Marsh White Award Final Report

prepared by the

Society of Physics Students

of

Coe College

Cedar Rapids, IA

Coe College's annual Playground of Science, held in the autumn of each year, has become an area-wide event in recent years. Originally conceived of and initiated by a Coe SPS member, the night of fun and educational demonstrations and activities has grown considerably, drawing over one thousand participants last year – quite a number for a college of 1,300 students! This past success has only been made possible by the continual improvement and expansion of the event, and with the help of the Marsh White award, we can rest assured that this year's night of outreach will be better than ever.

With the Marsh White funds, we have been able to develop and acquire materials for three very exciting new demos, and although there are already dozens of existing activities which curious children may take part in (imparting principles of mechanics, acoustics, thermodynamics, pressure, light and optics, electricity and magnetism, and more), we are confident that these new demos have the potential to, in fact, become the new centerpieces for the Playground of Science, adding new layers of excitement. These won't be the icing on the cake; they're a whole new confection.

The first demonstration in this new trifecta of physics fun is the dancing flame pipe. In this demo, a five-foot long pipe burns propane through holes along its length. A rubber membrane on one end is then stimulated with music from a nearby speaker. The vibrations set up standing waves in the pipe, creating areas of high and low pressure. This, in turn, causes the flames to change their relative heights. In this way, onlookers can literally "see" their music – or the waves set up by it – as the flames dance along in a dramatic presentation of sound and pressure.

The next demo also illustrates the effects of sound. A function generator and amplifier are connected to a powerful subwoofer, on which rests a small container. In

that container lies oobleck – a mixture of corn starch and water. This non-Newtonian fluid, well-known by curious 8-year-olds for its ability to resist being squeezed, also behaves quite bizarrely when subjected to complex pressure waves, not only roiling and bubbling in slow motion, but taking on intricate shapes and forms in three dimensions. This demo brings back an old friend in a whole new way to show concepts of pressure, force, and material behavior.

The final, and possibly most anticipated, portion of our outreach expansion is the construction of a great trebuchet. With the frame, itself, standing as tall as a person, this small siege engine is sure to launch some serious distance. Not only will small children (including us) learn of the principles governing projectile motion, the trebuchet may be the impetus for a new campus-wide ballistics competition, which the Physics Club is planning on initiating.

With these three new significant additions, the SPS outreach program at Coe College has both more depth and versatility. We give our sincerest thanks to the Society of Physics Students, Sigma Pi Sigma, and the Marsh W. White Awards Program.

Coe College SPS Chapter Expenditures:

Portable gas grill: $24.99

Vinyl washers: $0.79

Aluminum duct tape: $14.37

Furnace pipe: $5.43

Furnace pipe reducer: $5.32

Furnace pipe end cap: $4.47

Propane cylinder: $2.29

Subwoofer and shipping: $71.87

Oobleck materials: $15.00

Trebuchet plans: $16.95

Trebuchet materials: $120.00

Incidentals: $11.48

Balance: $0.00