

### **Introductory Remarks**

This review stands as part of a recently initiated Academic Program Review (APR) of four graduate program units in the Division of Bio-Medical Sciences and one in the Discipline of Genetics at Memorial University of Newfoundland (MUN). The purpose of this APR process is to evaluate the quality, success, and role of academic units and programs in the fulfillment of their own and the University's mission and strategic goals. Our external quality review panel consisted of Gerard Martin (Psychology, MUN) who acted as chair, Brian Staveley (Biology, MUN), Michael Kawaja (Life Sciences and Biochemistry, Queen's University) and Peter Pennefather (Pharmacy, University of Toronto). Our role was to comment on the self-study prepared for the APR process and communicate our impressions based on interviews with members of the units in question. We reviewed the graduate programs of four academic units in the Bio-Medical Sciences Division (Neuroscience, Immunology and Infectious Disease, Cancer and Developmental Biology, Cardiovascular and Renal Physiology) and one discipline in the Clinical Division (Genetics). These academic units represent five of the nine graduate programs in the Faculty of Medicine. The final step is to prepare this report to be delivered to the "Dean of Record", Noreen Golfman the Dean of Graduate Studies at MUN upon completion of our deliberations.

The conversations with the various stakeholders re-affirmed the points made in the informative APR self-study report. The report included a clear overall synopsis and comprehensive self-studies from each of the academic units reviewed. The self-study reports indicated worries concerning sustainability largely due to the small number of faculty and students associated with each program. However, stakeholder interviews revealed a substantial degree of collaboration and collegiality between programs in Medicine and with other cognate Departments of MUN in the Faculty of Science including Biology, Psychology and Biochemistry. The Genetics unit seems to function well as an independent group within the Clinical Disciplines, growing through cross appointments.

It is the view of the Panel that the Bio-Medical group should celebrate their interactions within Medicine and beyond with the Faculty of Science. It should seek growth through greater program integration internally and by leveraging what are currently informal collaborations with Faculty of Science. As the Genetics discipline unit has chosen a developmental path distinct from the others reviewed here, it will be treated separately in this report. However, there are obvious advantages to maintaining some level of integration between the other Bio-Medical disciplines and Genetics. An excellent example of this is that one member of the Cancer group is cross-appointed in Genetics and has had students in her laboratory in both programs.

### **Meeting with the Office of the Dean of Research and Graduate Studies**

The Division of Bio-Medical Sciences is comprised of four disciplinary streams that are responsible for graduate students, graduate student courses and undergraduate medical courses. They report to an Associate Dean for Bio-Medical sciences through individual program coordinators. These academic unit programs attempt to function as distinct "mini-departments" while sharing a few core resources. The disciplines include clusters of like-minded individuals who are inter-leaved over several

floors in the research sections of the Medical School. The Genetics group was originally part of the Bio-Medical group but is currently administratively affiliated with the Clinical Disciplines owing to its strong focus on clinical human genetics. It has a Chair and a Program Coordinator. This unit will soon move to a newly built nearby research building, freeing up space in the current medical research building. The Discipline of Genetics functions as a “mini-department” with a few core shared resources. It recently acquired an administrative assistant position reporting to the Chair of Genetics.

The exit degree for students streaming through each of the academic units is either a Master’s of Science in Medicine or a Ph.D. with discipline specialities noted representing completion of a disciplinary comprehensive exam in addition to the thesis. Other graduate programs in the Faculty of Medicine offer graduate diplomas in specialties like Clinical Epidemiology and Community Health and Humanities in addition to thesis-based M.Sc. and Ph.D. degrees. MUN does not currently offer a Genetics Counselling program but the Genetics program does seem to provide internship opportunities for such programs elsewhere. It appears that in all of the units examined, many graduate students enter the M.Sc. program with the intention of transitioning to an entry-to-health profession practice program like Medicine or Pharmacy. This reflects a wide recognition that M.Sc. and Ph.D. degrees do not guarantee a research career.

A minimum amount of funding (\$12,500) is guaranteed for graduate students and consists of a combination of money from the School of Graduate Studies and supervisor support. The School of Graduate Studies funds are distributed at the discretion of the Faculty of Medicine. The current standard is 2 allotments of \$6,000 per student for Master’s and 4 allotments of \$6000 for Ph.D. students. Students are not accepted as full time students unless this minimum can be met and in many cases supervisors will not accept students unless a stipend that is higher than \$12,500 can be achieved.

At the moment admission and course requirements seem to be decided through a fairly informal mechanism within guideline norms at the program level. However, the Associate Dean for Bio-Medical Sciences expressed a desire to create a graduate student oversight group to help harmonize the graduate student experience in the different disciplinary programs. A monthly Bio-Medical research forum with rotating presentations from the 25 active biomedical research labs has been recently instituted. The Research and Graduate Studies office has recently appointed a Staff Specialist II administrator who will be responsible for tracking graduate admissions and student awards. In addition to curated essential statistics, that person has been extremely helpful in coordinating the research forum and unit co-curricular events like the “Cover-Art” competition. Continued development and projection of a core identity will need such administrative support.

### **Meeting with the Dean of Medicine**

The Dean of Medicine gave an example of the “Memorial Model” of medical research that entails the following approach: firstly, the identification of a problem in terms of patients, family and community; secondly, a search for the Bio-medical basis of the disease; thirdly, the development of the best clinical care approach available that can be implemented while addressing the pertinent ethical

issues. The Genetics group has clearly been very successful working with this model as well as has been the other research groups within Memorial.

There are approximately 272 (87 are in Bio-Medical and Genetics) graduate students in the Medical program. However, many are enrolled in part-time graduate diploma programs. In the units reviewed there are a total of 71 full-time graduate students (52 M.Sc. and 19 Ph.D.) and 16 part-time graduate students (11 M.Sc. and 5 Ph.D.). These include almost half of all of the full time graduate students in the Faculty of Medicine. Over the last 6 years graduate student numbers in the units have increased by half primarily due to increased M.Sc. in Medicine students. They are supervised by 25 active researchers in the 4 Biomedical units and 8 researchers in the Genetics unit.

Of great significance, the Dean acknowledged the challenge of funding research that exists due to the absence of a provincial Health Research Fund. There has been a general Research Development Fund that has participated as part of the CIHR regional partnership program to ensure that highly ranked Newfoundland grants that score just below funding cut-off levels could be funded. Recently, the CIHR Regional Partnership Program has been cancelled. This may reduce incentives to even apply for national awards. On a positive note, the Faculty of Medicine just recently created two internal funds: 1) a \$250 K/yr Innovation Fund and a 2) a \$250K/yr Transition Fund. Policies governing their dispersal have yet to be specified.

The Dean noted that many students entering the M.D. program with an M.Sc. from MUN go on to be successful clinical researchers. On the other hand, some entering with a Ph.D. seem exhausted and no longer interested in research. The Summer Undergraduate Award (SURA) fund has recently been expanded and over 30 awards were made for this summer with more than 20 going to students from the Faculty of Science.

The Dean made a point of mentioning Dr. Proton Rahman (Assistant Dean of Clinical Research) and the work that he is doing to encourage clinicians with M.Sc.'s and Ph.D.'s to engage in research activity. It is unclear how the disciplines being reviewed will interact with those efforts. However, we note that Dr. Rahman is cross-appointed to the Genetics unit.

Later, at a panel lunch meeting, the Vice Dean of Medicine explained the new curriculum model that has been developed. This will follow the recommendations of the recently developed "Teaching and Learning Framework" that promotes flexibility and production of "21st century explorers on their personal voyage of discovery". She was proud of being a "2 year old" who entered Medicine after 2 years of undergraduate education and returned to academic medicine after practicing family medicine. She has focused her academic work on curricular innovation and learning assessment. There will be some free time (4 weeks) in the new curriculum for directed research in the Discovery pillar, although this did not appear to be a high priority. The panel did not have access to details of medical education transition plans. A program accreditation meeting was due to occur in the week after we visited.

## Discipline Meetings

All disciplines reviewed fall under the strategic theme of Well-being, Health and Bio-Medical discovery where their programs support research in biomedical sciences, ranging from cellular and molecular processes to animal and cell modeling. In all cases, the faculty were proud of their successes and were actively pursuing funded research projects. In the Bio-Medical Division programs 25 of the 31 members had external funding. In the Genetics unit the 8 core members worked collaboratively in securing sub-grants within large international cohort programs seeking access to the “Newfoundland Founders” genetic pool, as well as external funding including the recently successful CFI award matching investment in the new Genetics building. This is an excellent track record given the significant handicaps that the researchers are working under. The publication rate and the recognition of graduate students in publications appear to be good. The faculty whom we met were enthusiastic and justifiably proud of their successes. However, recent changes in funding program goals seem to pose a threat to this continued success.

Each unit currently has independent M.Sc. and Ph.D. programs that have their own course requirements and educational expectations. Each unit, to varying degrees has journal clubs and research days. Ph.D. students are expected to pass a formal comprehensive exam and graduate with a unit designation with their Ph.D. The process for organizing comprehensives seems fairly uniform across units and is tailored to the student by a specifically appointed comprehensive exam committee. Courses in the programs prepare the students for that comprehensive. One of the stakeholders indicated that the current disciplinary structure emerged in the 1990’s when there was a single division of Bio-Medical research. Disciplines were created to provide an academic home and to help focus the graduate training and comprehensive testing process. For the most part, this goal seems to have been achieved. However, M.Sc. students who now make up a large majority of graduate students have no formal way of demonstrating mastery of science or of developing that within the contexts of breadth courses. There is no formal M.Sc. thesis defence and no cross-disciplinary course focused on mastery of science in general.

Each unit questions if it has sufficient faculty to meet a “critical mass” level. In each case it appears that there is a great deal of “within group” focus but this is undoubtedly limited by low numbers of faculty per group. Although interactions between the disciplines clearly occurs at an informal level, these interactions are not viewed as contributing to attaining a critical mass within any given discipline. Interactions outside the Bio-Medical and Human Genetics group are clearly considered valuable and do occur. These interactions appear to occur on an *ad hoc* basis where common interests on a particular problem bring a discipline together with individuals outside the Medical School.

Although faculty and graduate students in the programs reviewed herein have little to no formal ties with MUN’s undergraduate science programs, it appears that many Honours B.Sc. students in the Faculty of Science Departments of Biology, Psychology and Biochemistry do their projects under the supervision of members of the division of Bio-Medical Sciences and in the Discipline of Genetics. The Faculty of Medicine has a Summer Undergraduate Research Award (SURA) program that was recently

expanded. Most of those students come from the Faculty of Science. There do not appear to be any ties with the Faculty of Engineering.

The various disciplines held the position that acceptance of graduate students involved a commitment to support students at a level that made living in St. John's possible. Students are expected to work long hours on their projects. The \$12,500 minimum stipend was not seen as sufficient to cover living expenses. In most cases, then, the major limitation on increasing the number of graduate students was access to funding packages.

In some cases a lack of laboratory space limited the number of graduate students a researcher could supervise. There did not appear to be much office space and common meeting spaces for graduate students outside of the laboratory. There was only one example of open thematic laboratory research space shared by several PIs and their students. Most PIs have been assigned to a traditional laboratory space regardless of research program intensity. One PI who felt particularly constrained was actively engaged in building a thematic interest group with colleagues within and beyond the Faculty of Medicine in anticipation of construction of the new Science building. That building will have a lot of shelved space to be developed through group grant and CFI funding and the individual recognized that evidence of collaboration prior to application will be necessary for success. Such foresight is truly commendable.

A significant exodus of students from the Master's of Science program into the Doctor of Medicine (M.D.) program prior to completion was considered to be a severe problem by all groups, especially by the Genetics group. This problem was handled in a variety of *ad hoc* ways and had varying levels of success. Students sometimes applied for and received one of very few allowable deferrals of acceptance, some supervisors warned that they would not write letter of recommendation in the first year of a student's Masters, and some students were not lost because they managed to return to the laboratory during the research component of their Medical program and complete their thesis.

Animal care facilities were noted to be a problem in the reports written by the groups as a limiting factor on research. The issue did not merit comment by the groups during their discussions with the committee.

### **Graduate Student Meetings**

The graduate students that we met represented all the disciplines under review. The students were bright, articulate and clearly motivated. They noted that the funding that they received made it very difficult to "make ends meet" in St. John's and that there was little opportunity to increase their income via teaching assistantships.

There was uniform consensus that there is an absence of consistent standards between the disciplines. There are not many standards for the allocation of laboratory and office space and, as a result, the space for casual interactions is limited. The number of courses, the work-load within each course and the educational value of courses seemed to vary greatly. Standardization would be

exceptionally helpful. The observation was made that course overlap occurred when multiple instructors contributed to a single graduate course. This lack of standards and oversight made it difficult, especially for international students, to recognize what is expected. One such student was very resentful of having to carry out what was thought as menial sample preparation with no apparent direct link to that student's project. Another student, in a similar situation, consulted the assistant Dean to voice concerns and managed to find an alternate supervisor. The latter experience should be the norm.

Master's degree students receive some funding to attend one conference while Ph.D. students receive partial funding for two. Students were given the opportunity to present at research symposia held within each discipline. They were given the opportunity to present research at a conference hosted by the Medical Science Graduate Student's Union. This organization has had representatives from each of the nine graduate programs and are involved in holiday party planning and charity work. Often program representatives were called upon to supply a student voice although this seems to be simply an *ad hoc* arrangement.

#### **Final exit meeting with Dean of Record, Dean of Graduate Studies**

The Dean of Record made clear that the newly appointed provost is responsible for the programs and education mandate and is driving the APR process. Her mandate is to promote student excellence and to ensure that MUN graduate students are competitive in receiving external awards from Tri-Council programs. She is extensively involved in organizing workshops for students applying for SSHRC and NSERC awards. However, the Dean admitted to poor communications with the Faculty of Medicine. Perhaps the new position of Assistant Dean Graduate Studies, who reports jointly to the Dean of Medicine and the Dean of Graduate Studies, will improve that situation. She will be involved in developing the new Graduate Studies Center and Residence in the recently acquired Battery Hotel. She develops programs to attract and settle international students: for example she is developing an interesting strategy to engage the new "Science without Borders" program of the Brazilian federal government.

Summaries

#### **Common Strengths (Division of Bio-Medical Sciences & Discipline of Genetics)**

- 1) Strong decisive leadership by the Dean. His support for excellence in research, scholarship, and education is readily evident. He continues to make fundamental and critical changes to the direction of the School of Medicine and its associated research groups, which collectively lead to increased national recognition of MUN. He is committed to the improvement of graduate studies in the Division of Bio-medical Sciences and the Discipline of Genetics.
- 2) The recent recruitment of 1) a new Associate Dean of Research and Graduate Studies and 2) a new Assistant Dean of Graduate Studies. Each of these individuals has a clearly defined job description. Both individuals have the support of the Dean of Medicine.
- 3) There are clearly defined programs such as journal clubs for the dissemination of disciplinary knowledge.

- 4) Comprehensive exam mechanism seems to be working well.
- 5) There is a commitment to support for integrative research (New building, Innovation fund, Transition fund, increase in SURA numbers, new appointments at Decanal level with clear mandates, and planned recruitment).

**Common Weaknesses (Division of Bio-Medical Sciences & Discipline of Genetics)**

- 1) There is a lack of critical mass in the respective programs as is revealed by the low numbers of Faculty in the identified groups and discipline (from 4 to 12).
- 2) There was an absence of consistent and clearly articulated expectations for graduate students among the four academic units (course loads, supervisor expectations, etc.).
- 3) The program does not have any formal mechanism to recruit undergraduate students from the Sciences or provide instructional (TA) experience for graduate students.
- 4) The program structure impairs efficiencies: recruiting, graduate student acceptances, management of teaching loads, and the absence of promotion of cross-appointments.
- 5) Overall number of students and level of stipend funding of students are lower than expected with little room to grow within current organizational structures and funding environment.
- 6) There was a lack of emphasis on developing a common co-curricular program for graduate students that touch on professionalism, research methodologies, knowledge translation, etc.
- 7) Limited opportunities for graduate students to attend national and international scientific meetings because of expense of traveling off-island.

**Strengths (Division of Bio-Medical Sciences)**

1. Strong leadership in the Associated Dean of the Division of Bio-Medical Sciences (on academic leave in 2012-2013) and in the acting Associate Dean (2012-2013). This choice of acting Associate Dean was perfect, in so much as his stewardship was in exact alignment with the vision of the Associate Dean on academic leave.
2. Demonstrated success in research and graduate studies
3. All four program co-ordinators knew their programs and engaged in frank discussions.
4. The Dean's vision of the Memorial model for Clinical Research places Bio-medical Sciences at the core of medical research at Memorial.
5. There is demonstrated success in nurturing new faculty members who are actively involved in research and graduate studies.
6. There are many informal interactions between the Faculty of Science and the Bio-Medical Sciences group.
7. The Bio-Medical Sciences appears to be the flagbearer of full-time graduate studies for the Faculty of Medicine as this group has approximately half of the full time graduate students.

**Weaknesses (Division of Bio-Medical Sciences)**

1. There is lack of formal mechanisms that would promote development of interdisciplinary and translational Bio-Medical Science knowledge and research despite this being a stated priority at many levels of government and granting agencies.
2. Research space has not been rationalized and thus does not allow for flexibility and innovation. Still stuck in the 1990's view of lone PI model of Bio-Medical Science research activity.
3. Student study space and student common space are inadequate.

**Strengths (Discipline of Genetics)**

- 1) Demonstrated success in research and graduate studies
- 2) Clear leadership by the Chair of Genetics
- 3) Success at CFI for new building will certainly enhance the profile and success of this discipline within the clinical sciences
- 4) The Dean's vision of the Memorial model for Clinical Research places Genetics at the core of medical research at Memorial.
- 5) There are many formal and interactions between the Genetics faculty and clinical research programs in Newfoundland as well as notionally and internationally.

**Weaknesses (Discipline of Genetics)**

- 1) There is a lack of critical mass (only 8 full-time and 5 cross-appointed faculty members).
- 2) There was an absence of consistent expectations for graduate students among supervisors within the program.
- 3) The program does not have any formal mechanism to recruit undergraduate students from the cognate programs at MUN or elsewhere.
- 4) The program structure impairs efficiencies: recruiting graduate students, graduate student acceptances, and management of teaching loads.
- 5) There is lack of formal mechanisms that would promote outreach and engagement with other programs at MUN and elsewhere, especially with anchoring development of interdisciplinary knowledge in understanding of human genetics.
- 6) Although distribution of space in new building seems to have been strategic, there are significant challenges to be overcome before, during and after the move to that space in 2014.

**RECOMMENDATIONS (School of Medicine organization)**

- 1) The Dean of Medicine expressed his support of the Associate Dean of Research and Graduate Studies and of the Assistant Dean of Graduate studies. Both individuals are clearly empowered to take full advantage of their given mandates. The job descriptions supplied indicate that it is well within their mandates to address the difficulties currently facing the graduate programs in the five sub-groups/disciplines examined. Both individuals should demonstrate their leadership through the



development and implementation of new strategic approaches that address the forthcoming recommendations.

- 2) There appear to be several people with the title of Associate Dean, yet the structural map of the School of Medicine would suggest that the Associate Dean of Bio-Medical Sciences and the Associate Dean of Community Health and Humanities report to the Associate Dean of Research and Graduate Studies. Perhaps the “chain of command” would be clearer if the Associate Dean Research and Graduate Studies was elevated to the position of Vice-Dean. The mandate of this Associate Dean, as stated, is quite extensive and pivotal to the functioning of the School of Medicine. Moreover, in the Dean’s absence, a Vice-Dean would have the authority to delegate as needed. That person could also coordinate an executive committee with a mandate to explore synergies and cross-cutting educational/research initiatives benefiting all programs.

#### RECOMMENDATIONS (Division of Bio-Medical Sciences)

- 3) Increase stipends for students to \$18 K/annum for Master’s and to \$21 K/annum for Ph.D’s. As repeatedly pointed out by the faculty members the minimum of \$12,500/annum is too low to support a graduate student. These levels of stipend support would be in-line with those at other national academic institutions.
- 4) Create a unified mechanism for graduate admissions. The duty should come under the leadership of the Assistant Dean of Graduate Studies in consultation with the 4 Program Coordinators. Currently, students are accepted and funded on a first-come basis. A single admittance with exceptions when necessary would ensure that the better students get funded, that students would move through program as a cohort and would create efficiencies with respect to applications for external awards and distribution of internal grants.
- 5) Create a uniform program identity for students that includes the existing sub-disciplinary foci including a common “Introduction to Graduate Studies in Bio-Medical Sciences” course. This would help with standardization of the curriculum and might create efficiencies in terms of joint meeting rooms, laboratory and office standards.
- 6) Develop a M.Sc. – M.D. program to draw upon strengths of the students and rewards their career aspirations. An important component of medical training is research. Many students now enter the Master’s program with the hope of entering Medical program. It would seem advantageous to recognize the aspiration of these students by accepting students into the Master’s program with the understanding, not promise, that completion of the Master’s of Science in Medicine degree would substantially improve the likelihood of admission into the Doctor of Medicine program. Development of program should come under the leadership of the Assistant Dean of Graduate Studies.
- 7) Negotiations should take place to incorporate the discovery pillar into the M.D. degree for students who do not enter the Medical program with a Master’s of Science. Expansion of this pillar could be carried out through development of M.Sc.-M.D. cohort.
- 8) The Dean needs to implement a transparent mechanism where requests for new space are considered and adjudicated. Currently, there does not seem to be widespread understanding of the

implications of Genetics moving to its new space. Nor does there seem to be a way to redistribute space assigned to inactive faculty members.

- 9) The Dean should designate some of the reclaimed space available with the exodus of the Genetics faculty as “open space” that is not assigned to an individual PI.
- 10) To provide a broader base for Bio-medical research and graduate education, the group should be proactive in seeking more interactions with appropriate groups in other parts of the university. Currently, much to the credit of the various disciplines, there are interactions between the disciplines and other groups. As the Bio-medical group has a lot to offer, this could be expanded.
- 11) Recruitment of new faculty should be contingent on increasing cohesiveness and strengths of the Bio-medical group. It should not be based on increasing or maintaining faculty numbers in any one of the identified four divisions.

#### **RECOMMENDATIONS (Discipline of Genetics)**

- 1) Continue to expand your successful enterprise as it captures, so beautifully, the Memorial Model described by the Dean of Medicine.
- 2) An identified program co-ordinator with a clear mandate to support and advocate for graduate students is needed.
- 3) They need clear oversight of the graduate student progress. Currently, it does not seem that the graduate students have an identified individual to whom they can consult.
- 4) Identify consistent expectations of graduate students by supervisors and *vice versa*.