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CROSSROADS

The Canadian Space Agency Space Learning Grants

Jason Clement*

The Canadian Space Agency (CSA), via its Space Learning Program offers a bevy of opportunities that Canadian university students may wish to leverage.

Through the Space Learning Grants Program, the CSA provides funding to upwards of 200 students each year – the majority being undergraduate and graduate students – which supports their participation in space-focused learning initiatives. This grant program, designed to assist students with funds to help cover travel, registration and living expenses, is open to students from primary school right up to the doctorate level, so long as the student is either a Canadian citizen or permanent resident of Canada.

Over the past year, funding awarded through this program has allowed students to participate in a wide variety of initiatives covering an array of fascinating disciplines - from an annual Aerospace Medical Association Meeting, and international Lunabotics competitions to Solar-Terrestrial science conferences.

While individual requests for funding can be submitted and considered, budget-permitting, on an ad-hoc basis year-round, there are also two opportunities both earmarked and funded through this program on an annual basis.

The first is the International Astronautical Congress (IAC) – the largest annual international space conference. Each year in February, students are asked to submit abstracts to the CSA on relevant conference topics that will also allow them to highlight their research at the congress. Each abstract undergoes an internal evaluation by CSA scientists, engineers and medical professionals with those achieving the highest rankings

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forwarded to the International Astronautical Federation (IAF) – the organization responsible for the IAC - for final selection. In 2011, close to 60 abstracts were submitted for consideration to be included at the congress in Cape Town, South Africa, with 21 Canadian students ultimately being selected for funding by the Canadian Space Agency to share their work with the conference delegation of international space professionals and other students. For anyone interested in applying to the 2012 edition of IAC, to be held in Naples, Italy, information on the application process will be posted on the student (17+) section of the CSA web site in the late fall.

A second learning opportunity funded by the CSA is the NASA Academy summer program. NASA Academy provides students at the upper undergraduate or early graduate levels with an opportunity to spend 10 weeks paired with a researcher at one of the NASA centres. Students selected to participate are given the extraordinary opportunity to conduct space research with an experienced researcher in addition to developing their own group project with fellow students.

NASA Academy participants are treated to a wonderful introduction to the space field through a series of presentations, meetings and visits at the various NASA centres across the United States. In the past two years, two McGill students have been selected through this competitive process - Medical student Laura Drudi in 2010 and Atmospheric Science student Alexandra Anderson-Frey for the summer of 2011. Information for those interested in applying to the 2012 NASA Academy will also be available via the student section of the CSA web site in the fall.

Finally, the My Research section of the CSA website profiles the next generation of space leaders, providing a showcase for students involved in space-related research. The profiles

featured in this section are constantly evolving and are written by the students themselves, with each profile sharing with the reader the individual's story of where they came from, what they are currently doing and where they see themselves headed in the future. This section also provides a great opportunity for space industry representatives to identify some of the country's brightest students

who may be at the forefront of leading the next wave of Canadian innovation.

For more information on any of these programs, as well as many other learning opportunities, please visit the student section of the CSA website at: <http://www.asc-csa.gc.ca/eng/youth-students/17/>

Jason Clement (B.A. Cultural Studies'98) currently works as a Communications Officer for the Space Learning Program at the Canadian Space Agency (CSA). Prior to joining the CSA in December 1999, Jason worked in the promotions department at what is now Virgin Radio and wrote his own section- called "Fresh Meet" - in a national magazine titled Fresh, which profiled people in the 18-34 demographic from a variety of interesting fields. At the CSA, Jason is responsible for the coordination of the Space Learning Grants & Contributions Program, the Student and Educator Professional Development Workshop Program, the Student/Youth section of the website as well as a variety of special projects including the development of student programming for a number of space-related international conferences. Jason also represents Canada at the Working Group level of the International Space Education Board.

CROSSROADS

Medical Education for Exploration Class Missions

NASA Aerospace Medicine Elective at the Kennedy Space Centre

Gregory E. Stewart*, Laura Drudi

BACKGROUND OF AEROSPACE MEDICINE ELECTIVE

For over a decade, the Canadian Space Agency (CSA) has selected Canadian medical students & residents to attend NASA's prestigious Aerospace Medicine Elective at either the Kennedy Space Center (KSC) on the Space Coast in Florida or the Johnson Space Center (JSC) in Houston, Texas (1). Selected students have the privilege to learn from pioneers and leading experts in space life sciences about the physiologic adaptations that occur during space-flight as well as the preparations and medical support required for a Space Shuttle launch to the International Space Station (ISS).

INTRODUCTION

The spaceflight environment poses many challenges to astronauts. Understanding the effects of long duration space travel and how a crew medical officer (CMO) operates in this extreme environment was the focus of the research project. The knowledge and skills set for future CMOs as the endeavours to space exploration continue, and Canada's involvement in this initiative was further assessed in this project.

Physicians are often chosen to be astronauts; however, non-physicians are often the CMO on the ISS. Forty hours of CMO training occurs during the two-year period leading up to the actual mission and there is no protocol for maintaining medical skills during a long duration mission (2,3). Therefore, procedural skill decay will be an important

issue worth considering for long duration space missions, and effective countermeasures should be developed for CMOs to manage arising medical events. Also, extensive equipment and supplies for the medical interventions cannot be provided due to the severe weight and volume constraints of spaceflight (4,5,6). Thus, risk management strategies dictate that only those situations that are the most severe, or the most easily diagnosed and treated will be anticipated and supplied.

The greatest medical concerns to a crew on an exploration class mission include (i) radiation exposure (ii) human behaviour and performance and (iii) physiologic alterations in the reduced gravitational environment (2,4,5). With the cancellation of the Constellation program, the current plan for NASA is to support the extension of the ISS through 2020. Thus, the ISS will serve as a platform for space life sciences research as well as preparation for future exploration class missions by increasing our understanding of space physiology (6,7).

The standard of care on the ISS is to support the crew 24/7 from Mission Control and to stabilize & transport an astronaut to Earth for definitive medical care (2). For future exploration class missions, however, the medical care system will need to be very autonomous and self-sufficient due to the communication delay and extremely long separation from definitive medical care. Furthermore, procedural skill decay will become a mission-threatening medical consideration, as the expected rate of a significant medical event extrapolated to a 2.5 year Mars mission involving 6 crew members is approximately 1 event/mission (8).

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