Sound |  |  |
| Grade 5 Science Cluster 1: Maintaining a Healthy Body | 5-1-01  
5-1-06  
5-1-10  
5-1-12  
5-1-07  
5-1-15 | − Experience a ‘real’ look inside the body to explore the body’s organ systems with a focus on comparing diseased and healthy systems. Students put together a skeleton, assemble MRI and CT puzzles, view live cells and stained tissue sections through microscopes and perform a simple heart and lung dissection with a focus on heart disease, diabetes, asthma and cancer. |
| Grade 6 Health Healthy Lifestyle Practices | K.5.6.B.1 | − Examine the causes and effects of stress on the body and heart. Students experiment with an EKG machine and blood pressure monitors to explore how the body experiences stress. They compare their own heart health to that of a sample patient case. |
| Grade 6 Science Cluster 1: Diversity of Living Things | 6-1-06  
6-1-07  
6-1-08 | − Students explore microscopic life with a study of bacteria that are important to human health. Students look at bacteria from their own bodies and view samples of common gut bacteria on plates and under the microscope. |
| Grade 7 Science Cluster 1: Particle Theory of Matter | 7-2-01  
7-2-13  
7-2-14  
7-2-17  
7-2-18  
7-2-19  
7-2-20  
7-2-22 | − Students perform an extraction of DNA from bacteria. This common molecular biology procedure lets students perform a range of separation techniques using their knowledge of solutions, mixtures and solubility. |
| Grade 8 Science Cluster 1: Cells and Systems | 8-1-01  
8-1-03  
8-1-04  
8-1-09 | − Students explore the heart from the whole organism to the cells of the heart, types of cells in the heart, cell specialization and current research. Students perform a basic cell culture technique using live cells to create an understanding of cell |
specialization and scale. Students also perform a basic pig heart dissection to explore the basis of cardiovascular disease.

- Students view stem cells through the microscope and explore the use of stem cells in basic medical research. Students examine a patient case of aortic valve stenosis and connect it to current stem cell research at the Research Centre with an isolation of aortic valves from pig hearts.

<table>
<thead>
<tr>
<th>Grade 8 Science Cluster 2: Optics</th>
<th>8-2-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience how scientists and healthcare workers use light for medical imaging and microscopy using live cells and tissue sections. Students create microscope slides for viewing under different microscopes.</td>
<td></td>
</tr>
<tr>
<td>Investigate eyes and diseases of the eye with a patient case for diabetes and diabetic retinopathy.</td>
<td></td>
</tr>
</tbody>
</table>

| Grade 9 Science Cluster 1: Reproduction | S1-1-06  
S1-1-13 |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Multi-day stem cell inquiry projects to explore mitosis and development. Students isolate bone marrow stem cells from rat bone and cultured them for use in experiments of their own design.</td>
<td></td>
</tr>
<tr>
<td>Students study mitosis in the context of heart disease, tissue regeneration and cancer. Over two days, students observe and measure mitosis in live cells in culture.</td>
<td></td>
</tr>
<tr>
<td>Explore the relationship among DNA, genes, proteins and traits with a bacterial transformation using the Green Fluorescent Protein (GFP) to create glowing bacteria.</td>
<td></td>
</tr>
</tbody>
</table>

| Grade 11 Biology Unit 1: Wellness and Homeostasis Unit 3: Transportation and Respiration | B11-1-06  
B11-1-07  
B11-1-08  
B11-1-09  
B11-3-16  
B11-3-06  
B11-6-05 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-day stem cell inquiry projects. Students isolate bone marrow stem cells from rat bone and cultured them for use in experiments of their own design, relating to lifestyle and development.</td>
<td></td>
</tr>
<tr>
<td>Explore cell metabolism in the context of diabetes by changing 3T3-L1 fibroblast cells into fat cells. Students observe the development of lipid droplets inside cells over time and connect the experiment to obesity-related diseases.</td>
<td></td>
</tr>
<tr>
<td>Explore the cellular and molecular basis of disease through heart research and heart health, with a focus on current stem cell research at St. Boniface Hospital Research, microscope work and a detailed heart dissection. Students examine a patient case of aortic valve stenosis and connect it to current stem cell research at the Research Centre.</td>
<td></td>
</tr>
<tr>
<td>Students explore neuroscience and neurological disorders from cells to system with a focus on disease and current research at St. Boniface Research Centre. Students model neuron damage in Alzheimer’s disease and isolate the hippocampus from preserved sheep brains.</td>
<td></td>
</tr>
</tbody>
</table>

| Grade 12 Biology Part 1: Genetics Unit 2-Mechanisms of Inheritance | S4B-2-01  
S4B-2-09 |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Explore phenotype in the context of diabetes by changing 3T3-L1 fibroblast cells into fat cells. Students observe the development of lipid droplets inside cells over time and connect the experiment to obesity-related diseases.</td>
<td></td>
</tr>
<tr>
<td>Explore the use of DNA and molecular biology in disease and medical research. Simple genetic engineering experiments with bacteria, green fluorescent protein and DNA restriction digests with gel electrophoresis help students understand how scientists manipulate DNA in heart and brain research at the Research Centre.</td>
<td></td>
</tr>
</tbody>
</table>
Other Activities and Special Programming in 2019-2020

Beyond regular curriculum-based lab programming, the Youth BIOlab was host to several other initiatives over the 2019-2020 school year.

− **Rossbrook House Outreach:** With the support of the St. Boniface Hospital Foundation, the BIOlab welcomed grade 3-8 after-school program participants from Rossbrook House for 4 evening sessions over the school year. Following a meal provided by the Foundation, we spent time together learning in the BIOlab and exploring the work of St. Boniface scientists.

− **Inquiry-based Stem Cell Projects:** This year again saw an increased focus on the development of multi-day inquiry-based learning sessions for grade 9-12 students. In most cases, students isolated stem cells from rat bones and cultured them for use in experiments of their own design and interest. Students designed experiments to test their stem cells with caffeine, cigarette smoke extracts, electronic cigarette vapour extracts and more, exploring their effects on cell migration, mitosis and differentiation. We ran two 3-4 day sessions using this inquiry model with groups from Hanover School Division and Winnipeg School Division.

− **Keewatin Science Fair (Feb 2020):** Anjelica travelled to Thompson, MB on February 24 and 25, 2020 to act as a judge and meet students and teachers from participating northern and remote First Nations schools.

− **Special Area Groups of Educators (SAGE) Conference (Oct 2019):** The BIOlab hosted an on-site session on inquiry learning for the yearly Science Teachers Association of Manitoba teachers’ conference.

− **National Biotechnology Week (Sept 2019):** In partnership with the Bioscience Association Manitoba, we hosted school groups for tours and lab experiences.

− **Canadian Medical Hall of Fame Discovery Days:** Two sessions were held at the Youth BIOlab for 40 students from across Manitoba as part of Discovery Days, in collaboration with the Albensi and Czubryt labs at St. Boniface Hospital Albrechtsen Research Centre.

− **5-day Student Leadership in Biomedical Science (Feb/Mar 2020):** 25 grade 11 and 12 students from 9 WSD schools received 5 days of intensive medical research training, designing and performing their own experiments on rat bone marrow stem cells.

− **The Science of Medicine (Nov 2019):** 3 full-day sessions were held in for 25 students from 9 schools across WSD, creating context for the core high school sciences (biology, chemistry and physics), and explored applications of physics and chemistry to basic medical science.

− **Manitoba Virtual Career Fair (June 2020):** Steve participated in an online career fair organized by Manitoba Education for Manitoba students during the COVID-19 shutdown.
COVID-19 Magazine: No Mercy for the Coronas!

In late March 2020, the Youth BIOlab was approached by St. Boniface Hospital senior administration with a request to work on a project with La Liberté, the French language newspaper in Manitoba. Together with Dr. Jean-Eric Ghia of the University of Manitoba Department of Immunology, they wanted to develop a COVID-19 resource for youth. Steve and Meghan co-wrote the 60-page publication with Dr. Ghia in April, and the magazine was published in English and French on May 21, 2020. Over 17,000 print copies were distributed with the Winnipeg Free Press and La Liberté, and over 20,000 downloads of the electronic version were recorded in the first month of publication. Copies were also distributed to partner school divisions and teachers for use with their students.
Indigenous Youth Outreach Initiatives

In recent years, we have welcomed the opportunity to develop new experiences and relationships with Indigenous youth from across Manitoba. This work is in partnership with school divisions, First Nations communities, the Manitoba First Nations Resource Centre and the Manitoba Métis Federation, and forms the basis for our NSERC-funded work.

- Mentored Science Fair Projects: Over the course of the fall and winter, Steve and Meghan mentored 6 projects for 7 grade 9-11 students from 6 Manitoba First Nations communities: Tataskweyak Cree Nation (Split Lake), Mathias Colomb First Nation (Pukatawagan), Sagkeeng First Nation, Chemawawin Cree Nation, St. Theresa Point First Nation, Cross Lake First Nation (Pimicikimak). Working with support and coordination from the Manitoba First Nations Education Resource Centre, teachers visited the BIOlab in September 2019, prior to introductory visits for students later in the month. Students returned in December to run experiments of their own design and collect data. Working with rat bone marrow stem cells, students chose different experimental treatments and studied cell behaviour, migration and viability over time. They treated cells with energy drink constituent chemicals, cigarette smoke extract, puffball mushroom extract, blueberry root extract, succinic acid or inflammatory cytokines and collected data for presentation at the Keewatin Regional Science Fair in February, 2020 or the Manitoba First Nations Science Fairs (MFNSF) in March, 2020. Both of these competitions are qualifying events for the Canada-Wide Science Fair (CWSF). Sadly, MFNSF and CWSF were both cancelled due to the COVID-19 pandemic. However, we all learned a great deal through this mentorship approach for a third year in a row, and a major congratulations goes to all students for their hard work! We look forward to all of these students joining us again next year to continue and expand their research.
— Cross Lake Education Authority Partnership: we began working with the Cross Lake Education Authority in the 2017-2018 school to help support for health sciences in their community. Cross Lake is one of the largest First Nations in Manitoba, and is exploring ways to build capacity for community participation and employment in their new hospital. After hosting all grade 8 students from Cross Lake in 2018-2019, we hosted a dedicated cohort of grade 9 students in 2019-2020. This cohort will work with the BIOlab over the next 3 years, with the goal of increased participation in the high school sciences and advancement to health science studies at the University of Manitoba. This forms the basis of our renewed NSERC project and other fundraising efforts, and will serve as a model for work with northern and remote communities in the future. A second semester visit to the BIOlab and a planned visit to the community were cancelled due to the COVID-19 shutdown.

— Manitoba Métis Heritage Fund: We met with coordinators for the Manitoba Métis Federation Provincial Youth Advisory Council in the fall of 2019, planning a visit from Métis youth in the spring, which was also cancelled due to the COVID-19 shutdown.

Teachers from northern and remote communities practicing techniques in preparation for mentored projects, September 2019 (left) and Grade 9 students from Cross Lake at the Research Centre, November 2019 (right).
Looking Ahead to 2020-2021

- **COVID-19 Pandemic Planning:** We will continue to monitor provincial, school division, WRHA and hospital guidelines for reopening the Youth BIOlab to school visits in 2020-2021. We are developing contingency plans for restrictions on field trips, partial reopening of schools or full reopening in 2020-2021. Since our operation largely involves group-based experiential learning in a high-touch environment, operating with full classes under personal distancing guidelines will be a challenge. Current prospective plans include online curriculum-linked video content, online live-streamed ‘field trips’ to the Youth BIOlab, online meet-a-scientist sessions and inquiry-based challenges that could enlist multi-class participation. If field trips are restricted, but visitors are allowed in schools, we will offer in-school sessions that could still provide some experiential learning opportunities for students. We see this as an opportunity to reach a broader audience online within school divisions, and still provide some of the content of our typical lab sessions. As the education situation, northern travel and social distancing requirements for 2020-2021 become clearer over the coming months, we will be in communication with partners to propose opportunities for lab engagement for classes. Video production started in June 2020 with the reopening of the Research Centre.

- **Cross Lake Project:** If travel restrictions allow for travel to and from northern communities in 2020-2021, re-establishing contact with Cross Lake is a priority. We hope to welcome our grade 9 cohort from this year back in Grade 10, and plan a trip to the community if possible.

- **Mentored Projects for the Manitoba First Nations Science Fair:** Based on the success of our mentored projects in collaboration with the Manitoba First Nations Education Resource Centre in the past three years, we are looking at ways to resume our approach for building successful projects for students from rural, northern and remote communities. Since these projects are usually small-group based, we hope to be able to focus some attention on these students if social distancing requirements restrict other large-group lab operations.
Feedback

The following are compiled from online program evaluations sent to teachers and students. Numbers are averages based on a rating scale from 1 (strongly disagree) to 5 (strongly agree).

<table>
<thead>
<tr>
<th>Teacher Feedback</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The information presented and activities performed were well aligned with curriculum.</td>
<td>5</td>
</tr>
<tr>
<td>The information presented was appropriate for student prior knowledge.</td>
<td>4.9</td>
</tr>
<tr>
<td>There was an appropriate balance between instruction and hands-on activities.</td>
<td>4.9</td>
</tr>
<tr>
<td>BIOlab experiences increase student interest in science.</td>
<td>4.9</td>
</tr>
<tr>
<td>BIOlab experiences motivate students to further pursue studies in science.</td>
<td>4.7</td>
</tr>
<tr>
<td>BIOlab experiences encourage students to consider careers in science.</td>
<td>4.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Feedback</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoyed my trip to the BIOlab.</td>
<td>4.2</td>
</tr>
<tr>
<td>The things we did at the BIOlab make me want to learn more about science.</td>
<td>3.9</td>
</tr>
<tr>
<td>The things we did at the BIOlab make me want to be a scientist.</td>
<td>2.8</td>
</tr>
<tr>
<td>I would like to come back to the BIOlab to learn more.</td>
<td>4</td>
</tr>
<tr>
<td>I would tell a friend to come to the BIOlab.</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Student Comments

- “Inspired me to become a microbiologist in the future.” (Grade 9)
- “Talking to scientists got me thinking about grad school.” (Grade 10)
- “I would like to be like you in the future. I’m going to start off in the faculty of science.” (Grade 9)
- “I learned that you need to learn about little molecules, proteins and other stuff to understand the bigger picture.” (Grade 11)
- “(I enjoyed) learning about stem cells, heart and brain. I have a better understanding about the human body and it will improve my mark in biology” (Grade 11)
Acknowledgments

Many thanks to Manitoba Education and the St. Boniface Hospital Foundation for their support of the construction of this one-of-a-kind lab. With generous donations from RBC, Canada Safeway, the Gossen family and many others, we have built something that will continue to help Manitoba youth discover biomedical science for many years to come. New donors this year, including an anonymous donor, the Manitoba Metis Heritage Fund, the Manitoba Metis Federation and the Canada Post Community Foundation are helping us take this resource to even more youth in Manitoba.

Thanks to Dr. Grant Pierce, Executive Director of Research at St. Boniface Hospital for his support of the BIOlab and his commitment to our work with youth. Thanks also to the many school divisions who officially partner with the Research Centre in the development and operation of the Youth BIOlab. Their visions for community partnerships make the BIOlab a success for learners.

We would also like to acknowledge the significant support of the BIOlab by NSERC through the PromoScience grant program. Their long-standing funding of the Research Centre’s outreach efforts will continue to enhance our ability to promote science in Manitoba.

Thanks to staff and students at St. Boniface Hospital Albrechtsen Research Centre for welcoming students into the building and tolerating them as they stomp past your labs. Special thanks to Dr. Bram Ramjiawan, Dr. Ian Dixon, Dr. Mike Czubryt, Dr. Davinder Jassal, Dr. Heather Blewett, Dr. Pram Tappia and Dr. Ben Albensi for always being eager to share their work and passion for discovery with youth, and to all of the staff, graduate students and post-docs (Aida, Reza, Cameron, Sonu, David, Weiang, Keshav, Abhay, Anne, Crystal, Matthew, Aleksandra, Zach, Danielle, Chris and Sam) who have shared their knowledge and love of science. Thanks also to Karen Hiebert, Rob Blaich and Joseph Pilapil for their creativity in promoting and supporting the Youth BIOlab. And to Karen Swanson, Susie Hirst and Shawna Kynoch for knowing all of the answers to all of our questions. Thanks to Natalie Landry for keeping things running behind the scenes and to Anjelica for joining the team and jumping right in. Thanks especially to Meghan Kynoch, for her enthusiasm, patience and hard work through the school year.

Many thanks to the students, teachers, administrators and staff of participating schools. The curiosity, interest and enthusiasm of Manitoba’s students are encouraging to everyone interested in the future of science and medicine and are the true key to the success of the RBC Youth BIOlab Jeunesse at St. Boniface Hospital Albrechtsen Research Centre.