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Oswald Research and Creativity Program

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Any current UK undergraduate (full- or part-time, enrolled for either semester) who does not already have a four-year degree is eligible for this competition and may submit papers and other projects in the following categories:

1. Biological Sciences
2. Design (architecture, landscape architecture, interior design, etc.)
3. Fine Arts (film, music, painting, sculpture, videotape, etc.)
4. Humanities: Creative
5. Humanities: Critical Research
6. Physical and Engineering Sciences
7. Social Sciences

Entries are judged on originality; clarity of expression; scholarly or artistic contribution; and the validity, scope, and depth of the project or investigation.

First place winners and co-winners in the 2001-2002 Oswald Research and Creativity Program:

**CATEGORY 1: Biological Sciences**
**TITLE:** Interaction of the IAP Deterin with Human Caspase-7 and Drosophila Reaper & Grim
**NAME:** Casey Wilford
**Biological Sciences Major**

A new subclass of BIR-containing proteins, Survivins, includes the Drosophila protein Deterin. Survivin is a very interesting protein because its expression is among the most tumor-specific of all cancer markers. This new BIR class is structurally distinct from known BIRs that function as inhibitors of apoptosis (IAPs), because the new proteins have only a single baculovirus-type repeat (BIR) and no RING finger motif; in contrast with the multiple BIRs and RING finger of known IAPs. This fact has generated controversy about whether or not the new “surviving” family of proteins are really IAPs. Survivin has been shown to be a passenger protein involved in cell cycle regulation, but its role in apoptosis has been questioned.

Deterin has been shown to rescue cell death induced by overexpression of Drosophila reaper and human caspase-7. Here, a more in-depth analysis of the interaction of Deterin with reaper and caspase-7 was accomplished through TUNEL staining, mutant constructs, western blotting, and in vivo data. In vivo, Deterin can rescue the eye ablation phenotype seen in flies overexpressing reaper or grim in their eyes. In contrast to its ability to inhibit full-length caspase-7, Deterin could not inhibit the more damaging effects of a truncated form of caspase-7 deleted for the prodomain.

Deterin mutant constructs indicate that different domains of the protein may be important for inhibiting different apoptosis activators. These results confirm that this new class of BIR-containing proteins does indeed have anti-apoptotic function. These results confirm the homology of the insect apoptosis pathway with the human apoptosis pathway, verifying that the Drosophila system will prove an integral tool in elucidating the mechanisms of apoptosis in humans. Determining the pathways of human apoptosis is a key step in uncovering the fundamental molecular causes of many forms of human disease involving too much or too little cell survival, including cancer and many types of neurodegenerative diseases.
CATEGORY 2: Design (architecture, landscape architecture, interior design, etc.)

TITLE: Design for Heritage Museum (African Cemetery #2) includes model, press boards and construction packet.

NAME: Katie Ritter
Landscape Architecture Major

CATEGORY 3: Fine Arts (film, music, painting, sculpture, videotape, etc.)

TITLE: The Twin Menaechmi Twenties Extravaganza!

NAME: Lacresha Berry
Theatre Major

Over a period of three months, Professor Nelson Fields gave our TA365 Costume Design class a four-part final project based on the comedy by Plautus entitled, The Twin Menaechmi, written in 454 AD. It’s about twin brothers (who are switched at birth) and all those who encounter them along their journey to find each other. We had to render 10 costumes for 10 characters in a five-act play. Rendering consists of coming up with a design concept, research based on your design concept, fabric swatches, putting your design into a set time period, and painting the design with a specific color palette in mind. Before the rendering process began, we gave a brief analysis of the play to understand it first. With these given circumstances in mind, I designed my final project based on the Roaring Twenties Circus. You will see clown make-up, acrobat, and servants all designed to resemble a 1926 New York Circus. Circuses are bright and colorful, and the humor and farcical nature of The Twin Menaechmi gave me a chance to experiment with a myriad of different colors and designs. I chose a highly stylized approach to the twenties, which represents the shapes of the twenties but with a whimsical flair to the period. The characters are fun, energetic and full of zest, so feel free to laugh and enjoy the roaring twenties as I did.

CATEGORY 4: Humanities: Creative

TITLE: Short Stories

NAME: Holly Jones
English Major

My father is a factory worker. He works at a plant that makes motors for refrigerators and other household appliances, never for cars. His goings and comings from the plant set the rhythm of my childhood; his kisses goodbye so early in the morning that it was still dark outside (and often missed because I slept through them); his daily lunchtime call to my mother; his arrival home around four o’clock. I’d hear the crunch of gravel in the driveway first, then the slam of the back door, and finally the various clumpings and scrapings as he changed out of his steel-toed work shoes into some casual, unadorned cowboy boots. His Dickies smelled faintly of sweat and grease.

I tell you about my father — about the cycle of factory work that was a given as I grew up — because it has been such an enormous influence on me as a writer, both in the subject matters I choose and my approach to the craft. Two of my three submitted stories feature a factory worker. They are not based on my father; rather, I imagine them to be people my father might work with. Thousands of men and women in my hometown are employed at factories. Over six large industries thrive in a region that can barely boast 10,000 people. It has created a culture, one that I try to recreate in subtle, but meaningful ways.

Factories represent for me stagnation, monotony, helplessness, and imprisonment. These are themes that I explore in my writing. Because of this, my stories are also more driven by language and emotion than action — simplicity in my upbringing that has contributed to simplicity in style. The motors my father builds do not go into cars. In fact, a motor he builds is not something we consciously think about, or spend money to improve. It’s just one little part of many that makes the refrigerators and washing machines of this world run. My stories are like that. No flash, no show, but a backbone to the everyday, household appliances we take for granted. I am more concerned with how little events in our lives have wide-reaching consequences.
These stories, along with others I am writing and fine-tuning during an independent study this semester, will be submitted as a portfolio to M.F.A. programs. I will graduate this December and hope to begin graduate studies by fall of 2004. Ultimately, I hope to develop a regimen of writing geared toward improving and increasing by body of work, leading to publication and the opportunity to teach workshops with beginning writers.

**CATEGORY 5:** Humanities: Critical Research  
**TITLE:** Interpreting Giovanna  
**NAME:** Benjamin P. Hall  
Art Education Major

**CATEGORY 6:** Physical and Engineering Sciences  
**TITLE:** The Effects of Cellulase on the Initial Adherence of Pseudomonas Aeruginosa on Glass Surfaces  
**NAME:** Brian D. Knox  
Biology/Chemistry Major

Biofilm is a pest to industrial processes and health professions alike. Traditional means of eliminating biofilm use microbicides to kill the bacteria that form the biofilm. Microbicides are ineffective because the bacteria are protected by the biofilm, and are costly as well. The use of the materials containing immobilized enzymes that can degrade the excreted materials that form biofilm could provide a better solution. This study examines the effect that cellulase has on the initial attachment of the Pseudomonas aeruginosa bacteria. If cellulase can decrease or prevent the attachment of bacteria to a glass surface, than it may be of use when immobilized on a surface. This study examines the effect that cellulase has on the initial adhesion of bacteria to a glass surface. The results support the hypothesis that the enzymatic activity of cellulase is effective in reducing the ability of bacteria to adhere to a glass surface.

**CATEGORY 7:** Social Sciences  
**TITLE:** The Effectiveness of Hedging Strategies as Price-Risk Management Tools for Dairy Farmers  
**NAME:** Matthew W. Gearhardt  
Economics Major

The increasing volatility of milk prices due to the phasing out of government support prices is forcing dairy farmers to face much greater price-risk on a month-to-month basis than they have in the past. To help manage this increased exposure to price-risk, the United States Department of Agriculture has created educational programs to teach producers how to use price-risk management strategies (specifically futures options) in their operations. Skepticism exists as to how effective these hedging strategies will be for producers in lowering price variability. To investigate these claims, statistical analysis was used to compare price- and basis-risk for different milk marketing orders. Market simulation was carried out using past pricing data and a uniform hedging strategy with put options. Statistical results identified that basis-risk was not significantly lower than price-risk to permit effective hedging, and market simulation with hedging did not reduce the variability of the producer’s income. Basis levels were found to be more volatile in the Southeast versus the Upper Midwest. However, hedging milk production with put options did produce greater returns to farmers when milk prices were drastically falling, bringing producers higher mailbox prices than if they had not used any risk management strategy.
Despite its initial lead, Britain’s growth and development slowed in comparison to that of other European countries during the “Second Industrial Revolution,” the period described by such innovations as the telephone and radio, motor vehicles, and the distribution of energy and power via electric current. The success of many other countries during the Second Industrial Revolution has been largely attributed to the effectiveness of formal education in encouraging and teaching technical and scientific subjects. Many of the continental states established these educational institutions during this period and consequently made significant advances in the development and spread of new technologies and industrial processes. Britain, however, did not join her neighbors in creating technical and scientific education centers until much later, a decision that most historians agree resulted in the country losing her industrial lead.

Britain had succeeded during the First Industrial Revolution by exploiting various techniques and methods derived from a given, relatively unchanging knowledge base — the type of knowledge that organizes and describes natural phenomena and regularities: what we would today call “science,” including mathematics. However, in order to make significant advances in their techniques and methods it became increasingly necessary to also have new advances in this knowledge base. These advances began to occur at a more productive pace during the Industrial Revolution, widening the epistemic bases of many techniques and leading to sustainable growth in technology. Both the increase in general knowledge and the development of applicable techniques lead to economic growth. The formal institutions for scientific and technical education provided the ideal atmospheres for the development of both types of knowledge.

Theories abound on why Britain delayed so long in adopting technical and scientific education. Economic historians would like to be able to compare Britain’s situation with those of the continental states, such as France and Germany, in order to identify possible societal factors that could have caused the different receptivity of each country to technical and scientific education at the time, and to then apply these factors to achieving a better understanding of economic growth, and for possibly manipulating them in the future to encourage healthy innovation and the acceptance of promising ideas and inventions within and across different societies.

While numerous historians have identified particular societal factors, such as risk aversion and capitalism, that have characterized inventive or innovative societies in the past, discrepancies exist in the theories of what particular combination of factors leads to economic growth and development over time and across cultures. All else equal, societies’ successes over time should be approximately equivalent because each one experiences uninnovative and innovative periods.

In the end, with the diffusion of ideas, all societies will share their advances: they will adopt the technology and knowledge of others, and likewise the same benefits. Who innovates first in a particular situation depends on numerous societal factors and on their interdependent relationships, but these variances in societal factors, both between societies and within a society over time, cannot be combined in a recipe or definitive relationship that will result in a foreseen outcome over time or in every situation. Rather, these variances may be treated as random variables. Instead, the factors that affect the diffusion of ideas are what may be better controlled and improved in order to advance economic growth and potential.

Britain’s failure was in seeing formal technical and scientific education’s success and being slow to react. Improved communication and diffusion of ideas could have sped up Britain’s adoption of this type of education by combating societal factors more effectively. As long as the diffusion of ideas can occur, a society can innovate and grow even if at any given time it happens to be relatively less innovative than other societies. Societal factors are significant to economists only in that they may interfere with the diffusion and communication of ideas, not because they may make a society intermittently “uninnovative.”