

**A Proposal to Acquire Equipment to Develop a Science Business Connection Related to the Coffee Industry.** *Submitted by Bradley E. Sturgeon (Chemistry) and Keith Williams (PAC). 10/20/2009.*

As a part of the recent renovations in HT, the chemistry department has converted a small classroom and a small laboratory into a medium sized “nutrition” laboratory. Although the nutrition lab retains many of the characteristics of a traditional chemistry laboratory, this space has now been thoroughly cleaned and is considered “food grade.” Food grade means that lab activities can now involve food related products that can be fully studied using our sensory perception; we can smell and taste the science.

The primary use of the lab will be to complement a new “nutrition” course being developed within the chemistry department (by Laura Moore) and a visiting alumni who will be teaching one section of the nutrition course as a requirement for her food science PhD program at Purdue University. In addition to this academic instruction, three other food related activities are underway. First, chemistry research students (guided by Laura Moore) are involved in developing food related laboratories that can be integrated into other more traditional aspects of the department. Second, a group of 3 freshman and 1 transfer student (guided by Brad Sturgeon) have engaged in a science-business activity. These students have generated 3 drink products (iced coffee, peach soda, and ginger ale) for which Keith Williams’ marketing course has sampled (Oct 14) and is currently discussing a marketing plan as a class group project. One of the students, prior to coming to Monmouth College, has formulated/marketed his own barbeque sauce. These “drink” students will also be generating “drinks” for our weekly science seminar; drinks had been generously provided by Doc Kieft, as well as Chris Fasano. Third, Ramon Ceja, a non-traditional (26 years of age) student, has been exploring coffee roasting/brewing techniques. It is the coffee related project we are looking for support.

As the first pilot program to truly connect the science and business departments, we have chosen to focus on a food-related area that has a large social impact; coffee. The coffee industry has become quite integrated into our society as more consumers are becoming aware of the low quality, high output, eco-*un*friendly grocery store brands and are now shifting towards the more specialized, fair-trade coffees. Even our campus food service had to contract out coffee services on in the Underground, so as to comply with “fair-trade” coffee practices. Coffee offers many avenues of exploration ranging from the science of the over 800 different chemical components (some of health benefits) to the ethical issues of international fair-trade practices. Such a program could open avenues of alternative spring breaks, entrepreneurial ideas, acquisition of scientific equipment through external funding sources, and most importantly establish a physical relationship between the science and business environments on the Monmouth College campus.

**Plan of Action**

- Purchase a coffee roaster, burr grinder, and green beans and use the nutrition lab as a working area.
- Offer roasted coffee to faculty and students. The following individuals have shown interest in purchasing coffee from our “program” for campus activities: Bruce Cvancara (Armark Food Service catering), Christine Johnston (Admissions), President Ditzler, and Jordan Hedberg (coffee shop outside Dean and President’s office).
- Explore a relationship with Armark to provide coffee for the entire Monmouth Campus. At the present time, Starbuck’s provides coffee brewing equipment as a part of the coffee contract, so this would require Armark to evaluate the financial outcomes of dropping the Starbuck’s contract.
- Partner with student initiated (Jordan Hedberg) coffee service “business plan” in Monmouth Community.

## **Capital Investment**

- Roaster: Sonofresco (1.3 lbs) Commercial Coffee Roaster, \$2500
  - Grinder: Grindmaster: Model 875 Automatic Gourmet/Grocery Commercial Retail Coffee Grinder, \$800
  - Green beans: Initial investment to get started, \$300.
  - Misc (propane, bags, papergoods), \$100.
- TOTAL startup costs: \$4200.

## **Business model**

The cost of green beans, when purchased in bulk ranges from ~\$3-\$5/lb. Freshly roasted coffee sells for >100% profit over the green bean cost (~\$6-\$10). Our initial efforts will be to provide samples for Armark, Admissions, Dean/President's office, and Jordan Hedberg, as well as faculty and students, to establish a market. Since the roaster/grinder are portable, these items can be transported to farmers markets. Once the Monmouth College coffee "brand" has been established, other local consumers (Monmouth residents/businesses) will be explored. Successful marketing may lead to thinking about franchising the concept on small college campuses.

Funds raised through the sale of coffee will be used to pay back capital investments within a 5 year period. Funds in excess of the yearly \$840 will be allocated to operational costs, refining the business model, and paying students marginal wages for services rendered.

## **Science Connection**

As mentioned above, coffee has over 800 chemical entities making it one of the most complex natural products used by humans. Although our understanding of the science literature with respect to coffee is currently limited, having access to green coffee beans from a variety of world locations and access to roasting and brewing equipment, would allow us to explore the chemical differences. The chemistry department has requested from the National Science Foundation – Major Research Instrumentation (NSF-MRI) program, a state-of-the-art chromatography-mass spectrometry system, which would allow for detailed analysis of coffee. The announcement of funded NSF awards will be in late December. Even in the absence of the requested equipment, some chemical exploration can be done, for example caffeine levels.

The Monmouth College coffee group has also come up with a scientific hypothesis related to the quality and timing of roasted bean usage. The hypothesis states that the standard practice of roasting green beans at temperatures of >400 °F generates free radicals (highly reactive molecules which can cause damage). Since high temperatures are needed to purge the bean of non-desirable volatiles, the high temperature roasting must be done. We propose that the free radicals generated must be allowed to react in the solid phase before being brewed. If freshly roasted beans are brewed immediately, then free radicals in the solution phase can polymerize highly desirable poly-phenolic components. The poly-phenolic compounds are thought to have health benefits. These free radicals do not pose a health threat to individuals; the free radicals would only remove any health benefits that may exist in coffee. The detection of free radicals is the expertise of Brad Sturgeon.