

## Program Summary (21 November 2013)

At 7:00 p.m., President Byrnes welcomed the membership to the 661st meeting of the HPS, which was founded in 1920.

At 8:00 p.m., President Byrnes introduced Jack Agee, the new vice-president. He also introduced our two interim section heads, Frank Tittel and Randall Hall. Frank replaces Jack who was promoted. Randall replaces Wil who is teaching at HCC. Jack went around and visitors were introduced by the members. Ballots were circulated for the five new member nominees.

At 8:10 pm, President Byrnes introduced former HPS President Herb Ward, who introduced tonight's speakers from the Rice University faculty: **Dr. Maria Oden**, Professor of the Practice in Engineering Education and Director of the Oshman Engineering Design Kitchen, and **Dr. Rebecca Richards-Kortum**, Chair and the Stanley C. Moore Professor of Bioengineering. Rebecca is a member of the National Academy of Engineering, among numerous other awards. Maria has received a Brown Teaching award, among numerous other recognitions. They will discuss the Rice Design Kitchen's role in the creation of a low-cost CPAP system that can be deployed in third world countries; see figure at the end.

The title of this evening's talk was **Learning to Swim: Engaging Undergraduate Students in Global Health Technology Innovation**. The membership warmly welcomed Drs. Oden and Richards-Kortum. This is the 661st meeting of the Houston Philosophical Society.

Rebecca gave an overview of the long-term goal of their work transforming technology into medical practice. The question of "who" might have access to those technologies came more recently in their thinking. It is easy to cite sobering statistics faced by large numbers of children in the third world, the so-called 90-10 percent gap. How can these innovations be made available to broader spectrum of the world's citizens?

Beyond traditional degrees is a program started by our speakers in 2006. The program brings together Rice undergraduate students to work with health care providers to learn problems faced and to study possible low-cost solutions.

Maria described one such project that focused on treating premature babies with breathing problems. Breathing problems are directly responsible for a majority of deaths in the first month of life for a premature birth, so-called respiratory distress syndrome. In the US, oxygen treatment progressed to CPAP treatment, which provides continuous pressure on the lungs, so the lungs do not deflate between breaths. The survival rate jumps to 70% from 25% using CPAP in addition to oxygen. The students assembled inexpensive parts (e.g. an aquarium pump) to produce a working CPAP device for \$150. This was field tested in Malawi, Africa, and received funding for deployment. Early statistics replicated the improvement in survival rates cited above. Current funding will allow deployment in all government hospitals in Malawi, reaching 60% of babies. The hope is to reach the other 40% of private hospitals. Other plans include expanding availability to South Africa.

Other infant needs include photo-therapy treatment. Students designed a



Rebecca Richards-Kortum and Maria Oden of Rice University have worked with students to develop a low-cost bubble Continuous Positive Airway Pressure (bCPAP) system (pictured) to assist infants with acute respiratory infection – the leading cause of global child mortality.

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\$100 unit, which are being deployed in Guatemala. Other students designing monitors that detect apnea, and even offer treatment by including a cell phone vibrator to “wake” a baby when appropriate.

Rebecca hopes that a complete set of technologies can be provided to a hospital serving a community of 300,000 for approximately \$5,000. The message of hope was well received.

Drs. Oden and Richards-Kortum wrapped up their remarks at 8:47 with an invitation to ask questions. After a lively discussion, the program concluded. The audience warmly thanked the speakers.

After another round of applause, and the meeting adjourned at 9:00 p.m.

President Byrnes announced that all five members had received the required 70% positive vote, and are admitted.

David W. Scott  
Recording Secretary