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Launching the New NUPOC

Steven A. Gard, PhD, and R. J. Garrick, PhD

The official ribbon-cutting and rededication of the **Northwestern University Prosthetics-Orthotics Center for Education & Research (NUPOC)** marks an exciting integration of our research and education programs. We feel particularly honored that University President **Morton O. Schapiro** joined us and presided over NUPOC's Ribbon Cutting ceremony and Open House. Equally, we could not have achieved this success without the institutional guidance and manifold support of Dr. **Elliot J. Roth** and the **Department of Physical Medicine and Rehabilitation (PM&R)**.



President Schapiro (foreground) cuts the ribbon, with John Michael, Steven Gard, and Elliot Roth (left to right).

President Schapiro toured NUPOC and remarked, *"This is exciting. I just had my tour and I was amazed by how extraordinary it is here. NUPOC is obviously at the cutting edge... the mixture of biomedical engineering, science, education, and medicine on one floor is everything you could ever want. It's extraordinary how you are changing people's lives here... I think one of the great things about Northwestern University is that's what we're trying to do here. We're trying to contribute to research and change people's lives. I think you guys just wrote the book on that. I am stunned, absolutely stunned by how brilliantly designed this whole operation is and how incredibly dedicated all the faculty and staff and students are."*

Over several years, we worked to integrate the P&O research laboratory with the education program, but the physical separation in our previous location was a formidable logistical obstacle. Our new location streamlines this integration and ensures greater cross-fertilization between the education and research arms of NUPOC. We now have a remarkable opportunity for both of our programs to expand their capacities, thus benefiting NUPOC students, our teaching and research faculties, the P&O field at large, and ultimately improving the care of prosthesis and orthosis users.

Our future is bright. Within 2 years, NUPOC will initiate a master's degree program in prosthetics and orthotics to replace the current P&O certificate courses; and we will sponsor a State of the Science meeting as part of our 5-year RERC grant under NIDRR.

Finally, the large multipurpose room seated at the heart of our offices is designated the **Childress Commons** in honor of Dr. **Dudley Childress**, Professor Emeritus at NU and former Director of NUPOC. A plaque on the wall of the Childress Commons

commemorates his devotion to rehabilitation engineering (see page 2). For more than 40 years, Dudley's guidance and contributions to research and education in prosthetics and orthotics have been legion. We are delighted that Dr. and Mrs. Childress were present when we rededicated our work to improve the lives of all people who live with a disability.

This new NUPOC allows researchers, educators and students to work side by side. This opportunity will enhance the clinical impact of our research program and provide new opportunities for educators and students to engage and contribute to our research effort. Together we will focus on important problems that both practitioners and prosthesis/orthosis users share. Similarly, the integration of our P&O research and education programs will encourage improved access and understanding of research among NUPOC students, thus enabling us to create better consumers of research among the next generation of P&O practitioners.

With Our Appreciation...

The efforts of many dedicated people enabled NUPOC's successful transition and Open House. NUPOC deeply appreciates the support and assistance of the Feinberg School of Medicine Department of Physical Medicine and Rehabilitation, the Office of Development, and the Media Support Team, as well as many generous donors. To all who have helped us, we offer our heartfelt "Thank you!"

The Childress Commons: A Tribute to Continuity

R. J. Garrick, PhD

At the official opening of NUPOC, **Steven A. Gard**, PhD, Executive Director of NUPOC, welcomed **Professor Emeritus and Mrs. Dudley S. Childress** and officially dedicated the **Childress Commons**, a large, multipurpose room located at the core of the research offices. Reminding the attendees that NUPOC's new location is the culmination of a rich historical past, Dr. Gard recognized **Dudley S. Childress'** countless professional contributions to rehabilitation engineering.

For more than 40 years, Professor Childress directed the Prosthetics Research Laboratory and worked to build it to its current status as a pre-eminent center for research and education. The commemorative plaque in the Childress Commons states, *"In grateful appreciation to Dr. Dudley S. Childress for his faithful service, unwavering dedication, and lifetime contributions to prosthetics and orthotics education and research."* On the wall opposite the plaque hangs a framed picture of Dr. Childress, who was featured on the cover of Northwestern University, Feinberg School of Medicine



Professor Emeritus Dudley S. Childress, PhD, beside the plaque that dedicates the Childress Commons in honor of his long service to rehabilitation engineering.

Ward Rounds (See *A Brilliant Mind; Ward Rounds*, Spring 2005:4-9).

Photographs in the new NUPOC evoke the significant contributions of earlier laboratory personnel. A 1975 group photo shows Dr. Childress standing beside Dr. **Clinton Compere**, who was recruited by Dr. **Paul B. Magnuson** to become the founding director of the Prosthetics Research Laboratory. Photographs of **Margaret Pfrommer** (1937-1998), who lived with quadriplegia due to polio, recall her 25-years as a member of the Prosthetics Research Lab and her influential role as a disability rights activist.

Dudley S. Childress' ideas and products were born of the systematic, intellectual rigor that he demanded from himself and his students. His work improved the lives of many people who live with an amputation or other disability and continues to inspire others. The Childress Commons is aptly named and will be the site of lively intellectual exchange and contribution among students, researchers, and educators in the fields of rehabilitation engineering, Prosthetics and Orthotics, and rehabilitation medicine.

A Conceptual Approach to Form and Function

Steven A. Gard, PhD, and R. J. Garrick, PhD

"Architecture is inhabited sculpture."

~Constantin Brancusi~
(1876-1957)

The conceptual design for NUPOC's physical appearance incorporates an architectural vision that represents function through the symbolism of color. Early in the design process, members of the architectural firm, **VOA Associates Inc.**, spent time with NUPOC researchers and educators to understand the scope of our work. The architectural concept of the new site connects research, education, and engineering with creativity in science; and reflects NUPOC's mission of empowering and liberating users of prostheses and orthoses.

The VOA design envisions a journey that unfolds along NUPOC's entryway, featuring gradient light that increases in intensity from the intimate reception shade to the naturally illuminated lounge, café, and conference room.

Zones of color are associated with primary function. Green indicates research; red indicates education, patient care, and support. Softer colors and forms that convey the fragility of the human body designate common use areas for model demonstrators. Dynamic, vibrant colors that symbolize technology, science, and machines dominate student areas.

Interconnected color accents link research and education, inspiring interaction among faculty, students, and prosthesis/orthosis users. The design of the NUPOC space seeks to enhance our goals of improving mobility, independence, and quality of life for prosthesis/orthosis users; while providing students and researchers many productive opportunities.

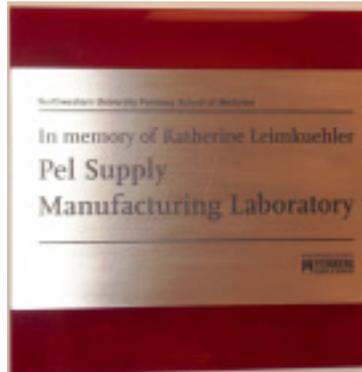
Major Gifts Support NUPOC Success

R. J. Garrick, PhD



Professor **Elliot J. Roth, MD**, visits the **Renee & Dr. Elliot J. Roth & Family Clinical Assessment Room** that he and his family generously donated to NUPOC.

The successful union between NUPOC research and education programs and NUPOC's move to new, custom-designed facilities (see page 1) came to fruition through the commitment and generous support of many donors. In addition to funding from major research grants such as NIDRR, the importance of



Pel Supply Manufacturing Laboratory contributed NUPOC's multi-use fitting and fabrication room in memory of **Katherine Leimkuehler**.

appreciates the individuals and organizations whose generous gifts resulted in named rooms: **Scheck and Siress Prosthetics Inc. Smart Classroom**; the **Renee and Dr. Elliot J. Roth and Family Clinical Assessment Room**; the **Pel Fabrication Room**; the **Marita Dorsch Carozza Student Lounge**; and the **Thranhardt Family NUPOC Resource Center**.

philanthropic gifts from alumni, colleagues, and friends of NUPOC cannot be over-emphasized. Such gifts help to further our work and ensure that NUPOC remains a vibrant, creative education and research center.

Philanthropic partnerships with colleagues, alumni,



Michael Oros, CPO (left), and **James Kaiser, CP** (right), visit the **Scheck and Siress Prosthetics Inc. Smart Classroom**, generously donated by Scheck and Siress Prosthetics Inc.

These generous gifts to NUPOC have enabled our growth and will continue to contribute to future generations through the development of valuable, new knowledge in Prosthetics and Orthotics, the education of



Marita Dorsch Carozza, CP, FAAOP, generously contributed funds for the **Marita Dorsch Carozza Student Lounge**.

patients, and students support NUPOC endeavors. These gifts have an enduring impact by building new facilities, as well as developing influential education and research programs. At this time, we wish to express our sincere gratitude to the many individuals and organizations that have contributed to NUPOC.

NUPOC recognizes and

future prosthetists and orthotists, and the improvement of the lives of many who live with a disability.



Ted and Loretta Thranhardt have been supportive contributors to NUPOC for many years.

NUPOC Welcomes Your Support

Alumni, colleagues, and friends who wish to further NUPOC's work are invited to make a contribution. Your gift can help advance NUPOC's work and improve the lives of those who live with a disability.

Postdoctoral Fellow: Azucena Rodriguez, PhD

R. J. Garrick, PhD

Azucena Rodriguez, PhD, has joined NUPOC as a postdoctoral fellow in the Department of Electrical Engineering. She is funded at NURERC by the **National Institutes of Health (NIH)** and the **Northwestern University-Select Teaching and Research Training (NU-START)** Program (see page 5) for a 3-year appointment that includes mentored research and teacher training. She will work on NURERC projects about lower back pain and prostheses. Currently, Dr. Rodriguez is working on the NIDRR-funded research project, *Evaluation of Spinal Motion in Persons with Transfemoral Amputation: Relationship to Low Back Pain*. This study considers how prosthetic use after lower limb amputation creates gait asymmetry that may affect body alignment and contribute to back pain. Dr. Rodriguez reflected, *"I would like to help improve the quality of life for those living with limb loss by finding the best-fit range for prosthetic devices."*



Azucena Rodriguez, PhD

Her academic success and pursuit of engineering was a surprise to her family who moved to the USA from Mexico when she was in 5th grade. Although learning English slowed her initial progress, she took advanced classes in mathematics, which improved her confidence and powered her progress in science. In 10th grade she took a course on architecture and industrial engineering, where she enjoyed drafting and auto-CAD. Instructors recognized her potential, mentored her, and helped her negotiate the path to college.

At the **University of California-Riverside (UCR)**, she enrolled in mathematics and ultimately graduated in mechanical engineering. As a rising freshman, Dr. Rodriguez was selected as one of 15 minority students to participate in the **California Alliance for Minority Participation in Science, Engineering and Mathematics (CAMP)**, a UCR program designed to support and increase the number of under-represented minority students seeking degrees in engineering, technology, mathematics and science. For 5 weeks prior to beginning her freshman year, she worked intensively on chemistry and calculus. She recalled, *"Everyone in this group focused on math and science. We encouraged each other throughout our college years and we are still friends."*

Throughout her 4 years as a CAMP fellow at UCR, she participated in professional development workshops, summer internships, and used resources in the CAMP

academic center. Dr. Rodriguez reflected, *"I was determined to succeed and passed with high grades. I think that CAMP was the key to my collegiate success and ultimately put me on the path to graduate school."*

As a UCR summer intern, she tested and compared metal strengths, relishing the challenge of research. Subsequently, she spent 2 summers at Ford Motor Corporation in Livonia, MI, where she analyzed pressure data, developed test and data collection methods. Recognizing her affinity for research and her desire for more creative, intellectual, and applied opportunities in engineering, Dr. Rodriguez entered the **UC Berkeley and UCSF Graduate Program in Bioengineering** where she earned her doctorate. While at UCB, Dr. Rodriguez worked collaboratively on various projects, including a student research team that established improved safety in needle-free injection technology in the Dominican Republic.

For her dissertation, Dr. Rodriguez conducted basic science research on the human spine in the UCSF Orthopedic Surgery Department. Unfortunately, her project lacked funding, so she contributed to writing proposals for an NIH grant that was successfully funded. She admitted, *"Writing grants is good experience for the real world of research."* With the NIH grant, Dr. Rodriguez focused on biomechanics of the lumbar spine and disc nutrition, culminating in her dissertation, *Endplate Permeability of the Human Intervertebral Disc and its Relationship to Disc Degeneration (2010)*.

After graduation, she refined her career options at the UCSF Career Center, where she recognized that her long term goals would include both research and teaching. Dr. Rodriguez noted that as an undergraduate volunteer, she had designed and taught science lessons in an elementary school outreach program and, as a UCB graduate student instructor, she had taught introduction to bioengineering. *"My career goal is to become an engineering professor at the university level."*

Dr. Rodriguez has several publications and podium presentations, has been active in Toastmasters, the Latino Association of Graduate Students in Science and Engineering, and the Society of Hispanic Professional Engineers. Dynamic and energetic, Dr. Rodriguez trains for a triathlon, running, swimming and biking—undeterred, even by the harsh Chicago winter.

Welcome to NUPOC, Azucena!

NUPOC Success in Research Collaboration

R. J. Garrick, PhD

NUPOC research projects successfully collaborate with researchers from other departments within Northwestern University and other institutions. Recently, NUPOC has welcomed and provides training and mentorship for three postdoctoral research fellows whose affiliations include the **Department of Neurosurgery, Department of Electrical Engineering & Computer Science, Department of Physical Medicine and Rehabilitation, Northwestern University Clinical and Translational Sciences Institute (NUCATS),** and the **Northwestern University-Select Teaching and Research Training Program (NU-START)** program.

Most recent among personnel with inter-agency affiliations is **Azucena Rodriguez, PhD,** who comes to NUPOC with the support of the **Northwestern University-Select Teaching and Research Training Program (NU-START),** a joint effort between Northwestern University and **Northeastern Illinois University (NEIU)** to support under-represented groups in engineering. Her three-year postdoctoral fellowship combines research mentoring with teaching mentoring and experience at Northwestern University's partner institution, Northeastern Illinois University, which serves a large population of Hispanic and African-Americans. By the end of the program Dr. Rodriguez will have contributed to research on the spine and lower back pain among prosthesis users and will have designed and/or taught at least one course at NEIU, and will

participate in professional development workshops. NU-START is an NIH (National Institute of Health) sponsored program in partnership with (NIGMS) National Institute of General Medical Sciences.

A NUCATS sponsored **Engineering into Medicine Postdoctoral Fellow, Matty Major, PhD,** brings collaborations among NUPOC, NUCATS, and the **Department of Physical Medicine and Rehabilitation** (see *Capabilities*, 18(4)5). **Pranitha Gottipati, PhD,** is a postdoctoral fellow with the **Department of Neurosurgery** (see *Capabilities*, 18(2)5) and works on two collaborative projects at NUPOC, *Analysis of Pathological Spinal Motion* and *Sagittal Spinal Alignment*.

NUPOC researchers also work collaboratively with colleagues in Northwestern University Departments of **Physical Medicine and Rehabilitation, Bioengineering, Rheumatology, the Center for Rehabilitation Outcomes Research (CROR),** and others. NUPOC conducts research projects in association with major institutions, including the **Department for Veterans Affairs, the Department of Defense, Center for the Intrepid,** and several business entities.

Researchers and students alike reap rewards from intellectual and institutional collaboration. Benefits include intellectual cross-fertilization, complementary knowledge, and broad-based skill sets that stimulate new ideas and produce useful, new knowledge.

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NUPOC Hosts Crystal Lake South High School Science Students

R. J. Garrick, PhD

Forty-seven science students from Crystal Lake South High School (CLSHS) toured NUPOC on November 30, 2010 with their Principal **Marsha Pothoff** and science instructors **Rich Marrano** and **Rene Kasischke**. During their tour they visited research stations where they learned about r e h a b i l i t a t i o n

engineering and careers in Prosthetics and Orthotics (P&O). NUPOC Executive Director **Steven A. Gard** welcomed the group and provided an overview about current laboratory research projects and educational programs. **Craig Heckathorne**, M.Sc., discussed upper limb prostheses; **Kerice Tucker**, Research Engineer, discussed lower limb prostheses, the Shape and Roll Prosthetic foot, and CAD-CAM fabrication; **Stefania Fatone**, PhD, BPO(Hons), discussed the PEDAR system. **Rebecca Stine**, MS, with the assistance of **BJ Johnson**, MS, demonstrated motion analysis and discussed human gait and movement. **Christopher Robinson**, CPO, FAAOP, MBA, ATC, introduced the field of P&O, professional qualifications, and career opportunities.

Teachers and students responded positively to the new information they learned. Ms. **Kasischke** remarked, "The presenters were very friendly and explained things in the perfect amount of detail - not too complicated but just enough." One student



Some of the CLS-HS students who toured NUPOC to learn about rehabilitation engineering and P&O. NUPOC Executive Director Steven A. Gard, PhD (far right), facilitated the tour.

reviewed her tour saying, "I gained a new perspective on how important prosthetics are to people and how much detail it takes to make them."

Students expressed particular interest in motion analysis and its associated technology. Another student

remarked about PEDAR, "Research about sensing high and low pressures in the feet of people with diabetes was explained. Dr. Fatone modeled the equipment and showed us how the pressure sensing technology worked. She explained that people with diabetes lose feeling in their feet, and she hopes to help them by decreasing the risk of tissue damage in their feet with the pressure sensing device."

The enthusiasm and dedication of NUPOC researchers impressed the group. One student observed, "What really impressed me is the determination and drive of every individual person in the school. They were all so passionate about their own jobs, and what they contribute to prosthetics. I hope...to do the same with my future." Another student echoed similarly, "I liked how the researchers weren't scripted or rehearsed. You could tell they were passionate about what they do." NUPOC hopes that educational tours such as these may inspire young scientists to enter the field of rehabilitation engineering or P&O.

Eric Nickel, MS, Successfully Defends Thesis

Eric Nickel, MS, successfully defended his master's thesis, *Further Development of an Adaptable Prosthetic Ankle Unit*, in biomedical engineering at Northwestern University (Evanston, IL) where he developed an advanced prosthetic foot-ankle system that adapts to different surface slopes. His research was funded by the National Institute on Disability and Rehabilitation



Eric Nickel, MS

Research (NIDRR) of the Department of Education under grant number H133E080009.

Mr. Nickel now works at the Minneapolis VAMC with **Andrew Hansen**, PhD, on the further development of a prosthetic ankle that adapts mechanically to changes in surface. Congratulations, Eric!

Thomas Karolewski, CPO, MA

Thomas Karolewski, CPO, MA (Director of Prosthetic Education, NUPOC), completed a master's degree in Education at Concordia University Chicago. Already an award-winning teacher, Mr. Karolewski brings new skills that will enhance NUPOC courses and engage future P&O students. Congratulations, Tom!

Robinson Honored with OPERF Educator Award and Fellow of the Academy

R. J. Garrick, PhD

Christopher Robinson, MBA, CPO, FAAOP, ATC (Assistant Director of Orthotics Education, NUPOC), has received the **2010 Orthotic and Prosthetic Education and Research Foundation (OPERF) Educator Award** as a \$2,500 cash grant. The award supports prosthetics and orthotics educators who teach at CAAHEP-accredited P&O educational institutions and are pursuing higher degrees designed to further their skills as P&O instructors. Mr. Robinson will use his OPERF grant for tuition as he pursues a master's of science degree in **Clinical Research and Regulatory Administration (CRRA)** at Northwestern University.



Christopher Robinson, MBA, CPO, FAAOP, ATC.

As a NUPOC instructor, Mr. Robinson moderates a weekly journal club where he teaches his students how to understand, evaluate, and integrate new knowledge. Mr. Robinson is eager to enhance evidence based clinical practice and sees CRRA as a bridge between P&O

education, clinical practice, and research domains. In the future, Mr. Robinson plans to engage in research that connects clinical skills to the creation of objective evidence.

In January, the **American Academy of Orthotists and Prosthetists (AAOP)** honored Mr. Robinson by recognizing his achievements with the designation **Fellow of the Academy**. This status entitles him to incorporate FAAOP as a title in his signature. Fellows of the Academy are recognized after completing two Certificate Programs for Professional

Development and conducting substantial work in the P&O community. Mr. Robinson will be officially inducted as a Fellow of the Academy at the Academy Annual Meeting and Scientific Symposium in Orlando, FL, on March 16 through 19, 2011. These awards reflect professional commitment and dedication to high quality patient care. Congratulations, Chris!

NUPOC News

Publications

Klodd E, Hansen A, Fatone S, Edwards ME. Effects of Prosthetic Foot Forefoot Flexibility on Gait of Unilateral Transtibial Prosthesis Users. *Journal of Rehabilitation Research and Development*, 47(9).

Fatone S, Stine R, Gard, S. Randomized Crossover Study of AFO Ankle Components in Adults with Post-Stroke Hemiplegia. *The Academy Today*, 6(4):A4-A5. <http://www.oandp.org/academytoday/2010Oct/>

Presentations

Gard, S. How Do Persons with Bilateral Transtibial Amputations Walk? Different Ways of Looking at the Data. Midwest Chapter American Academy of Orthotists and Prosthetists (AAOP) 2010 Annual Fall Session on September 18 in Lake Geneva, WI.

Fatone, S, McGovern, D. Preliminary Experience with AFO-FC Tuning:Challenges and Outcomes. Midwest Chapter American Academy of Orthotists and Prosthetists (AAOP) 2010 Annual Fall Session on September 18 in Lake Geneva, WI.

Heckathorne, C. Design and Evaluation of Multi-Articulated Prosthetic Hands. Midwest Chapter American

Academy of Orthotists and Prosthetists (AAOP) 2010 Annual Fall Session on September 18 in Lake Geneva, WI.

Meetings

Stefania Fatone, PhD, BPO(Hons), participated in a Breakfast with the Experts Session with **Elaine Owen**, MSc, SRP, MCSP, and **Donald McGovern**, CPO, on "The Importance of Being Earnest about Shank and Thigh Kinematics when Designing, Aligning and Tuning Ankle-Foot Orthosis Footwear Combinations" at the 64th annual meeting of the American Academy for Cerebral Palsy and Developmental Medicine (AACPDMD) from September 22 to 25 in Washington, DC.

Awards and Honors

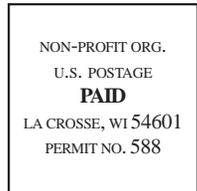
Stefania Fatone, PhD, BPO(Hons), was guest editor of the September issue of *Prosthetics and Orthotics International* that focused on Lower Limb Orthotics. Dr Fatone's editorial was "Challenges in Lower Limb Orthotic Research," *Prosthetics and Orthotics International*, 34(3):235-237. Read this on-line at http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=20738229

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Jared Howell Leads NUPOC Group in Guatemala

R. J. Garrick, PhD

Jared Howell, CPO (Assistant Director of Prosthetics Education at NUPOC), led recent NUPOC graduates to Zacapa, Guatemala where they worked with the **Range of Motion Project-Chicago (ROMP)**, ROMP on site clinicians, and ROMP Volunteer Field Director, **Dave Krupa**, CP. This annual outreach trip included participants **Katie Antle**, **Christy Vant**, **Jacqueline Ziegler**, **Jenna Lombardo**, **Jennifer Pecora**, and **Zach Lacy**.

From December 4 through 13, 2010, Mr. Howell and the NUPOC group provided custom-designed thermoplastic orthoses and prostheses using componentry donated by U.S. practitioners. Clients were low income individuals, some of whom traveled more than 8 hours to reach the ROMP clinic. Persons with amputation secondary to trauma received prosthetic solutions; and children who had not obtained prior medical care received orthotic solutions.



NUPOC graduates contributed their P&O skills at the ROMP Clinic in Zacapa, Guatemala. With ROMP on site clinicians are NUPOC representatives: (first row) Jenna Lombardo (4th from left), Jennifer Pecora (5th from left), and Jacqueline Ziegler (far right); (second row) Katie Antle (3rd from left), Jared Howell (4th from left), Zach Lacy (5th from left), and Christy Vant (6th from left).

Mr. Howell noted highlights and successes of the 2010 NUPOC cohort's experience at ROMP. *"We designed and fit a prosthesis on an 18-year old girl who had a hip disarticulation secondary to osteosarcoma. Also, for a 9-year old with severe congenital scoliosis and labored respiratory function, we designed, fabricated, and fit the first thoracic lumbar spinal orthosis (TLSO) ever fit at the Zacapa Clinic."* Toward the end of their work week, the NUPOC group climbed the spectacular and still active Pacaya Volcano (elevation 8,373 feet) that

erupted in May 2010 and dramatically changed the landscape and the nearby village.

Mr. Howell remarked on the enthusiasm with which the group met their challenging work and the importance of the P&O solutions to the Guatemalans who attended the ROMP clinic, *"We saw our work at the Zacapa ROMP Clinic improve people's lives."*