BRIGHT HORIZONS #7 PROGRAM

Saturday, May 29, 2010 — (Montréal)

11am **Boarding commences**

4pm **All aboard!**

5pm **Depart**

5:30pm – 6pm **Canada: An Introduction**
David Sadava, Ph.D. — [Crow's Nest]

Canada: a huge, scenic country with a small population of polite, peaceful people, some of whom speak French. Is that it? Join David Sadava, one of our lecturers who is a dual Canadian and US citizen and who has worked in the Canadian government, for some fascinating insights on the foreign (yes, it really is foreign) country we are visiting. He will try to answer your questions about how Canada is governed (yes, they have a Queen), how Canadians have met the challenge posed by a bicultural society (English- and French-speakers try to get along) and how Canada differs from its neighbor to the south (a Canadian politician once compared it to sleeping with an elephant).

6pm – 7:30pm **Bon Voyage Party** *— [Crow's Nest]*

Sunday, May 30, 2010 — (Québec City)

4:50pm – 6pm **A Brief History of Our Universe**
Max Tegmark, Ph.D. — [Wajang]

With a cosmic flight simulator, we'll take a scenic journey through space and time. After exploring our local Galactic neighborhood, we'll travel back 13.7 billion years to explore the Big Bang itself and how state-of-the-art measurements are transforming our understanding of our cosmic origin and ultimate fate.

6:15pm – 7:45pm **Astrodynamics: Natural Orbits from Epicycles to Chaos**
Kathleen Howell, Ph.D. — [Wajang]

From the dawn of time, the paths of the planets, moons, and other natural bodies have fascinated humans. How did we come to understand their motion and celestial mechanics? From the epicycles of the Greeks in the Ptolemaic solar system, to Newton's law of gravity, to the launch of Sputnik, we have learned much about the natural orbits of the heavenly bodies. Now we use that knowledge of astrodynamics to send man-made vehicles to space. Join Dr. Howell and take a look at the key areas of orbital mechanics. You'll have a sharper perspective on space exploration, and will be well equipped to follow important open questions in astrodynamics.

Monday, May 31, 2010 — (Sea Day)

8:30am – 9:30am **Parallel Universes**
Max Tegmark, Ph.D. — [Wajang]

Is physical reality larger than the part that we can observe? Dr. Tegmark argues that not only are parallel universes likely to exist, but that there may be as many as four different levels of them, related to infinite space, cosmological inflation, quantum mechanics and mathematical structures.

10am – 11:30am **Obesity and Unhealthy Food Choices in Cultural Perspective: The French-American Contrast**
Paul Rozin, Ph.D. — [Half Moon]

Americans worry so much about their weight and try to eat low fat food, and French eat a higher fat diet than Americans and worry less. Doesn't that make you wonder why obesity is much lower in France than in the USA?

Settle into a sedentary session with Dr. Rozin, and assess the determinants of food choice and food intake. You'll take a look at how the modern developed-world food environment is opposite to the environment to which we are adapted, and how this leads to obesity. We'll compare the ways the French and Americans have adapted to the major changes in the food world, and get the scoop on how the French have managed to be less afflicted by obesity and more engaged in the enjoyment of eating.

Noon – 1pm **LUNCHEON** (all invited)
Cosmology and the Meaning of Life
Max Tegmark, Ph.D. — [Pinnacle Grill]

When gazing up on a clear night, it's easy to feel small and insignificant. Join Dr. Tegmark for a a status report on the search for extrasolar planets and extraterrestrial life. Might cosmic life be much rarer than one might guess, making our planet the most significant place in our entire observable universe? We'll discuss and speculate about possible long-term futures for life on earth and in the cosmos.

1pm – 2:30pm **The Personal Genome: What is the human genome and what does it mean for human individuality?**
David Sadava, Ph.D. — [Half Moon]

If the 20th century was the "century of physics", the 21st will be the "century of biology", particularly genetics, the study of heredity. This century opened with the deciphering of the human genome. We can now describe how we are different from one another in more precise terms than ever. Join Dr. Sadava and you'll learn what a genome is, why biologists decided to focus on human and other genomes they've studied, and what we know so far. Discover insights into where we may have come from, both as human groups and in relation to the other creatures with whom we share the Earth.

3pm – 4:30pm **Mission Design: Exploring the Solar System**
Kathleen Howell, Ph.D. — [Half Moon]

Scientific mysteries and huge surprises await all of us space explorers, whether we're viewing Earth from the perspective of space or seeking out our neighbors, that is, the planets, dwarf planets, moons, asteroids, and comets that populate the solar system. But how do we get there? How do we get a spacecraft where we want it to go? What about power? How do we address the demands of the space environment? Dr. Howell will lay out the principles and process of designing a space mission. Get the scoop on the successful engineering techniques and some of the challenges in getting humans and robots to space destinations.

5pm – 6:30pm **The Emotion of Disgust: From Toilet to Terrorism**
Paul Rozin, Ph.D. — [Half Moon]

How did a basic food rejection mechanism designed to protect the body from toxins and disease evolve, in cultural history, to become a reaction to all sorts of offenses, including things like incest, murder, and cheating?

Get a clear look at the behind-the-scenes of disgust, and the factors such as the sympathetic magical laws of contagion and similarity that shape disgust. Join Dr. Rozin for an exploration of the meanings of disgust, and the sense in which disgust at eating worms may be the same fundamental process as our reaction to hearing about incest or even cheating on examinations.

5pm – 6:30pm **Genetics and Food: Can Knowledge of Genomes Transform Agriculture?**
David Sadava, Ph.D. — [Wajang]

In some ways, we are what we eat. Many people are concerned with what they eat (the scientific field of nutrition). Fewer people worry about the human food supply (the applied biology field of agriculture). Genetics and DNA have a lot to say about both of these topics. With Dr. Sadava as your guide, get the latest on the "green revolution" in crop production, the interaction of the human genome with foods, and the potential and risks of genetically altered crops.

7pm – 8pm **The Mysterious Dark Side of Cosmology: Dark Matter and Dark Energy**
Max Tegmark, Ph.D. — [Wajang]

A recent avalanche of accurate measurements has revolutionized our understanding of cosmology, but also stumped us with new puzzles. What are the dark matter and dark energy that together make up 96% of the stuff in our universe? Learn about some of the most promising dark matter and dark energy candidates, and some of the experiments that may solve these mysteries in the next few years.

Tuesday, June 1, 2010 (Charlottetown)

5pm – 6:30pm **Solar Sailing**
Kathleen Howell, Ph.D. — [Wajang]

Nearly 400 years ago, Johannes Kepler observed that the tails of comets are sometimes blown about what he considered to be a solar "breeze." Kepler suggested that perhaps ships could move through space using large sails to capture the breeze from the Sun. The concept of practical solar sailing was introduced in the 1920's and serious studies of the idea by engineers began in the 1950's. Solar sails are very thin sheets of reflective material that reflect sunlight — they transfer the momentum of light energy to their spacecraft. This sunlight pressure yields a force that pushes a spacecraft through space, without using any fuel. Solar sails are real! Test sails are being constructed; solar sail capabilities are being analyzed; solar sail mission have been planned. Learn the facts with Dr. Howell.

7pm – 8pm **How Did It All Begin? Or Did It? How Will It All End?**
Max Tegmark, Ph.D. — [Wajang]

Although we humans have undoubtedly asked these questions for as long as we've walked the Earth, we've made spectacular progress on them in recent years, forcing us to discard much of what cosmology textbooks told us up until quite recently. Get the latest on competing ideas, their implications and how they can be experimentally tested.

Wednesday, June 2, 2010 (Sydney)

4pm – 5:30pm **Cloning and Stem Cells: What are the Potential Uses of Plant, Animal, and Human Cloning and What is the Reality of Stem Cell Uses?**
David Sadava, Ph.D. — [Wajang]

The biology behind cloning has been known for over a century. The first plant was cloned in the mid-1950s and the first animal several decades later. In this lecture, you will learn how and why these feats were accomplished. Human cloning is now a possibility. The promise of using stem cells to treat diseases and even improve athletic performance in healthy people is a related topic. Delve into the realm of cloning and stem cells with Dr. Sadava. You'll learn of the ethical issues surrounding the use of human embryos to get the cells used, and the ways biologists may circumvent these concerns.

6pm – 7:30pm **Lay Thinking About Risks: Hunter-Gatherer Thinking in The 21st Century**
Paul Rozin, Ph.D. — [Wajang]

Humankind's adaptations to our ancestral environment have equipped us with a variety of feelings and mental shortcuts which often aid us in negotiating the modern world. However, they are sometimes maladaptive in the rapidly evolving world that we have created. Explore the methods humans use to determine what to eat and what to avoid, and how humans deal with the many potential risks (e.g. nuclear power, genetic engineering) that the modern world presents.

7:30pm – 8pm **Cocktail Party** *— [Half Moon]*

Thursday, June 3, 2010 (Halifax)

4pm – 5:30pm **Psychological, Cultural, and Biological Perspectives on Some Foods: Water, Spices, Meat and Chocolate**
Paul Rozin, Ph.D. — [Wajang]

Why do billions of people in the world add hot chili pepper, which irritates the inner surface of their mouth, on most of their savory foods? Would you drink pure water recycled directly from sewage water? How do you feel about T-bone steaks? Why is chocolate irresistible? Dr. Rozin will shed light on the answers to these questions. The biological and cultural history of these substances, and the reactions of contemporary people from Western-developed cultures to each of these foods are on the table in this session.

6pm – 7:30-pm **Genetic Medicine: Can Knowledge of the Genome Transform Medicine?**
David Sadava, Ph.D. — [Wajang]

Your health is determined by both heredity and environment. Beginning in the 1800s, humankind has made great progress in modifying the environment to improve public health. This progress has led to the near-elimination of many infectious diseases in some parts of the world and treatments for other diseases. Dr. Sadava will show you that as we learn more about our heredity through studies of the genome, we can describe what goes wrong in the many diseases that have a genetic component, such as cancer and heart disease. Get a researcher's input on how these descriptions may lead to cures and how information about an individual's genome may lead to personalized treatments.

7:30pm – 8pm **Cocktail Party** *— [Half Moon]*

Friday, June 4, 2010 (Bar Harbor)

4:45pm – 6:15pm **What is the Interplanetary Superhighway?**
Kathleen Howell, Ph.D. — [Wajang]

The gravity fields of the Sun, planets, and other bodies in the solar system, all interacting together, paint a more complex picture of the pathways through the solar system than previously envisioned. In fact, interplanetary superhighway is a vast network of "tubes" that indicate low-energy trajectories throughout the solar system. These pathways are located where gravity between bodies balances centrifugal force. If you'd like to swing on a star, planet, and/or other celestial body, tune in as Dr. Howell covers the practical applications of libration points, and the use of knowledge of the interplanetary superhighway in the two decades since it has been been available for use in spacecraft missions.

6:30pm – 7:30pm **Questions, I've Got Questions: Black Holes Edition**
Max Tegmark, Ph.D. — [Wajang]

Take a look at some of the most spectacular recent evidence that black holes really exist. Dr. Tegmark will cover what we know about them and what remains mysterious. Are black holes in fact crucial to enable galaxies to form? Can black holes form new universes in their interiors? Plus, using a fully general-relativistic flight simulator, you'll take a scenic orbit of the monster black hole at the center of our Galaxy and discuss how one could actually make this dizzying journey with only modest energy expenditure.

7:30pm – 8pm **Farewell Party** *— [Half Moon]*

SPEAKER PROFILES

Kathleen Howell, Ph.D. is on the faculty of Purdue's School of Aeronautics and Astronautics. She was named the Hsu Lo Professor of Aeronautical and Astronautical Engineering in 1982. Dr. Howell received her B.S. in aerospace engineering from Iowa State University in 1973, followed by a master's degree (1977) in aeronautical and astronautical engineering and a doctorate in aeronautical and astronautical sciences (1983) from Stanford University.

Dr. Howell's areas of research interest include orbit mechanics, spacecraft dynamics, and control trajectory optimization. She is an American Astronautical Society Fellow and has been recognized with numerous awards, most recently including being named as one of '50 Most Important Women in Science' by Discover Magazine in November 2002; appointment as an Associate Fellow, American Institute of Aeronautics and Astronautics in 2004; receiving the Dirk Brouwer Award of the American Astronautical Society in 2004; earning Purdue's Elmer F. Bruhn Teaching Award, 2005; receiving the Best Paper Award at the AAS/AIAA Space Flight Mechanics Meeting, Sedona, Arizona, January 2007; and being recognized with the American Astronautical Society's "President's Recognition Award" for technical achievement and contributions to the society and the profession in August 2007. Dr. Howell also received the John V. Breakwell Memorial Award at the International Astronautical Conference Astrodynamics Symposium, International Astronautical Federation World Congress in Hyderabad, India, 2007.

Paul Rozin, Ph.D. was born in Brooklyn, New York. He attended the University of Chicago, under the Hutchins' General Education System, receiving an A.B in 1956, and received a Ph.D. in both Biology and Psychology from Harvard, in 1961. His thesis research was sponsored by Jean Mayer. He spent two subsequent years working with Jean Mayer as an NIH postdoctoral fellow at the Harvard School of Public Health. Since then, he has been a member of the Psychology Department at the University of Pennsylvania, where he is currently Professor of Psychology. Past scholarly interests included food selection in animals, the acquisition of fundamental reading skills, and the neuropsychology of amnesia. Over the last 25 years, the major focus of his research has been human food choice, considered from biological, psychological, and anthropological perspectives. During this period, he has studied the psychological significance of flavorings placed on foods in different cuisines, the cultural evolution of cuisine, the development of food aversions, the development of food preferences, family influences in preference development, body image, the acquisition of liking for chili pepper, chocolate craving, and attitudes to meat. Most recently, major foci of attention have been the emotion of disgust, the entry of food issues (e.g., meat, fat) into the moral domain in modern American culture, French-American differences in the food domain, attitudes to recycled water, and the psychology of music. Some of the recent research is carried out in France, Japan and India, as well as the United States. In the last few years, he has also investigated forgiveness, aversions to ethnic groups, and ethnic identity.

Paul Rozin is a member of the Society of Experimental Psychologists, has twice been a fellow at the Center for Advanced Study in the Behavioral Sciences, was a visiting Scholar for Phi Beta Kappa, and a Visiting Scholar for one year at the Russell Sage Foundation. He is a member of the American Academy of Arts and Sciences and a recipient of the American Psychological Association Distinguished Scientific Contribution Award for 2007. He was an editor of the journal, Appetite, for ten years.

Paul Rozin has been teaching introductory psychology for about 30 years, has chaired the psychology department at the University of Pennsylvania, directed the university-wide undergraduate honors program, and has been involved in developing policies and teaching materials to guarantee a minimal competence in quantitative skills and critical thinking in University of Pennsylvania undergraduates. He was also a founding director of the Solomon Asch Center for the Study of Ethnopolitical Conflict.

David Sadava, Ph.D. is the Pritzker Family Foundation Professor of Biology, Emeritus, at Claremont McKenna, Pitzer and Scripps, three of the Claremont Colleges. In addition, he is Adjunct Professor in the Department of Cancer Cell Biology at the City of Hope Medical Center.

Dr. Sadava graduated from Carleton University in 1967 as science medalist, with a B.S. with first class honors in biology and chemistry. While an undergraduate, he worked in biological control at the Canada Department of Agriculture and as a science policy officer to the government of Canada. A Woodrow Wilson Fellow, he received a Ph.D. in biology from the University of California at San Diego in 1971. Following postdoctoral research at the Scripps Institution of Oceanography, he joined the faculty at Claremont in 1972 as an assistant professor, and was promoted to associate professor in 1977 and full professor in 1984. In 1996, he became the inaugural Pritzker Foundation Chair of Biology. He has taught a wide range of courses in the biological sciences, ranging from genetics, to biology for non-majors, to cancer biology and has mentored hundreds of undergraduates in research. He served as Chair of the science program at Claremont for two terms. He repeatedly won awards for superior teaching as well as other faculty honors. In 2009, he left teaching to devote full time to laboratory research and writing.

Dr. Sadava has been a visiting professor at the University of Colorado and at the California Institute of Technology. He currently serves as an Advisory Board member at the Keck Graduate Institute and at the UCLA Center for Society and Genetics and is a trustee of Western University of Health Sciences. A bench scientist throughout his career, he has held numerous research grants and written over 55 peer-reviewed scientific research papers, many with undergraduate student co-authors. His published research has been wide-ranging, from the biochemistry of plant growth, to the genetics of racehorses, to human genetic diseases, to the mechanisms of drug addiction. For the past 15 years, his research has focused on resistance to chemotherapy in human lung cancer, with a view to developing new, plant-based medicines to treat this disease. He is the author or co-author of five books, including *Plants, Genes and Crop Biotechnology* and the recently published ninth edition of a leading biology textbook, *Life: The Science of Biology.* Committed to educating the general public, he has presented innumerable public talks on biological topics and has given free public courses on cancer. He recently prepared a course for The Teaching Company, *Understanding Genetics: DNA, Genes and Their Real-World Applications.* He lives in Los Angeles.

Max Tegmark, Ph.D. is a Professor of Physics at the Massachusetts Institute of Technology. Tegmark's research has focused on cosmology theory and phenomenology, but has also included diverse topics such as interpretations of quantum mechanics, predictions of inflation, and parallel universes.

A native Swede, from his initial American foray in Berkeley, California. Dr. Tegmark has tended eastward. Max Tegmark earned a B.A. in Economics from the Stockholm School of Economics, and received a B.Sc. in Physics from the Royal Institute of Technology, Stockholm. He earned an M.A. Physics, and subsequently a Ph.D. in Physics, from the University of California, Berkeley. Tegmark then served as a research associate with the Max-Planck-Institut für Physik in Munich. In 1996 he headed back to the U.S. as a Hubble Fellow and member of the Institute for Advanced Study, Princeton. Dr. Tegmark next sampled the environs of the City of Brotherly Love as an Assistant Professor of Physics at the University of Pennsylvania, where he received tenure in 2003. Forsaking the delights of Philadelphia, he moved to MIT in September 2004.

Dr. Tegmark has received numerous awards for his research, including a Packard Fellowship (2001–06), Cottrell Scholar Award (2002–07), and an NSF Career grant (2002–07). His work with the SDSS collaboration on galaxy clustering shared the first prize in Science magazine's "Breakthrough of the Year: 2003."