



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Ryan J. Nowicki	Project Number J0214
Project Title Justice Cup Viscometer: Can a 10th Century Chinese Cup Measure Viscosity?	
Abstract Objectives/Goals The 10th Century Chinese Justice Cup is a simple drinking device with a twist: it dumps all of its liquid through a hole in the bottom after reaching a certain fill level. My hypothesis is that the Justice Cup can also be used as a simple viscometer, a device used to measure viscosity or the amount of resistance to fluid flow. Methods/Materials 27 different liquids were tested in both a Justice Cup Viscometer and a Simple Funnel Viscometer and the results were compared. The mean drainage times for each liquid were then plotted against viscosity to obtain a calibration chart for each viscometer. Results The Justice Cup was used as a simple viscometer and produced measurements far more accurate than other Simple Viscometers. Liquids with different viscosities flowed through the Justice Cup over a greater range of times than the Simple Viscometer. The viscosity of an unknown liquid was then accurately predicted by examining the proper position on the calibration line. Conclusions/Discussion Viscosity is a very important property of a fluid that is used not only in the production of many industrial and household goods (e.g. oil, drilling fluids, pumps and food), but also in medicine to better understand fluid flow in humans and other living things. This experiment showed that a device created over 1000 years ago for trickery and amusement can in fact accurately measure viscosity over a wide range of common liquids. These data suggest that the design of the Justice Cup should be considered in the future production of simple, low-cost viscometers.	
Summary Statement This project studies an ancient Chinese tea cup to determine if it can be used to measure viscosity.	
Help Received Dad/Mom helped pour the liquids in the cups while I measured drainage times; Teacher gave me advice on how to display data; Dr. Ratcliff helped understand the complex relationship between drainage time and viscosity	