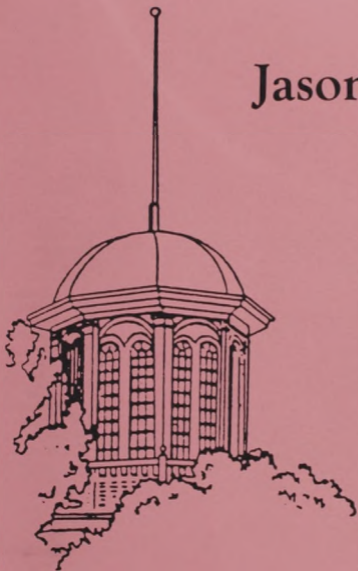


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ACKNOWLEDGEMENT

For many years, the students of the College of Liberal Arts have successfully published the Jason, a literary magazine showcasing the creative writings of the students. While the Jason has given an outlet and audience for the literary talents of our students, the scholarly work done has been largely confined to the classroom. The Jason II, a journal of student scholarship, is designed to provide a wider forum for some of the excellent papers students write during their four years at Willamette.

The papers that follow represent only a portion of the innovative, creative, and scholarly work that is done each semester at Willamette University. A special effort was made to include papers from different disciplines and class levels.

The editorial committee wishes to thank Dean Berberet and A.S.W.U. for their financial support, and The Print Shop for their encouragement and invaluable assistance. Finally, we wish to express our appreciation to the thirty-four students who were willing to share their work with us.

The Self-Centered Person: An Incomplete Human Being

By Colleen Broderick

C.S. Lewis' basic perception as to the nature of man's relationship to God is embodied in the *reality principle*. The reality principle is Lewis' statement of the way things truly stand between God and man. God has created human beings to be in fellowship with Him and in community with one another. Unfortunately, most human beings are unwilling to acknowledge the fact that, by virtue of having created us, God has a right to our lives. Indeed, Lewis sees this as the real mistake of the first human beings; Adam and Eve: ". . . they wanted to call their souls their own, but to do so is to live a lie, for our souls are not, in fact, our own." (Meilaender p. 3) In short, human beings desire to be self-centered. A person who is self-centered is one whose thoughts, emotions and energy are completely centered upon himself. Such a person has no desire to enter into fellowship with God. To enter into any relationship is to take on the responsibility of giving something of oneself to another. The self-centered person is incapable of giving, for he cannot take his eyes off himself long enough to see what anyone else's needs may be.

God asks us to give up our lives to Him. The self-centered person is afraid that in giving his life to God, he will get nothing in return. He is unable to trust that God's ways are truly better than the ways of man. This mistrust illuminates the basic problem with self-centeredness. The self-centered person has an inaccurate view of reality. The truth is that God, because He has created us, is the only one who actually knows what it means to be fully human. The self-centered person has also failed to understand that God's love is entirely self-giving. God did not create human beings out of need. He is secure in His own greatness. Screwtape, the main character in Lewis' *The Screwtape Letters*, described God's character extremely well in

This paper was written for C.S. Lewis & the Religious Imagination in the Fall 1986.

contrasting it with that of Satan: "We are empty and would be filled; He is full and flows over." (p. 38) The person who is self-centered is afraid that in flowing over, God will somehow wash away his individuality. In this fear, the self-centered person turns his back on God, rejecting His fellowship. Thus, because it constitutes separation from God, self-centeredness is the very essence of sin.

The self-centered person tries to find a method of self-fulfillment. To do so is impossible for if one does not give oneself to God, God can never complete the work He has started in him. Therefore, the self-centered person is lacking certain essential qualities which can only be obtained as gifts from God. In C.S. Lewis' works of fiction, the reader meets with several characters who attempt to find fulfillment apart from God's plan. Lewis clearly illustrates that such a person, instead of possessing abundant life, destroys whatever spark of life he once had.

One essential characteristic lacking in the self-centered person is humility. Because of an erroneous view of reality, the self-centered person cannot correctly define humility. Such a person believes humility means having a low opinion of oneself. Screwtape is delighted with this definition: "... thousands of humans have been brought to believe that humility means pretty women trying to believe they are ugly, and clever men trying to believe that they are fools . . . and we have the chance to keep their minds endlessly revolving around themselves in an effort to achieve the impossible." (p. 64) The person who believes such a definition of humility has missed the mark completely. God's definition of humility is a kind of self-forgetfulness, so that one can look beyond oneself. God wants us to enjoy creation as it is, not to be forever worried about how we perceive it.

In the absence of true humility, the vice of pride takes its place. Perhaps this is a reaction to the false definition of humility, for the proud man has far too high an opinion of himself. To have pride is to think oneself above others. In today's society, much emphasis is put on a person's status. People are encouraged to be prideful and encouraged to find pleasure in being above others. Therefore, the attainment of a certain status, and the sense of pride that accompanies it, are often mistaken for fulfillment. There is, however, one very simple reason why pride cannot fulfill. Pride is nothing in itself.

That is, pride is essentially competitive. For one who is proud, pleasure comes not in having something, but in having more of it than anyone else. It is not enough to have a big house and a great deal of money because the minute someone else attains the same level of affluence, the proud man wants a bigger house and even more money. There is no security in pride. One is forever seeking and never gaining any satisfaction.

Such is the problem with Mark Studdock, one of the central characters in *That Hideous Strength*. Mark is newly married, but spends very little time with his wife. He has a good job doing something he enjoys. At least he used to enjoy it. Mark seldom enjoys anything once he becomes involved with the Progressive Elements at Bracton. He is always concerned with "getting ahead", that is, with attaining entrance into the "inner ring" of the N.L.C.E. Mark is definitely a self-centered person. He cannot bear to be ignored. He believes that once he is inside the inner ring of leaders, he will gain the respect and admiration of others and thus be satisfied.

This is not, however, what happens. Mark is easily manipulated by the leaders of the organization. He is made to do all sorts of things which should be against his principles, but he does not object because he is so anxious to attain his goal. He can think of nothing else. Mark's self-centeredness drives him on. It corrupts everything that was good in his life. He and Jane by no means have a perfect marriage. Each is less concerned for the other than they are for themselves. There was, however, at least some thought of the other. In the isolation at Belbury, Mark loses all capacity to give. He has absolutely no intention of bringing Jane to live with him, because she would refuse to play the games he has been playing and would then hurt his chances for advancement into the "inner ring". What has happened to Mark may be explained in remembering that God desires self-forgetfulness. In isolation, there is no one for Mark to think about but himself.

It is this tendency toward isolation which Lewis thinks makes pride a more dangerous vice than even sensual perversions. To illustrate this point, Lewis uses a striking example from his own school days, which he describes in *Surprised by Joy*. There was apparently an "inner ring" in the prep school which Lewis attended.

There was also evidently a rather high incidence of homosexual affairs among this group. Lewis does not deny the fact he believes homosexuality to be a terrible vice, but surprisingly, he defends it as at least more constructive than the vice of pride. In sensual vices such as these, there is at least some semblance of fellowship, however small. The person must really give something of himself. There is something like the shadow of self-giving love which God possesses and wishes us to have.

So it is with Jane and Mark's marriage. It is certainly not the ideal relationship, but there is some good in it because it requires Mark to come out of himself, even if it is only slightly. It is ironic that in not bringing Jane to Belbury, Mark believes he is saving his status with the inner ring. The reader knows, that in actuality, the leaders of the N.L.C.E. have no interest in Mark at all. It is Jane they want because Jane can tell them where Merlin is buried. This is one example of the problem of placing all one's hopes of fulfillment in something of which God is not a part. The inner ring is a corruption of God's gift of community. There is no true fellowship in any inner ring.

When Mark finally begins to realize how foolish he has been, he can see this. He begins to see the truth as he thinks about how his career in the N.L.C.E. got started. He came to trust Wither on the recommendation of Feverstone. Mark wonders how he could not have seen through the false camaraderie Feverstone offered him. After all, Mark tells himself disgustedly, Feverstone was only good enough to fool "pawns" like Curry and Busby. Then with a shock, Mark remembers a time when he was more than pleased to associate with the likes of Curry and Busby. As he thinks about it, Mark sees that his whole career with the N.L.C.E. has been trying to get ahead, at the expense of others. Yet he seems to get nowhere. Everytime he thinks he has reached the true inner circle and is privy to all its secrets, he finds something else he did not realize or someone ahead of him. Moreover, rather than gaining anything, he is forced to give up more and more of himself to prove his loyalty to the inner ring. In trying to save his own life, he was losing it.

Screwtape gives insight into the type of fulfillment a man who accepts God's sovereignty is to have. Screwtape tells his nephew Wormwood that God wants a universe full of beings united to Himself but still distinct. The example he uses to illustrate this is

that God wants a human being to be able to design the best cathedral in the world and rejoice in its being the best and be no more or less glad that it was he who designed it than if anyone else had. God wants us to find our pleasure in merely having good things, not in being in competition for them. because competition is really endless and can never satisfy.

Screwtape cannot understand the idea of being united to God but still distinct from Him. In his emptiness, Satan desires to finally possess everyone, believing that this will fill his empty soul. Unfortunately, human beings who live in a state of separation from God often believe the same illusion.

Since human beings were never meant to be out of fellowship with God, those who reject this reality still have a yearning for something the world does not offer. Some people's solution to this problem is to try and elevate whatever it is that gives them the most earthly satisfaction to an unnatural level of importance. We have met with two of Lewis' characters who attempt self-fulfillment in this way.

In *The Great Divorce*, Pam is Lewis' example of one who is completely self centered. Pam elevates her relationship with her son to an unnatural level. In the process, she destroys it, as well as her relationship with the rest of the family. Maternal-love is an essentially good emotion. It is an illusion, however, to believe that such love can take the place of God's love. No earthly relationship was meant to do this. What God has created as good becomes distorted because it cannot be placed in proper perspective apart from Him. Pam exchanges the natural affection of a mother for a desire to possess her son.

Pam does not love her son. If she really loved him, as God intended for her to love him, she would want what is best for him. Instead, she wants to take him back to Hell, not to love him, but to use him. She wants to use him to fill the void in her heart which God was meant to fill. The reader can see, through Pam, that self-centeredness kills all enjoyment of whatever good God gives to us. Reginald, Pam's brother and the spirit sent to help guide her to God, brings up the fact that Michael was taken away from her on purpose. What she called love was torture to him. After his death, she revels in her own grief, paying no attention to the rest of her family. She, of

course, does not see it in this way because, being self-centered, she can only see that her own needs go unfulfilled.

In his novel, *Till We Have Faces*, Lewis introduces another character whose self-centeredness keeps her outside of fellowship with God. Orual does not see herself as self-centered. She claims to love her sister Psyche. Indeed, it is true that the child most likely would have been poorly cared for, were it not for Orual's intercession. Orual truly delights in the child's great beauty and in everything about her. Unfortunately, what Orual loves most about Psyche is the fact that the child is dependent upon her. Like Pam with Michael, Orual chooses to elevate her adoration of Psyche to an unnatural level. What should be a wonderful, mutually supportive relationship becomes corrupted because Orual refuses to live under the sovereignty of the gods.

Psyche must be sacrificed to the god of Grey Mountain. It is told that some mysterious creature called the Shadow Brute will come to her. Some say this creature will devour her, some say he will take her for his bride. Orual is devastated by this news. There is, however, a self-centered motive behind her grief. She is not so much broken hearted by the idea that Psyche will lose her life, as she is by the idea that she will lose Psyche.

Orual's self-centeredness is particularly evident in her meeting with Psyche on the night before the sacrifice. She should be trying to comfort Psyche, but it is obvious she herself wants comforting. Orual is only interested in hearing how everything pertains to herself. She only wants to hear that Psyche cannot bear the thought of being without her. She is jealous of everything and everyone else whom Psyche mentions in the conversation. She cannot even let the girl have the comforting thought that she may be the bride to a god. Orual leads Psyche to doubt this, and when at last the poor girl weeps, Orual is wretchedly pleased, because she gets to "comfort" Psyche. It must be noted that there is nothing self-giving about the comfort Orual gives. She only wanted to force Psyche to focus attention upon her. When Psyche recovers from her grief, Orual is actually disappointed. Is this love?

As with Pam, in *The Great Divorce*, Orual's true desire is not to love her sister, but to possess her fully, in order to be able to use her

to fill the emptiness in her own life. If Orual had loved her sister, she would have rejoiced that Psyche found happiness. For Psyche does become the bride of a god. Orual claims not to believe it because she cannot see the palace Psyche claims to live in. This is not the only reason, however, to believe that it exists. She can see other clues plainly enough. Psyche is well fed, she is actually healthier than she has ever been. The argument is made that Psyche is not in her right mind, however, she speaks and thinks clearly enough. Also, Psyche is extremely happy. No, it is not fear that Psyche is hurt or unhappy that causes Orual to want to bring her off the mountain. Rather Orual is afraid Psyche is happy and she can't stand the idea of Psyche being happy without her, just as Pam could not bear the thought of her son being happy without her.

In fact, Orual is so self-centered and so desperate to hang on to what she perceives to be her only source of happiness and fulfillment, she deliberately ruins Psyche's happiness. She orders Psyche to sneak into her husband's bedchamber with a lamp to see what he looks like. She knows full well that Psyche has been forbidden to do this and will more than likely be severely punished. She does not care about Psyche's suffering at all, only her own. When Psyche refuses to do as her sister bids, Orual puts a dagger through her own arm to make Psyche feel guilty. It works, Psyche agrees to disobey her husband, but her attitude is not what Orual would have wanted: "Oh, Orual, to take my love for you . . . to use it as a weapon of mastery and torture . . . I begin to think I never knew you-whatever comes after, something between us dies here." (p. 165)

This quote reveals the real folly of living for oneself, outside of God's fellowship. Psyche has always loved Orual deeply, but Orual could never respond to that love and enjoy it as it ought to have been enjoyed. Because she does not accept God's great love, Orual's need for love is insatiable. Nothing and no one else can fill the space in one's heart which God, who is immeasurably superior to us, was meant to fill. Orual refuses to believe that the gods would give her and Psyche a love for each other which is purer and more satisfying than Orual can possibly imagine. Instead, Orual takes that love that Psyche does have for her, and destroys it.

It has been shown then that any attempt to find fulfillment apart from a relationship with God, will finally leave one dissatisfied. The

only solution is to let God have one's life and become centered self, as opposed to self-centered. A centered self is one whose mind and heart are completely centered upon God. Lewis creates a character who is a centered self. This is Emeth in *The Last Battle*. Emeth is a young Calormene warrior who enters Aslan's country. It may seem strange that Lewis chooses to portray a Calormene as a centered self. Actually, his purpose seems to emphasize the fact that it is a person's heart that God is interested in, not any external standard such as human beings often value.

Emeth is quite an extraordinary young man. He is unlike any other Calormene which the reader meets. Lewis describes him as "rather beautiful in the dark, haughty Calormene way." He is certainly a noble young man. Emeth is ashamed of his mission in Narnia, because it is carried out secretly and he realizes deception is dishonorable. How different this attitude is from that of a self-centered person who will use any means to achieve his desires.

Perhaps the most admirable quality which Emeth possesses is a sense of reverence. He is most willing to meet Tash face to face, though he knows it may mean his death. There is an absolutely unself-centered motive for his worship. He does not honor Tash in order to gain anything. He worships Tash because he knows Tash to be superior to him, and so, worthy of honor.

Aslan tells Emeth all find what they truly seek. Emeth tells the seven friends of Narnia that he has served Tash since he was a boy and that the name of Aslan was hateful to him. It is clear, however, that in actuality Emeth knew nothing of the true nature of Aslan. All of the characteristics which Lewis shows us in Emeth; intelligence, honesty, courage and reverence; are not qualities which a true servant of Tash is capable of possessing. Rather, Emeth assumes he has been following Tash. In fact, he has been seeking righteousness. If this were not so, Emeth could not have recognized Aslan as Lord when they met. Yet, immediately upon seeing the lion, Emeth realizes that "the glorious one" is worthy of all honor and humbly admits he was wrong.

Herein lies the difference between one who is self-centered and one who is a centered self. Emeth's search is outward because though he is not certain what God is like, he can see his own inadequacy. Thus, upon meeting God, he recognizes His greatness

and accepts it joyfully. The self-centered person's search is inward. Therefore, he sees what little he has and is unable to see how much more God has to give him. If we turn toward God, we are able to be filled. If we turn away, we are unreachable and consequently incomplete human beings. The fact of the matter is, fellowship with God is not an option. It is a necessity if we are to attain true humanity.

BIBLIOGRAPHY

- Lewis, C. S. *The Great Divorce*. New York: MacMillian, 1946.
- Lewis, C. S. *The Last Battle*. New York: MacMillian, 1956.
- Lewis, C. S. *Mere Christianity*. New York: MacMillian, 1943.
- Lewis, C. S. *Screwtape Letters*. New York: MacMillian, 1961.
- Lewis, C. S. *Surprised by Joy*. London: Harcourt Brace Jovanovich, 1955.
- Lewis, C. S. *That Hideous Strength*. New York: MacMillian, 1946.
- Lewis, C. S. *Till We Have Faces*. London: Harcourt Brace Jovanovich, 1956.
- Meileander, Gilbert. *The Taste For the Other*. Michigan: Eerdmans Publishing, 1978.

Greek and Roman Differences

By Martha Bennett

Greek art is often considered humanistic. That is, it is seen as glorifying the natural man. Yet, in reality, Classical Greek art was not really a tribute to the men and women of the age, but rather, it was dedicated to the eternal condition of mankind. It represents the Greek vision of the ideal man and is a tribute to this ideal. On the other hand, Roman art was much more personalized. Roman works give a sense of life, personality, energy, and momentary circumstance. Roman art focused on people. This contrast between the Classical Greek ideal of the eternal and the Roman concept of the individual in art can be seen in comparisons of architecture, sculpture, and painting.

The Parthenon on the Acropolis in Athens and the Basilica Ulpia from the Forum of Trajan in Rome demonstrate the differences between Classical Greek and Roman architecture. Initially, we can see many similarities between the two buildings. Both of them contain places for worship of the gods. Both have strong appeal to the people of each society; the people are the reason these buildings were constructed. Next, both buildings are rectangular. The architects' conception of the ideal building seems to have been similar in this respect; Greco-Roman architects thought in straight lines, not in curves (even the Pantheon has a rectangular porch). Finally, both buildings make fairly extensive use of the column as an architectural device. The column was typical of the Mediterranean region. It is well suited to a warm, sunny climate where the people seldom worry about weather and do not need solid walls to protect themselves.

Yet, the purpose of these two buildings is completely different. The Parthenon was built primarily for the worship of the goddess

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Athena. The building belonged to her, and the people were involved in it only to pay tribute to her. The interior of the building was used by the priests, not the general public. The Parthenon was dedicated to the eternal Athena. On the other hand, the Basilica Ulpia was a building of the people. The interior of the building was huge, with large vaulted space for light and people. The Basilica was a place for business transactions, courts, stock trading, and civic activities. It was a busy, bustling place. Worship of gods was shoved into apses at the far ends of the building; religion was secondary. The conception of the buildings themselves was also very different. The Parthenon was built to be viewed from the outside. It was conceived of as an enormous sculpture. As such, the way the columns were designed — to give the illusion of mathematical symmetry — the crises over the corner triglyph, the dimensions of the building and the careful detail of the pediment sculpture all tend to unify the Parthenon. Every part of the building relates to every other part, making it a whole and suggesting the ideal of eternal beauty. In retrospect, the Basilica gives the impression of being just a building. The focus of the structure is people, not beauty. The huge interior spaces, ceilings vaulted by stacked columns, and the concern for light (solved by celestory windows) all point to the Roman concern with the here and now of human existence. The building does not strive to make a sculptural statement but for space for the people who are inseparable from it. The finer noteworthy contrast is in building materials. The Parthenon was built of marble — a beautiful, expensive, and eternal material. The Basilica Ulpia was concrete which is more economical and practical.

In sculpture, the differences between Greek and Roman art are revealed, less obviously, by Polykleitos' *Doryphoros* and the Roman *Augustus of Prima Porta*. These two works at first glance seem almost identical. They both hold, basically, the same walking pose with one arm extended. They are both unified and balanced. The broad shoulders, thick torso, muscular body, and mature face and chin of both figures suggest the idealized proportionalized conception of Classical Greek art. Additionally, it is easy to see that both of these men are warriors, hardened by the experience of many years.

Augustus of Prima Porta clearly displays the Hellenic influences on Rome. Yet, upon closer examination, some dramatic differences

can be found. The most obvious difference, of course, is that the Doryphoros is nude while the Augustus is clothed as a warrior. This difference is important because Doryphoros comes to represent the Greek concept of the perfect man. He has absolutely no identity. He is every man, and he is no man. Yet, Augustus' clothing distinguishes him as an individual. His dress identifies him as an officer in a Roman Legion (supposing we do not already know his identity). Further, the breastplate with its scenes of battle and of gods gives us a sense of the man's beliefs and values. We get an impression of who he is. Secondly, the positioning of the raised arm helps distinguish between the two figures. Doryphoros' arm is close to his side, raised without being extended. He could hold this posture anytime — when he was walking, or in a competition, or discussing politics with his wife. It does not convey the feeling of any moment. On the other hand, Augustus' arm is fully extended and his first two fingers are pointing to something. He gives the impression that he is addressing a crowd or directing his legion. He betrays a sense of the moment. Finally, the faces of the two works give differing impressions. The Doryphoros' hair, chin, and face convey no individuality because of the high degree of idealization, while Augustus' face, though somewhat stylized, conveys elements of his character and personality.

Painting also illustrates the conceptual differences between Greek and Roman art. The vase decoration *Hermes Bringing the Infant Dionysos to Papposilenos* illustrates Greek concern with the eternal while the paintings from the *Villa of the Mysteries* have frozen a specific moment in time.

Both of these paintings are based on the myths and rituals surrounding the god of wine (Dionysos in Greece — Bacchus in Rome). As such, both contain certain elements that emphasize the formality and ritual of the scene. Rich detail can be found in both works. The artist of the *Hermes* is concerned with Papposilenos' white beard, and the Roman painter treats the hands and fingers in this scene carefully. Both paintings also make use of reds, yellows, and browns which make them warm and rich.

Yet, the differences in the very nature of the paintings illustrates general Greek and Roman differences. The scene in the *Hermes* is the illustration of a myth. The figures are gods, not men. This stresses the Greek belief in eternal beauty. Real life, even on a

household utensil, is not worthy of representation to the Greeks. The Villa paintings, however, narrate the rituals performed by real people. These are people you can touch, not gods in a myth. The Villa paintings are like a frozen moment in time, while the Hermes is out of any time frame. This concept of myth versus real life is conveyed by the style of both paintings. The figures of the Hermes are flat, without much shape or roundness. Their movements seem stiff and ritualized; their gestures are calculated. The artist has not given their faces personality. Almost exactly the opposite is true with the Villa figures. They are not sculpturally round, but the artist has used shading and shadow to make them seem like people. More important, the use of curved lines in the arms and cloaks of the figures gives a sense of energy and motion. The figures are graceful instead of awkward. Their potential for movement is greater. Finally, the architectural style of the Villa paintings contributes to their sense of immediacy. The painter's utilization of floor and walls makes it seem as if the viewer is actually in the room observing, and perhaps participating in, the ritual. The Hermes, however, is clearly a narrative scene we are looking at from a distance. It is like a synopsis of a book or movie.

In all three mediums, the same differences between Classical Greek and Roman art seem to be typical. The Greeks loved the rational, the calculated, and the eternal. Their art portrayed the glory of the gods, the ideal man, and a sense of permanence. Roman art, however, displays tremendous energy, life, and a consciousness of the here and now.

For Reference, please see:

Gardner's Art Through the Ages, San Diego, Harcourt Brace Jovanovich, Inc., 1986.

1. The Parthenon: plate 5-45, page 151
2. Basilica Ulpia: 6-48, page 219
3. Doryphoros: 5-61, page 160
4. Augustus of Primaortia: 6-57, page 225
5. The Hermes: 5-64, page 162
6. Villa of the Mysteries: 6-29, page 204

An Electron Microscopic Comparative Study of Gentamicin and Kanamycin Nephrotoxicity in the Bullfrog, (*Rana catesbeiana*)

By Mark Walterskirchen

ABSTRACT

The damage to proximal tubule cells of bullfrogs caused by gentamicin and kanamycin was studied by light and electron microscopy to determine any difference between the two drugs. The bullfrog was utilized to determine if the bullfrog's simpler cardiovascular and renal systems handle the drugs differently from mammals'. The aminoglycoside antibiotics were given at dosages of 50 mg/kg daily for six days to California bullfrogs. Gentamicin was very nephrotoxic in terms of histological criteria developed. The damage caused by kanamycin was similar to that seen at an early stage of gentamicin nephrotoxicity, and the overall damage from gentamicin was comparable to that seen in mammals. From this study it appears that kanamycin nephrotoxicity is less than but no different in terms of criteria than gentamicin.

There is extensive documentation of the nephrotoxicity caused by the aminoglycoside antibiotic gentamicin, particularly in the rat. (Houghton et al, 1976; Humes et al, 1982; Kaloyanides et al, 1980) Little, however has been done in relation to comparing the histological damage caused by two different aminoglycoside antibiotics with differing nephrotoxic potentials. Also, very little research has studied the way in which amphibians are affected by these aminoglycoside antibiotics. For this study, gentamicin, which is known to cause a high degree of damage in mammals, was compared to the aminoglycoside kanamycin which has a significantly lower nephrotoxic potential in terms of functional disability and morphological damage. (Luft et al, 1978) The purpose of this study was to

This paper was written for Electron Microscopy in the spring of 1985.

compare and contrast the degree of damage that occurred in the bullfrog kidney when the aminoglycosides were administered over a six day period.

A dosage of 50 mg/kg was chosen because of the documentation that gentamicin causes a high level of renal damage at a similar level in the rat. (Gilbert et al., 1978; Houghton et al., 1976) It was questioned whether kanamycin, at this same dosage, would cause a different type of damage or that the damage that did occur would be similar to that seen at an early stage in gentamicin nephrotoxicity. It was also questioned whether the bullfrog, *Rana catesbeiana*, which has a simpler cardiovascular and renal system, would handle the drugs in a manner similar to mammals and thus incur the same sort of damage. It is interesting to note that in humans kanamycin has a recommended dosage over three times higher than that of gentamicin. (Luft et al., 1978) This reflects the differing levels of injury related to each drug.

Materials and Methods

California bullfrogs (*Rana catesbeiana*) weighing 50–160g were obtained from a California supplier and housed in tanks which were designed to allow a continuous flow of cold tap water. During the study the bullfrogs were separated by treatment group to prevent the absorption of significant amounts of drug from the surrounding water as has been reported. (Fox and Russell, in press)

A total of six animals for each drug and five control animals were used in the study. Each bullfrog received a single intramuscular (IM) injection daily for six days at a dosage of 50 mg/kg. The control animals were given a volume of 0.9% sodium chloride solution equivalent to that received by drug treated animals.

Approximately 24 hours following the final administration of drug each bullfrog was weighed and then sacrificed by double pithing. The body cavity was opened and the vascular system perfused through the aorta with approximately 40-50 ml of sterile Millonig's phosphate buffer. (Millonig, 1962) This was followed by a perfusion with 20 ml of fixative. (2.5% glutaraldehyde and 2.0% paraformaldehyde) During the second perfusion the body cavity was allowed to fill with fixative to permit external, as well as vascular, fixation of the kidneys. A kidney was then removed and two

longitudinal sections were taken from the midsection and cut into numerous 1 mm³ cubes and prepared for both light and electron microscopy study. Following fixation in fixative for 3–5 hours and a post-fixation in 1% OsO₄ for 1–1/2 hours the sections were dehydrated in increasing concentrations of ethanol. (30–50–70–85–95–100%) Subsequently the tissue was carried through two changes of propylene oxide and infiltrated in a 1:1 mixture of propylene oxide and plastic resin overnight. One half of the cubes were infiltrated and embedded in Alderite while the other half in Spurr's resin. One mm thick sections were cut on a Porter-Blum MT2-B ultra microtome and stained with toluidine blue for light microscopy. Ultrathin sections were cut and stained with uranyl acetate and lead citrate for study using a 50 KV AEI 6B electron microscope.

To quantitate the histological damage in the renal tissue which was a measure of nephrotoxicity, a set of parameters was developed with a corresponding grade from 0 to 4 being assigned. Table 1 details the grading system. For each of the 23 animals, 6 slides were prepared for light microscopy and then randomly assorted and a computer generated random number was applied to the slide's label. Three blind, non-biased assessments were then made with each slide being given a grade based on the criteria. The values were collected and averaged.

Grade	Parameters
0	No damage
1	Some vacuoles and cytosomes Less than 50% of cells affected
2	More vacuoles and dark cytosomes Some brush border discontinuity More than 50% of cells affected
3	Majority of cells containing vacuoles and cytosomes More brush border destruction Some luminal debris Some cellular shrinkage
4	Total cellular necrosis Much luminal debris

Table 1



Micrographs of proximal tubule cells from control animals. Brush border membrane (BB) is continuous and relatively tall with a few vacuoles (VC). (X 6,800)



Micrographs of gentamicin damaged renal tissue. the extreme nephrotoxicity is characterized by large collections of cytosomes (CT), numerous myeloid bodies (MB), and the destruction of cellular membrane (arrows). N-nucleus. (X 5,900)

Following the collection of data a statistical analysis was conducted utilizing the Willamette University Statistical Program to compare by analysis of variance and T-test the values obtained from the histological study.

Results

The mean pathological scores are shown in Table 2. It shows that for both kanamycin and gentamicin the pathological score is significantly different than the control score ($P < 0.05$) using an analysis of variance.

Both the control animals and those animals which received gentamicin had renal tissue which was similar to that seen in mammals which had received the same sort of treatment. (Houghton et al, 1976)

The micrographs of renal tissue from control animals were clear of any major damage. The brush border membrane was relatively tall and continuous. There were some small vacuoles present in the cytoplasm, but this is expected to a small degree from normal cellular function.

Control	1.40±0.63
Gentamicin	4.00±0.00
Kanamycin	2.50±0.76
Streptomycin	1.47±0.88*

*Not significantly different from control ($P > 0.05$).

Table 2

The early signs of nephrotoxicity due to kanamycin included swollen mitochondria, vacuoles containing small myeloid bodies and the loss of some brush border membrane.

As is seen in the rat (Houghton et al, 1976), the proximal tubule is the primary site of damage. The distal tubule of the bullfrog as expected received no damage.

Many cells within the proximal tubules were damaged to different degrees. The damage ranged from a small loss of brush border membrane with few vacuoles, to the cytoplasm containing numerous vacuoles and cytosomes, extreme swelling of mitochondria and much discontinuity in the brush border membrane.

In kidney tubule cells damaged by gentamicin the nephrotoxicity was extreme. The damage included large collections of cytoplasmic debris, cellular desquamation and necrosis with numerous myeloid bodies present.

Discussion

The present literature presents a detailed description of the gradation in histological damage that occurs as more and more gentamicin reaches the renal tissue of mammals. (Houghton et al, 1976; Humes et al, 1982; Kaloyanides et al, 1980) The earliest signs of damage include the increase in the size and number of secondary lysosomes, also called cytosegrosomes, cytosomes or phagosomes, as well as the swelling of mitochondria. The secondary lysosomes are primary lysosomes which have altered their structures by combining with endocytic or autophagic vacuoles. As damage progresses electron-dense myeloid bodies increase in number and size along with a corresponding decrease in the number and height of the brush border membranes. Vacuoles enlarge and the lumen of tubules begin to collect brush border fragments, extruded myeloid bodies, vesicles, and cytoplasmic debris. As the damage continues there is extensive cellular necrosis and desquamation accompanied by the continued extrusion of materials into the lumen of both proximal and distal tubules.

The extensive damage just described is readily visible in the micrographs of the bullfrog kidneys that were subjected to gentamicin in this study. There is general cellular necrosis, numerous myeloid bodies and large collections of cellular waste materials.

In the micrographs of the kanamycin treated bullfrogs there is the expected lesser degree of renal injury, because of kanamycin's lower nephrotoxic potential seen in rats. (Luft et al, 1978) The damage that does appear includes the gradual increase in size and number of vacuoles, primary and secondary lysosomes and the loss in height and number of brush border membranes. This type of nephrotoxicity is characteristic of gentamicin induced damage at an early stage. There appears to be no obvious changes in nephrotoxic parameters from that seen in rat kidneys damaged by gentamicin.

The exact cause or causes of aminoglycoside nephrotoxicity is still open to speculation. There is no firm answer as to why myeloid bodies develop or why the primary lysosomes change into secondary lysosomes. It is also unknown why gentamicin is so much more nephrotoxic than kanamycin. Possibly it is due to minor structural differences between the drugs causing a difference in binding capabilities. However, it is apparent from this study that the damage caused by kanamycin at a similar dosage is very similar to that found at an early state of disturbance caused by gentamicin as well as showing that nephrotoxicity caused by aminoglycoside antibiotics in the bullfrog is similar to that seen in rats.

LITERATURE CITED

- Fox, K.E., and N.J. Russell,
Comp. Biochem. Physiol. 1986.
- Gilbert, D.N., C. Plamp, P. Starr, W. M. Bennett, D.c. Houghton,
and G. Porter,
Antimicrob. Agents Chemother. 1978.
- Houghton, D.C., M. Hartnett, M. Campbell-Boswell, G. Porter,
and W. Bennett,
Am. J. Pathol. 1976.
- Humes, H.D., J.M. Weinberg and T.C. Knauss,
Am. J. Kidney Dis., 1982.
- Kaloyanides, G. J., E. Pastoriza-Munoz,
Kidney Int., 1980.
- Luft, F.C., R. Bloch, R.S. Sloan, M.N. Yum, R. Cotello, and D.R.
Maxwell,
J. Infect. Dis., 1978.
- Millonig, G.,
5th International Congress of electron microscopy,
Academic Press, 1982.

Women In Administration: Striving For Equality

By Deborah Bellemore

Sex-based inequalities exist in school employment from elementary school through higher education. This is most apparent in school administrative positions. While research shows that women are quite capable in this area, men hold a disproportionate number of leadership positions. (Fauth, 1984) This imbalance is the result of a variety of factors including discriminatory practices against women, social forces which have defined women's role in the field of education, and the changing nature of school administration. (Thomas, 1986) Certain trends in recent years have helped women, such as the greater acceptance of women as men's equals and the greater number of women entering graduate work. (Thomas, 1986) But these factors have not been strong enough to erase the disparity between the number of men and women in administrative positions. The establishment of support groups for women, as well as programs designed to specifically encourage women to enter the field are helping women make positive gains in administration. (Shakeshaft, 1984)

Recent statistics demonstrate that women do not have equal standing in the school system. Although women constitute 83 percent of elementary teachers and 47 percent of secondary teachers, they are clearly underrepresented in administrative and policy-making decisions. (Fauth, 1984) Only 12 percent of elementary school principals, 4 percent of high school principals, and less than 1 percent of school superintendents are women. (Fauth, 1984) In addition, women who are in top positions of leadership are more likely to work in small schools and urban areas than men in those positions. (Encyclopedia of Educational Research, 1982) Similar results are found in higher education. The Leaders in Transition

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Project, initiated in 1981, discovered that only one-fifth of senior administrators were women. (Tinsley, 1984) Positions which employed the largest amount of women were head librarian, registrar, and director of financial aid, while for male respondents, the top three positions were president, chief business officer, and registrar. (Tinsley, 1984) At all levels of school administration, women earn lower salaries than men and are less represented at any state and national levels. In 1978, nearly three times as many female principals as male principals earned less than \$20,000 per year. (Biklen, 1980)

Discrimination against women involves the arbitrary attribution of inferiority based on the grounds which have little to do with their actual behavior. (Gould, 1964) Many of the reasons for the unequal treatment of women can be traced to the division of sex roles in our society. Women are often seen as too emotional, not task oriented enough, too dependent on feedback and evaluations from others, and lacking an ability to make authoritative decisions. (Biklen, 1980) They are viewed as being able to nurture children and follow instructions in a bureaucratic structure, but not able to dominate the structure in leadership positions. (Biklen, 1980) Research on performance counterbalances this stereotypical attitude. (Fauth, 1984) Another difficulty results from the different ways in which women are evaluated. Men are judged on the job by their level of effectiveness, while women must be competent in their female roles as well as their occupational roles. (Epstein, 1975)

Women also face discrimination in areas concerning job training, selection processes, and the nature of the position attained. (Biklen, 1984) Women are generally discouraged from seeking managerial positions, while men are encouraged to seek them. Although the enrollment in departments of administration across the U.S. has increased, the training approach, with few exceptions, remains the same. The ideal school administrator is portrayed as male. (Shake-shaft, 1984) There is a near total lack of models for women in school administration. (Niedermayer, 1974) In addition, colleges and universities make no special effort to recruit women for training and women teachers receive less encouragement from supervisors to become administrators. (Biklen, 1980) Female students in administrative programs receive a smaller percentage of financial

assistance and less mentor support from faculty in terms of job access than their male peers. (Clement, 1975)

A strong social bias appears to exist against appointing women to administrative positions. One study conducted in Oregon shows a cultural norm that encourages men to seek managerial positions and discourages women from doing so. (Schmuck, 1975) It also shows that women receive unequal treatment not only on the job, but before the final selection process for positions. (Schmuck, 1975) Discrimination does not necessarily occur in the screening process, but takes place before that. Women are often not even considered for leadership positions, regardless of qualifications. (Estler, 1975)

Internal barriers such as low career aspirations, self limiting beliefs and attitudes, lack of motivation, and poor self image are commonly cited to exploit the small number of women in leadership positions. (Shakeshaft, 1984) While these do play an important role, too often external variables such as the lack of encouragement and support, the lesser likelihood of obtaining a sought-after administrative position, and the inaccessibility of information concerning position requirements and job vacancies bring about such feelings. (Fauth, 1984) Many researchers suggest that women limit their aspirations to conform as nearly as possible to their expectations of what is feasible. (Estler, 1975)

The demands of home and family life are a potential barrier to keep women out of administrative positions. (Shakeshaft, 1984) One study reports that almost one half of the females surveyed expressed an interest in administration and of these, family considerations did not influence their aspiration level. (Fauth, 1984) Women generally experience some conflict in establishing themselves as school managers and their traditional role in the home. (Erickson, 1985) Some women find it impossible to give their all to a career and still be fair to their family. (Woo, 1985)

As school administration becomes more like a business, those in leadership positions turn to men as effective business managers. (Biklen, 1980) Perhaps this has contributed to the drastic decline in the number on women principals over the last fifty years. (Encyclopedia of Educational Research, 1982) The increasing bureaucracy of the school system has resulted in an interesting separation, both

in training and professional life, of the professionals of teaching and administration. (Fauth, 1984) Women tend to hold administrative positions in counseling and personnel, while areas such as budgeting and finance are traditionally held by males. (Biklen, 1980) It is odd that during a period when there is an increased participation of women in the management of private enterprise, the trend toward fewer females in educational administration continues.

Are fewer women in top positions because they are less qualified than men? Research demonstrates that female principals are as effective or more effective than male principals. Women principals were considered to be excellent in their ability to create a supportive building atmosphere, to perceive and to solve problems, to take appropriate action, and to facilitate improved human relations, in the school community. (Smith, 1978) In addition, women have been found to be more concerned than men about the academic progress of students, to be more knowledgeable about curriculum, to value the productivity of their teachers, and to demonstrate greater concern for individual differences than men. (Faust, 1984) Women exhibit a more democratic style of leadership than men, and encourage participation and inclusiveness rather than exclusiveness in schools. (Shakeshaft, 1986) In general, teaching and learning seem to be the major interests of women administrators. These factors combine to help build a sense of community and a higher morale in schools where women are administrators. (Shakeshaft, 1986) This data may also suggest that women must be better qualified than men and strive harder in order to achieve the same status as their male counterparts.

Programs are emerging to help provide support to women on their way up the career ladder. In Arizona, one such workshop helped to increase the number of women principals by 13 percent over a four year period, and has also markedly improved attitudes toward administrators. (Metzger, 1985) They also contributed to the creation of a strong network of women to give help to other interested women achieve psychological and professional readiness for careers in administration. (Metzger, 1985) Other programs have focussed on changing women's attitudes and beliefs about themselves and their roles in the schools. (Shakeshaft, 1984) At the Center for Women in Educational Leadership at the University of

North Carolina interested women with leadership potential met to assess their needs, concerns, ambitions, and the barriers they had encountered. (Woo, 1985) The study revealed that women need to develop a more realistic approach to their roles and abilities in order to resolve the conflicts between the mixed messages that society transmits. (Woo, 1985)

Women need to be encouraged to defy traditional administrative organization and values to combat the sex-based inequalities that exist. An increased women's role in school administration could serve to strengthen the educational system by promoting greater equality between the sexes. (Shakeshaft, 1986) Women's place in leadership will ultimately be determined by the larger context of social change in society and in the field of education.

Understanding the reasons that women hold so few administrative positions and examining the options available to them is a step in the positive direction.

BIBLIOGRAPHY

- Bilken, S.K., & Brannigan, M.B. (Eds.). *Women and Educational Leadership*. Lexington, Mass.: Lexington Books, 1980.
- Clement, J. *Sex Bias in School Leadership*. Evanston, Ill.: Integrated Education Associates, 1975.
- Encyclopedia of Educational Research (Vol. 1-4)*. (5th ed.). New York: Free Press, 1982.
- Epstein, C.F. Bringing women in: Rewards, punishments, and the structure of achievement. In R. Kundsinn (Ed.). *Women and Success*. New York: William Morrow, 1975, pp 13-21.
- Erickson, H.L. Conflict and the female principle. *Phi Delta Kappan*, 12, 1985, 288-291.
- Estler, S. Women as leaders in public education. *Signs: Journal of Women in Culture and Society*, 1, 1975, 363-386.
- Fauth, G.C. Women in educational administration: a research profile. *The Educational Forum*, 49, 65-78.
- Gould, J. & Kolb, W.L. (Eds.) *Dictionary of the social sciences*. New York: Crowell-Collier Publishing Company, 1964.
- Metzger, C. Helping women prepare for principalships. *Phi Delta Kappan*, 12, 1985, 292-296.
- Neidermayer, G., & Kramer, V. *Women in Administrative Positions in Public Education*. Philadelphia: Recruitment Leadership and Training Institute. (Eric Document Reproduction Service NO. ED 096 942).
- Shakeshaft, C. A gender at risk. *Phi Delta Kappan*, 9, 67-68.
- Schmuck, P. Deterrents to women's careers in school management. *Sex Roles*, 1, 1978, 339-353.
- Smith, J. Encouraging women to enter administration. *National Association of Secondary School Principals' Bulletin*, 62, 1978, 114-119.

- Thomas, D.M. Why aren't women administering to our schools? *National Association of Secondary School Principals' Bulletin*, 62, 1986, 114-119.
- Tinjsley, A., Secor, C., & Kaplan, S. (eds.). *Women in Higher Education Administration*. San Francisco: Jossey-Bass, 1984.
- Woo, L.C. Women administrators: Profiles of success. *Phi Delta Kappan*, 12, 1985, 285-288.

David Hume's Contributions to the History of Economic Thought

by Dan Keppler

Many great thinkers throughout Western History have contributed to the field of economics. A study of economic history always includes a handful of great economists that developed the field and the theory that it employs. There exists, however, a large body of other intellectuals including natural scientists, political scientists, historians, writers, and philosophers that has also had major impact on the history of economic thinking. The sum of all the direct and indirect influence of the individuals in this diverse group may even outweigh the work done by the economic giants. By closely examining the work of one of the minor economic thinkers, we can better understand the way in which the entire discipline evolved.

When most people in the academic community hear the name David Hume, they generally associate it with the disciplines of philosophy and history. Nevertheless, Hume's relationship with the renowned economic thinker, Adam Smith, Hume's correspondence with other economists, and his few essays on economic subjects have led today's economists to include him as a contributor to their field. (Oser, pp. 57-8) Most economists continue to remember Hume as a forerunner to the classical school of economics. In order to clearly view Hume's economic thinking, one must first look briefly at his life and his works in other disciplines.

David Hume was born in Edinburgh, Scotland in 1711. At the age of twelve, he entered the University of Edinburgh but lost interest and left at the age of fifteen without a degree. In 1734 he went to study in France, where he wrote his first philosophical work, *A Treatise of Human Nature*, which he published in London in 1738. He remained in Great Britain for most of the rest of his life where he

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became an eminent but unorthodox philosopher. At one point, the University of Edinburgh refused him the chair of Philosophy because of his unusual views. (Oser, p. 54) Hume was formally educated in history and thus wrote an extensive multi-volume history of England in addition to his philosophical writings.

Modern philosophers consider Hume to belong to the philosophical school of empiricism. The empiricists believed that all of human knowledge derives from the senses. They opposed the rationalism school of thought which maintained that certain knowledge, such as knowledge of God, is innately embedded in the human mind. Empiricism, like rationalism, has difficulty explaining the origin of perceptions from the senses and thus questions the existence of matter. The importance of Hume's empirical views stems from the fact that he tended to reject theological explanations for these types of epistemological questions. Hume's moral and ethical philosophy primarily questions the origin or foundation of our moral judgments. Hume holds that moral judgments are based not on pure reason, but on a sort of intuitive feeling called sentiment. His assertion that we base morality on what we believe is useful and agreeable to ourselves and others makes him a forerunner to the philosophical and ethical movement of utilitarianism.

David Hume continues to stand as one of the key figures in modern philosophy and although most economists consider him a minor contributor to their discipline and a mere forerunner to the classical school, Hume's economic ideas have directly and indirectly had profound influence on the economic theory of today. The remainder of this paper shall first discuss Hume's views on different economic subjects as portrayed in his writings and then critically evaluate the influence these writings have had on modern economics.

David Hume lays out his general economic view in an essay entitled "Of Commerce". Hume begins by stating that the majority of people in a nation form two distinct groups: husbandmen and manufacturers. According to Hume the husbandmen "... are employed in the culture of the land..." while the manufacturers "... work up the materials furnished by the former." (Hume, p. 261) He thus divides the mainstream of a capitalist society into a class of capitalists, who own the means of production, and a class of laborers,

who work with the means of production for a wage. Hume states that without this arrangement the bulk of society would return to a subsistence, agricultural economy. However, the current arrangement allows for what he calls a superfluity of commodities to be produced. This economic surplus, in combination with trade, allows people to live above the subsistence level. Hume reiterates that skill in production will only continue to improve if trade takes place or the capitalists will have no incentive (due to no competition) to make production more efficient. More surplus allows a nation to support a larger population, but again will only arise if uninhibited foreign and domestic trade takes place. (Hume, pp. 261-7)

Next, Hume argues for a sort of labor theory of value. He says "Everything in the world is purchased by labour," (Hume, p. 267) and he contends that the economic power of a state lies in the amount of labor and commodities that the state possesses. For Hume, however, labor consists not only of workers, but workers employed in a manufacturing system. (Hume, pp. 267-8)

Finally Hume argues that just as a domestic commerce strengthens a nation, so does trade with other nations. He states that foreign trade in general increases the stock of labor in a nation thus making the state more powerful and its citizens richer. Specifically, Hume says that imports furnish new materials to be consumed by the country, giving the citizens more wealth. He also says that exports provide an outlet for a nation to sell its surplus and leads to production of commodities that would not have otherwise been produced. (Hume, pp. 269-71)

Hume portrays his view of money in a short essay appropriately entitled "Of Money". He begins by affirming that "Money is not, properly speaking, one of the subjects of commerce, but only the instrument which men have agreed upon to facilitate the exchange of one commodity for another". (Hume, p. 289) He further holds that money is nothing but a representation of labor and commodities and that it primarily serves as a means of rating them in relation to each other.

Hume also develops a sort of price theory based on the amount of money in circulation and the amount of commodities available. He states that prices depend on the proportion between money and

commodities. When the amount of money rises with respect to commodities, prices go up. When the amount of money falls in relation to the number of commodities, prices drop. This analysis of price seems extremely close to the basis of the price theory utilized by modern economists. (Hume, p. 298)

Hume next explains his understanding of the circular flow of money. He contends that when a large amount of money is injected into the economy, it stimulates the growth of production until the time when prices rise. His point goes something like this. When a quantity of money enters the economy, it goes not to everyone but to just a few hands who use it to their advantage. These few hands spend the money on commodities which causes an increase in sales for the merchants and manufacturers. These production owners use the extra income either to hire more workers and increase production or to increase wages. This causes workers to consume and spend more, which provides more income for merchants who will eventually raise prices. Until the prices throughout this circular flow have increased, production will be on the rise. This time lag, according to Hume, favors industry, but it can have the opposite effect when money leaves the economy and prices begin to fall. (Hume, pp. 293-295)

Hume also holds that money and prices have an effect on international trade. He explains that when one nation gets ahead of another in trade it is difficult at first for the latter to catch up since it lacks the skill in production, the labor stock, and the resource of merchants that the former possesses. However, pricing compensates for the advantages of one country over another. The low price of labor in the disadvantaged country attracts industry which will eventually make up for the country's previous lack of production. Hume concludes that industry will travel from one nation to another increasing productivity and enhancing the economy. (Hume, p. 291)

Hume's ideas on interest come largely from his reaction to the then common notion that low interest rates indicate a thriving economy because they are the result of a large supply of money. In "Of Interest" Hume refutes this notion of interest rates. He argues that money supply has no effect other than to raise or lower the price of labor. Hume explains:

Silver is more common than gold, and therefore you receive a greater quantity of it for the same commodities. But do you pay less interest for it? (Hume, p. 303)

Hume points out that three factors affect the rate of interest: The demand for borrowing, the supply of borrowable funds, and the amount of profit arising from commerce. (Hume, p. 305)

Hume describes how the demand for borrowing and the supply of money that is lendable both depend on the habits and way of life of the people in a nation. In a nation with little frugality, borrowers are numerous and the interest rates increase. In a nation where most of the property is collected in particular hands and lenders are numerous, the rate of interest falls. (Hume, p. 306)

Increased commerce affects interest, since commerce causes increased profits which, in turn, cause money to gather in large sums that can be lent out. This increase in lendable funds drives down the rate of interest. In an opposite manner, Hume states, low profits from commerce drive up interest rates. (Hume, pp. 310-11)

Many contend that Hume's analysis of international trade and his refutation of the principles of the mercantilist school of economics stand as his greatest contributions to economic thought. His essays "Of the Balance of Trade" and "Of the Jealousy of Trade" primarily attack the mercantilist views that trade benefits only the exporting nation and that a nation's goal in trade should be to accumulate specie.

Hume describes how many nations restrict exports in order to save domestic commodities for the people of those nations and how other nations restrict imports to prevent money from flowing out of the country. He then shows how each of these restrictions causes exactly the opposite of the intended effect. Hume contends that policy designed to restrict exports lowers the money supply (in the short run). This lowers the price of commodities and the price of exports to foreign nations which causes an increase in exports and an increased flow of money into the country. Therefore, goods actually begin to flow faster out of the country. (Hume, pp. 318-19)

Hume also shows how governmental restrictions on imports, intended to prevent money from leaving the country, have the

opposite effect. If imports are restricted, money supply increases briefly, but then the price of commodities and exports also increase. Fewer exports reduce the amount of specie in the country. (Hume, pp. 318-19) This concept of the flow of specie between nations through trade is probably Hume's single most important contribution to the history of economic thought.

Finally, Hume advocates free trade between nations on the grounds that it promotes healthy competition between manufacturers in each nation and allows consumers in each nation to have a wider variety of commodities. Competition between the manufacturers in different nations inspires progress in the form of industry as each nation has to innovate to improve production. Hume also advocates trade between nations in order for the world to take advantage of the diverse natural resources that exist between countries. (Hume, pp. 335-7)

After examining the major points Hume made in his essays it now seems logical to evaluate some of his ideas and look at how they relate to the economics of today.

The thrust of Hume's essays seems to reject the ideas of mercantilism, the economic school of thought that preceded him. This rejection, however, paves the way for the school of classical economics which forms the basis of the discipline today. An examination of Hume's work leads one to discern five major concepts that he employs to argue most of his points. These five concepts are also heavily relied upon in modern economics and thus illustrate the importance of Hume's work to the field.

The first idea that almost all of Hume's work points to is the concept that the true wealth of a nation lies not in the money within that nation, but in the labor and commodities that the nation possesses. Hume utilized this concept as a rejection of the mercantilist view that specie forms a nation's wealth. Hume argues his view by showing how human needs are fulfilled when nations seek to increase the volume of commodities and to employ more labor within their economy. This view of a nation's wealth is still evident today as economists measure economic growth in terms of gross national product which is nothing more than the total of all a nation's commodities. Hume's view still carries huge significance in today's complicated world.

A second concept that Hume tried to demonstrate also came as a rejection of the mercantilist school. This was the concept that in trade, particularly trade between nations, all parties involved benefit. Hume argues this in a variety of ways but mainly by showing how trade between two nations improves the well-being of citizens in both nations. Today this idea is basic to economic theory because economists realize that, unless trade benefits both trading partners, it will not take place. Much of today's economics focuses on the conditions necessary for trade to take place. Price theory is an example of this.

The next important idea Hume had that relates to today's economics is his concept of the circular flow of money. Hume analyzed the flow of money in two different contexts, the flow of specie between nations and the effect of an increase in money supply on a single nation's production. Hume's concept of specie flow between nations in trade has relevance today since we still concern ourselves with trade imbalances between nations. His concept of an increase in money yielding a short-run increase in production directly correlates with our modern notion of the circular flow of money and the multiplier flow.

The fourth important concept that Hume's economic essays portray is probably among the most important in all of modern economics. This is the simple concept of pricing based on supply and demand. Hume applied this concept to interest rates and to labor but it seems unclear whether or not he saw supply and demand as the determinant of all prices. Some essays seem to imply that Hume favored a labor theory of value where the price of a commodity reflects the amount of labor put into that commodity. Regardless of this, it seems clear that Hume utilized the concept of supply and demand in at least some of his analysis and we can trace the modern notions of supply and demand back to Hume's time.

Finally, Hume used the concept of economic surplus in his writings. Economic surplus, which Hume refers to as superfluity, is the commodities that an economy produces above and beyond what is needed for people to survive. Thus any economy that has gone beyond the subsistence level has some sort of surplus. Part of modern economic theory as it has developed through the ages deals with the allocation of this surplus. Hume involved this notion of

surplus when he advocated free trade between nations. He saw trade as a way for nations to sell their surplus in order to obtain the surplus of other nations and thus increase the well-being of the populace of all trading nations. Hume saw surplus as a means for improving human happiness.

David Hume was born twelve years before Adam Smith and died a few months after Smith published his most famous and influential book *The Wealth of Nations*. Throughout his life, Hume was in constant contact with Smith. Some see Hume as a sort of mentor to Smith and it seems highly possible from looking at Hume's economic insight, that he could have formulated a complete economic analysis such as Smith's *Wealth of Nations*. If this had been the case, perhaps Hume would be considered today as one of the founders of the field of economics, just like Smith.

BIBLIOGRAPHY

- Hume, David. *Essays: Moral, Political, and Literary*.
"Of Commerce." London: Oxford University Press. 1963.
- Hume, David. *Essays: Moral, Political, and Literary*.
"Of Money." London: Oxford University Press. 1963.
- Hume, David. *Essays: Moral, Political, and Literary*.
"Of Interest." London: Oxford University Press. 1963.
- Hume, David. *Essays: Moral, Political, and Literary*.
"Of the Balance of Trade." London: Oxford University
Press. 1963.
- Hume, David. *Essays: Moral, Political, and Literary*.
"Of the Jealousy of Trade." London: Oxford University
Press. 1963.
- Oser, Jacob and William C. Blanchfield. *The Evolution of Economic
Thought*. San Diego: Harcourt Brace Jovanovich. 1963.

The Form of Focus in Three Works of Art:

An Old Threnody by Tajihī,
"Resolution and Independence" by Wordsworth,
and "Hadleigh Castle" by John Constable

By Julie Webb

Focus may seem a strange word to apply to a work of art. Cameras have mechanisms that focus; eyes have that within them which focuses. Attention can be focused, but can art? If a work of art can be said to "have focus," then its focus must be its unifying quality or qualities—the manner in which it guides its audience's experience. Given that the experience of art usually necessitates a certain degree of participation and imagination, focus must exist in those elements or be achieved through those processes which incite the highest degree of audience involvement. Thus, a work may focus its subject's attention toward an idea or a part of itself: in this manner, elements of a poem—words or lines, for example—may have within them the piercing clarity or subtle direction of focus.

Poetry and painting then, are certainly focused. Study and comparison of the style of focus in three selected works—from Japan, an old threnody by Tajihī; from Northern England, a poem by Wordsworth and a painting by Constable—should yield a clearer understanding of the many facets of focus: they should show why the art forms "work," why they produce their intended effects in an audience.

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Eighth Century

Tajihī' an Old Threnody from the "Man'yōshū"

Because it is not confined within the brief *haiku* form, Tajihī's threnody permits itself rounded, smoothly descriptive images. Such images form the gentle opening of the poem:

The mallards call with evening from the reeds
And float with dawn midway on the water
(Keene, 1960:40)

The mallards' "call", the reeds, and the water present a peaceful scene. The natural image of evening in the first line flows without punctuation into the image of morning in the second line. Tajihī smoothly introduces quiet pictures to readers' minds, setting a contemplative, receptive mood.

They sleep with their mates, it is said
(Keene, 1960:40)

the poem continues. Tajihī introduces the image of the couple, the crucial image of this threnody. The reader must feel the completeness of the couple in order to react, later in the poem, to the speaker's desolation at the loss of his wife.

The mallards and their mates sleep beside one another—

With white wings overlapping and tails asweep
Lest the frost should fall upon them.
(Keene, 1960:40-41)

—touching each other, sheltering each other from the cold. An image of the marriage bed seems to spring naturally from this image of the sleeping ducks: that is, it appears natural for the speaker to be reminded of the intimate comfort of husband and wife lying beside each other. Thus, Tajihī forms the poem in such a manner that memory and emotion seem called forth by setting, according to the manner of much Japanese poetry. Stated another way, setting is Tajihī's focus toward emotion in the poem.

Once the image of the ducks is complete in the reader's mind, Tajihī continues to the next stanza, the stanza that relates his observations to his feelings. The pace of the poem increases temporarily: commas connecting a comparison end lines six, seven, and

eight, driving toward the exclamation point in line nine. *Tajihi* quickly introduces two more nature images.

As the stream that flows never returns,
And as the wind that blows is never seen,
My wife, of this world, has left me,
Gone I know not whither!

(Keene, 1960:41)

Just as the speaker cannot control the movement of stream or wind, he is powerless in the face of his wife's "leaving." Images of nature once again evoke emotion. The poem's mood changes from receptive contemplation to plaintive grief. In fact, three exclamations of helpless grief conclude the poem.

The envoy is the final, concise connection of images with emotional reaction:

Cranes call flying to the reedy shore;
How desolate I remain
As I sleep alone!

(Keene, 1960:41)

Cranes, traditional symbols of immortality, are introduced into the poem in this final link between nature and humanity. They are placed directly opposite the speaker's final exclamation of desolation; they seem to emphasize his confusion. Some beings are immortal, yet his wife is dead, and he must, painfully, "sleep all alone." *Tajihi* juxtaposes two ideas, with no connecting "yet" or "and." Their striking effect lies partly in their curious mixture of similarity and difference: the image of the cranes is a somewhat desolate one, like the image of the lonely speaker, yet it demonstrates the speaker's state of mind.

Tajihi devotes the entire first stanza to a description of natural elements. The first two lines of the second stanza are a transition, through simile, from nature to the personal. The next two lines, numbers eight and nine, are purely personal, the core of the poem toward which all of the preceding lines are focused. Lines ten, eleven, and twelve present an image of human existence in the present as a physical expression of the grief expressed in lines eight and nine.

The envoy condenses the emotion of the poem, playing upon images already presented to readers. It fuses nature with the personal for a dramatic finish.

Tajihī makes tremendous use of nature imagery in focusing his readers' emotions. He sets forth his poem in clear sections, moving from nature to the personal, and from the personal to a mixture of the two. Setting inspires emotion.

1802-1807

Wordsworth: "Resolution and Independence"

"Resolution and Independence" begins in a natural setting:

There was a roaring in the wind all night;
The rain came heavily and fell in floods;
But now the sun is rising calm and bright;
The birds are singing in the distant woods

(Wordsworth, 1952:235)

Wordsworth opens the poem with a placement in time and with dynamic images of nature. He gives a sense of time past, of continuity, in the words "all night," and a sense of comfortable change with "But now the sun is rising calm and bright." Nature images are charged with energy and action suitable to the mood. That is, the wind roars; the rain "[comes] heavily and [falls] in floods"; the sun "[rises]"; the birds "[sing]"; the stock-dove "broods"; the jay "makes answer as the magpie chatters"; and the air "is filled with pleasant noise of waters." (The lines are so filled with active images that many must be quoted in entirety!) These active images draw readers into the poem by firing imagination: readers identify similar images in personal memory and bring them to the poem. Indeed, Wordsworth fills the poem with references to the active life of nature and of humanity: like most—if not all—poets, Wordsworth wants readers to burrow deeply into his poem, so he chains his poem together with natural images.

From natural images Wordsworth continues toward contemplation or philosophy. He establishes a setting in the first two stanzas, fills it with life through vivid imagery and continues his description—to some extent—in the third stanza. However, the third stanza

becomes personal:

I was a Traveller then upon a moor;
I saw the hare that raced about with joy
(Wordsworth, 1952:235)

Wordsworth relates the setting to the speaker (himself): he bends his readers toward the speaker's mind in order to communicate with them. A hint of the speaker's feelings appears in lines nineteen through twenty-one, forming a transition between the setting and the speaker's thoughts, sharpening the focus:

The pleasant season did my heart employ;
My old remembrances went from me wholly;
And all the ways of men, so vain and melancholy.
(Wordsworth, 1952:235)

Stanza IV begins after this and Wordsworth advances into philosophy.

But, as it sometimes chanceth . . .

As high as we have mounted in delight
In our dejection do we sink as low
(Wordsworth, 1952:236)

He leads readers, focusing their imagination, through description of setting and communication of feelings to elucidation of thoughts. He then proceeds by further personalizing the stated philosophical ideas:

To me that morning it did happen so
(Wordsworth, 1952:236)

Next, Wordsworth seems to draw out of philosophy once more into personal experience of his setting (sharpening with the repeated images of bird and hare); then back in to thoughts triggered by personal identification with nature:

I heard the sky-lark warbling in the sky;
And I bethought me of the playful hare:
Even such a happy Child of earth am I;

But there may come another day to me—
(Wordsworth, 1952-236)

In Stanza VI, Wordsworth develops the personal note with the kind of remembrances he mentions in line twenty; these he extends into the philosophical mode once again, illustrating the speaker's thoughts with an example from the past. (Wordsworth, 1952-236)

The end of Stanza VII marks the end of pure philosophy's appearances in the poem. From Stanza VIII to the end, "Resolution and Independence" is narrative and all thoughts are personal rather than general. The primary image-emotion-philosophy pattern works as a focus, channeling readers' minds to the point where they are ready for the ultimate image of the Leech gatherer. In fact, the transition from the introduction's philosophical end to the entrance of the Leech-gatherer is especially easy and welcome, like a breath:

We Poets in our youth begin in gladness;
But thereof come in the end despondency and
madness.



Now, whether it were by peculiar grace
(Wordsworth, 1952: 236-37)

The rest of the poem follows a pattern similar to the image-emotion-philosophy pattern: it travels from the image, words, and actions of the Leech-gatherer to the reflections (always personal) of the speaker. Still Wordsworth changes outward images to inward reflections. —Stanzas XVI and XVII, for example:

The old Man still stood talking by my side;
But now his voice to me was like a stream
Scarce heard . . .



My former thoughts returned
(Wordsworth, 1952:239)

Even the poem's meter is a strong focusing device: the ab-ab-cc end-rhyme draws readers toward the end of each stanza, and hence onward into the poem.

So Wordsworth uses meter, diction, and the changing of images

to thought as his principle devices of focus in "Resolution and Independence."

1829

Constable: "Hadleigh Castle"
(oil on canvas, 122 x 164.5 cm)

Constable exhibited this painting, after much deliberation, (Reynolds, 1984:200) at the Royal Academy in 1829. He called it "Hadleigh Castle. The mouth of the Thames— morning after a stormy night," and he included a quotation from Thomson's *Season's*:

The desert joys
Wildly, through all his melancholy bounds
rude ruins glitter, and the briny deep,
Seen from some promontory's top,
Far to the dim horizon's utmost verge
Restless, reflects a floating gleam.

(Quoted in Reynolds, 1984:199)

Most of the foci, or areas of interest upon which Constable wishes to fix attention, are included in this bit of poetry. The primary focus, of course, is referred to in the title: it is the ruined remains of Hadleigh Castle. Constable succeeds in creating in his painting the effects of wildness and restlessness mentioned in the poetry, for many critics have described the picture's mood as "stormy."

To create the stormy effect, Constable carefully selects, arranges, and relates his foci. The castle remains, for example, are set off to the left of the painting. Fused with the rocky promontory, these remains anchor the painting in the lower left-hand corner. In fact, a series of parallels which sweep through the scene are begun at this very corner. An outcropping of rock traces a diagonal between the corner and the large ruin; it bulges into the view of the ruin's dark interior. Protruding behind and to the right of the castle ruin, a ridge of land shoots a firm diagonal toward the water. A parallel diagonal runs under the small ruin, in front of the tree, and beyond; it is echoed in the curve of the coastline.

At least two parallels begin in the lower right-hand corner. Two more rock outcroppings point toward the upper left-hand corner

and the castle.

The sky, which resembles a cloud-study, (Reynolds, 1984:200) has the greatest influence upon the storminess of the painting. Billowing out in bursts of light, the clouds trace—sometimes in shadows, sometimes in the sun's rays—the diagonals established on land. In the clouds, these diagonals collide, and this accounts for much of their stormy appearance. In the painting's upper left, the shadowed pattern of the clouds seems to trace the tops of the ruins, drawing attention to their shape.

Constable works a great deal with *chiaroscuro*, his light-versus-dark technique: the yellow-gold rays and glow of the hidden sun touch all of the picture's diagonals. Light pours over the ruins and the creatures surrounding them, fades beneath the promontory, and touches the agitated waters.

The seagulls' arrangement creates yet another set of diagonals. They are obviously arranged carefully to produce effects of connection and distance: Constable changed the number and position of the birds through his succession of "Hadleigh Castle" sketches. (Constable, 1973: plates 120-123)

Viewers look *down* upon the seagulls in the foreground of the painting, and the gulls near the ruins are very small. In addition, Constable sharpens the outlines of a few bushes in the foreground, but uses a very painterly technique on the rest of the scene. Painterly strokes give a rough animation to the landscape, further enhancing the stormy effect.

The diminishing perspective which makes the scene seem enormous also makes it seem lonely. Human and animal figures are few: a shepherd (with no sheep in sight), a dog (with his attention turned *away* from the ruins), and some cattle. (Reynolds, 1984: 200) These humanize the landscape without reducing nature's powerful effect upon viewers.

Parallels, *chiaroscuro*, and diminishing perspective are John Constable's major methods of focus in "Hadleigh Castle." He uses them to create a powerful, somewhat troubled effect upon his viewers. His elements of focus add depth and movement to his painting. These three works of art contain some strikingly similar methods and elements of focus. They all use nature imagery to draw their audiences into philosophical or emotional treatment of their

subjects.

Tajihi carves emotion from his readers with sharp images of nature which produce answering emotion in his speaker; the readers' reactions to the images supply their understanding of the speaker's reaction.

Wordsworth leads his readers through simple, easy nature images to the thoughts they trigger, and sometimes on to pure philosophy.

Constable organizes and paints his picture of nature to produce a specific perspective and emotional response in his viewers.

The emotions produced by the Tajihi and the Constable are in some ways similar. Loneliness and desolation are bittersweet in the poem, brooding in the painting. In light of the fact that "Hadleigh Castle" was painted shortly after the death of Constable's beloved wife (and its sketches done during a rocky point in their courtship years before—see Reynolds, 1984: 200), the painting shows a dramatic starkness of emotion. The Tajihi poem is a clear cry of misery. These similar emotions are produced largely by the similar methods of focus already mentioned. Even "Resolution and Independence" invites a brooding spirit using the shared nature-emotion philosophy technique.

Each of these three works involves its viewers, readers, or listeners through some form of focus. Each demonstrates how focus, the backbone of art—that which supports it and gives it purpose—evokes through method and form the imaginative participation of its audience.

WORKS CONSULTED

- Constable, John *Constable: Paintings, Drawings and watercolours*, Text by Basil Taylor. London: Phaidon, 1973.
- Keene, Donald *Anthology of Japanese Literature*. New York: Grove Press, 1960.
- Reynolds, Graham *The Later Paintings and Drawings of John Constable*. Vol. 1. New Haven: Yale University Press, 1984.
- Wordsworth, William *The Poetical Works of William Wordsworth*. Second edition. Ed. E. de Selincourt. Vol 2. Oxford: Clarendon Press, 1952.

The British Economy and the SDP/LIBERAL Alliance: Trends in Electoral Politics

By Marc Overbeck

The beginning of the 1980's was a period which witnessed substantial changes in the economy of the United Kingdom. The British economy, which had arguably been in gradual decline since the end of the Second World War (Crick: 1981:57), began turning sharply for the worse, plagued by such problems as unemployment, high interest rates, and increases in the cost of living.

By the current government's own admission, these economic problems, from which Britain continues to suffer, "are likely to persist for some time." (UK Regional Development Report to the European Commission, Vol 11: 1986: sec. 1.16) Indeed, most economists today agree that rather than being merely a short-term setback, the economic downturn which began at the start of the decade could prove to be one of severely damaging, long-term proportions.

The economy was not the only area in Britain which witnessed major changes during the early 1980s. In March of 1981, Dr. David Owen, Mrs. Shirley Williams, and Mr. William Rodgers—all former members of the previous Labour Government—along with Mr. Roy Jenkins, former President of the European Commission, resigned from the Party along with 10 Labour MPs and 9 Labour Peers and formed the Social Democratic Party (SDP). Soon after, leaders of the SDP and the Liberal Party, led by Mr. David Steel, met in negotiations aimed at forming a political bond between the two groups. By autumn of that year, leaders of the two parties had reached an agreement, and subsequently announced the formation of "the Alliance", which was aimed at "breaking the mold of British politics" (Times Guide to the

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House of Commons: 1984: 253).

The accelerated deterioration of the economy and the emergence of the Alliance as a new political entity both represent fascinating topics which invite interesting speculation in themselves from students of modern British society. Perhaps a more valuable point of focus, however, and one which requires inter-disciplinary study, is to hypothesize on the effects the one subject might have on the other, that is, how might the economy play a role in the short-term electoral success (or failure) of the Alliance?

To argue that a worsening economy will be of benefit to the Alliance in the short term, in their quest for electoral success, as this author will attempt to do, without examining the components of the subject individually, does not do the topic justice. The whole of any issue, after all, is the aggregate sum of its parts. It is important therefore, (if not essential,) to first examine the relationship between the Alliance's future electoral performance and the economy by looking at the three integral parts of the matter—the economy, the Alliance, and the British electoral picture. Only once some of the basic assumptions and aspects of these three parts are brought to the surface and they are carefully scrutinized can real progress be made toward finding a thoughtful answer to this intellectual query.

The Economy

The British economy is a complex web of labour, capital, productivity, and hundreds of other forces. One could write (and many have written) an entire book describing only a single part of its intricate nature. Since the overall goal of this work, however, is to explain the relevance of the economy to electoral politics, it would seem reasonable to concentrate a discussion of the economy on that factor most perceptible and important to the average citizen (the person making electoral decisions), if it can be shown that the assumptions made about and attitudes toward this issue are roughly comparable with the assumptions of and attitudes toward the economy as a whole.

Rather than probing into the effects of the London Stock Exchange or the details of the Banking Industry's inner workings—items which seem to be "of little interest" (Madwick: 1986: 134) to the average citizen, the intention here will be to concentrate on that aspect of the economy which bears greatest relevance for the voters: Unem-

ployment. It has been this issue, more than any other in recent months, which has attracted the concern of voters, not only among economic issues, but among all political issues. In the MORI survey of 20-23 October 1986, unemployment was mentioned by 80 per cent of those responding as the "most pressing problem facing Britain." (British Public Opinion, Nov. 86: 4)

Indeed, unemployment has been a constant problem in Britain since the mid-1970s, but "since 1979, when the Conservatives returned to power, the increase has been remarkable." (Fothergill and Vincent; 1985:50) In September of 1979, there were 1.6 million persons listed as unemployed (5.4 per cent of the working population). By September of 1986, this figure has risen to 3.3 million, or a rate of 12.1 per cent. (Dept. of Employment Press Notice, Oct. 1986)

One important point to note is that while the economy has experienced a severe decline in many areas over the last six years, the decline has clearly affected certain regions much more than others. In general, the areas which have been hardest hit by "Thatcher's recession" (Fothergill and Vincent: 1985: 32) have tended to be the North and West, which have long depended on manufacturing and heavy industry—sectors which are currently in decline—as their main economic base. In the South of the UK, and to some extent, the East as well, "the effects of the current economic malaise have been less harsh." (Fothergill and Gudgin: 1983: 134)

A region-by-region analysis of unemployment, for example, shows clearly the "significant variation in unemployment rates between the different regions" (UK Regional Development Report, Vol 1: 1986: 1) and serves to further illustrate the "North-South divide" so often referred to today. The percentage of the working population listed as unemployed during the month of September 1986 was 8.5 per cent in the South East (region), 9.0 per cent in East Anglia, and 10.1 per cent in the South West. Conversely, the rate during the same month was officially reported as 13.8 per cent in Scotland, 14.0 per cent in the North West, and 16.2 per cent in the North. (Dept. of Employment Press Notice: 1986: 6)

In other sectors of the economy as well, the "North-South divide" with regard to the economy becomes apparent. The Gross Domestic Product (GDP) per capita of many regions in the South is much higher than those in the North when compared on a percentage basis

with the average throughout the country as a whole. The latest figures available, for example, show that in the South East region, GDP per capita was 117.0 per cent of the national average while in Yorkshire and Humberside, it was only 87.8 per cent of the national average. (Economic Trends, Nov. 1985) Similarly, the percentage of households below the Supplementary Benefit Level was nearly 2.5 times as great in Yorkshire and Humberside as it was in the South East region. (Fothergill and Vincent 1985: 17)

The Alliance

The SDP/Liberal Alliance was intended by its founders to serve as a "radical centre in British Politics" (Times guide to the House of Commons 1984: 157) Whether it has grown to take on such a role, is a source of some controversy, but certainly it is a unique political entity in British politics, in both its structure and its policies. Although its leaders tend to refer to it as a single political unit, it is really two separate parties, the Social Democrats, led by Dr. David Owen, and the Liberals, led by Mr. David Steel.

The elder of the two parties of the Alliance, the Liberal Party, has a strong history of tradition, being the party of men such as William Gladstone who had profound influence on British history during the nineteenth century. The Liberals served as the main rivals to the Conservative Party until after the First World War, when the appeal of Socialism and the Labour Party began to take hold with the working-class in Britain. The Liberals never fully recovered from the jolt given them by the Labour Party, and have remained a third party ever since, only on occasion showing strong performances in General Elections.

The SDP, on the other hand, is the youngest of all of Britain's main political parties, formed little more than five years ago. Most of the SDP's initial founders were members of the right wing of the Labour Party who broke with it for a variety of reasons, not the least of which were policy over the European communities and approaches the Party took in dealing with Britain's defence. (Mrs. Shirley Williams, for example, had long been critical of the Party's anti-EEC platform.) This was also a period during which the Labour Party was engaged in a "vicious struggle" (Times guide to the House of Commons 1984: 229) between the Right and the Left for control of the Party, a struggle

which many today claim the Left has won. (Drucker et al: 1984: 198)

Initially, the Alliance gained much support after its formation in the autumn of 1981, and some polls had support for the Alliance gauged as high as 51 per cent during parts of 1982. During the early days of the Alliance, it was closely associated with the many reforms it proposed for the British political system. A Bill of Rights was one of the most important of these reforms, designed to give Britain "once, and for all, a codified constitution." (Rothman et al: 1976: 235) A second piece of legislation an Alliance government was to put through was a Freedom for Information Act, which was intended to abolish much of the "secret state" (Childs: 1986: 162) which Britons had objected to in earlier opinion polls. The third major reform the Alliance intended to enact was a system of proportional representation in Parliament ("the linchpin of our entire programme of radical reform." (Times Guide to the House of Commons 1984: 345) this last reform, in addition to being "more democratic" (Times guide to the House of Commons 1984: 164), was designed to allow smaller parties (like the Alliance) a greater voice in the workings of Government.

The Alliance never rescinded their positions on these reforms, but gradually, began to be seen as taking on the role of a "traditional party" when it adopted positions on major issues. This resulted in a dissipation of much of the "catch-all" support the Alliance had received at the onset of its formation. While one MORI poll in August of 1982 showed the Alliance with 51 per cent support nationally, by 1983, its support had dipped down into the mid-thirties, and was never again to reach such a level. (British Public Opinion, Sept. 1982: 1)

The 1983 General Election, which was supposed to be, as Jenkins and Steel put it, "a watershed in British politics" (Times guide to the House of commons: 1984: 334), was a great disappointment for the Alliance. It received 26 per cent of the vote, but elected only 23 MPs. Support began falling off at an even more rapid rate, and has tended to stay in the mid-to-lower 20 percentiles ever since, except for some momentary surges in 1985 (although polls within the last month have had the Alliance as low as 18 per cent). (Gallop survey, Nov. 1986)

In making preparations for general and local elections, constituencies are divided up between the two Alliance parties, neither of which run candidates against the other. The decisions concerning

which party will be allotted the constituency are based on electoral data, attitudes, and past performance of Liberal candidates in the particular regions (as the Liberal Party has been around for over a century).

While the decisions regarding party allotment of constituencies are made as a "joint effort" (Norton, p. 221), this is about the only place in which the two parties formally work together, aside from campaigning before and during elections.

Formation of policy, for example, is still quite an internal matter; each party constructs its manifesto at its own conference, in its own manner. Such a manner may be more pleasing to the individual parties themselves, but it has, on occasion, led to problems with platforms appearing not completely in agreement with each other. The most striking example of this occurred during the last Conference Season, when the Liberals adopted a "nuclear-free" defense policy, while the Social Democrats had already adopted a policy supporting the concept of a "minimum nuclear deterrent". Although the problem was technically corrected within a few weeks, the parties were not able to escape without some damage. Fifty-eight per cent of those surveyed four weeks after the Liberal Conference replied that they felt the Alliance appeared "a good deal" or "somewhat" divided.

And while the Alliance was designed to be a "radical centrist party" (Times Guide to the House of Commons 1984: 64), there is evidence to suggest that this is not necessarily the view of the general public. Only 32 per cent of those surveyed said that they felt the Alliance had any "new or radical" proposals to offer the electorate. (Gallup survey: Oct. 1986) Whether this is because the Alliance has not adequately put its message across, or because there simply is no middle ground on which to tread is a case for historians to decide when they write the chapters of the Alliance's history. In any case, the Alliance certainly is hoping that this situation will change, and that the debacle of the conference season will also soon be forgotten.

The British Electoral Picture

The performance of the economy, it has already been articulated, will play a large role in the success or failure of the Alliance over the course of the next few years and, indeed at the next General Election. This role, however, cannot be interpreted in a vacuum, nor will it be a

result of no outside factors. To examine and discuss fully the link between the Alliance's future prospects and the economy, one must look back to the past, to see where the Alliance and the other parties have fared best, and to the present, to identify and extrapolate the attitudes and sentiments the public have towards key political issues and the political parties.

The results of the 1983 General Election were very much indicative of traditional voting patterns, despite the new factor of the Alliance vote. They also, according to many, served to substantiate claims of "two Britains." The conservatives were clearly the dominant force in the South and East of Britain, allowing Labour to take only three English seats south of Birmingham outside of the London Area: Ipswich, Thurrock, and Bristol. Labour, in turn, captured the majority of seats in Scotland and in Wales, and in many of the Northern English cities as well.

This pattern generally represented a reinforcement of traditional voting habits—the Conservatives have tended to dominate the English constituencies, while Labour has tended, over the years to find most of its support in urban areas, and the "Celtic Fringe" of Scotland and Wales. Where the picture differed slightly for the two main parties from past elections was that in 1983, the Tories were able to capture a sizeably greater number of seats in the midsections and in Scotland than in previous elections. This was due, in large part, to the fact that many of these seats were marginal, and the Conservative opposition was divided between the Alliance and Labour.

Because the Alliance captured so few seats despite their reasonably good showing of 25.4 per cent of the votes, it was difficult to claim that they had established a strong foothold in any one geographical area. When one examines the map closely, however, it becomes apparent that the Alliance did show more strength in the South—the Conservatives' area of support—than in the other regions of the country. This is an important fact. Although they failed to win a majority of votes in any single region, the Alliance finished second overall in the South East, Eastern, Southern and Wessex, and South Western regions, taking 27.8 per cent, 28.9 per cent, 30.5 per cent, and 33.7 per cent of the vote, respectively. The Alliance performed quite well in the larger Southern cities as well, such as London, where they received 24.7 per cent of the overall vote, and in Bradford, where they were the

favorite choice of 25.7 per cent. (Times Guide to the House of Commons 1984: 102)

In terms of where their strength lies, the picture today for the Alliance looks much the same as it did in 1983. A good deal of their support remains in the South and East, where the Alliance has overtaken Labour as the chief opposition to the Conservatives. Overall, however, the national picture gives the Alliance some reason to worry. Their support remains below 25 percent, and has them far behind both the Conservatives and Labour, which have been running neck-and-neck since September 1986. The October Gallup survey shows the Conservatives and Labour tied for first with 37.5 per cent each of the vote, with the Alliance trailing far behind with just 22 per cent. Because of the "first-past-the-post" system used to decide parliamentary contests, third parties have always fared poorly in Britain, unless they have been able to concentrate support in specific areas. In the 1983 General Election, this is just what the Alliance was not able to do. Its base of support was spread fairly evenly. (Although they did fare a bit better in the South and East than in the rest of the Nation, their support base was spread far more evenly than that of either the Conservatives or Labour.) As a result, while they received 25.4 per cent of the total vote, only 23 Alliance MPs were elected.

An examination of voters' attitudes toward the political parties and their sentiments on key issues, both economic and other, provides some basis on which to interpret the performances of the respective parties, and the background data on the economy and on the nature of the Alliance. It is by the responses to the questions asked, after all, that we are able to get into the mind of the British voter. Once this is done, attitudes can then be juxtaposed with fact—out of which comes analysis.

Unemployment, as has already been shown, ranks as the most important political issue in the minds of British voters. How the public view the parties' abilities to deal with this topic, however, and with the economy in general, differs slightly according to region. In the Gallup Survey of October 1986 it was shown that when broken down by region, residents of the Northern English counties, Scotland, and Wales (hereafter to be referred to as "the North") replied that they felt Labour had best policies for dealing with unemployment (49 per cent for Labour, as opposed to 24 per cent for the Conservatives and

10 per cent for the Alliance).

In the same survey, only 44 per cent of respondents from the Southern and Eastern English counties (hereafter to be referred to as "the South") replied that they felt Labour was the best party for dealing with unemployment, while 25 per cent said the Conservatives and 13 per cent opted for the Alliance. Interestingly enough, the survey also found that fewer residents of the South considered unemployment to be the nation's most pressing problem (76 per cent as opposed to 80 per cent nationally).

Certainly, one can point to the fact that even though unemployment is perceived as an extremely important issue, it is still only one issue. Attitudes concerning which party has the best policies to deal with unemployment, and its relative importance among all political issues might not necessarily be representative of those attitudes concerning the economy as a whole. An examination of the poll's findings, however, regarding questions on other sectors of the economy and on the economy as a whole, show much the same general feelings as those found from the responses on unemployment—that the Government's economic policies are not terribly effective (or that Labour's policies would be more successful).

The issues of defense and law and order, which rank just below unemployment in importance on a national level, are also perceived differently by different regions. In the North, for example, defense is not perceived to be nearly as important an issue as in the South. Only 18 per cent of those in the North consider defense to be the first or second most important issue, while 24 per cent in the South considered it to be an issue of such importance. Furthermore, among Southern respondents, 40 per cent replied that they felt it was "very likely" or "quite likely" that a Labour Administration would "run down Britain's armed forces."

On the overall question of which party had the best policies to deal with Britain's defense, 49 per cent of those in the South said that the Conservatives did, with just 22 per cent claiming Labour's defense policies were best. In the North, 47 per cent opted for the Conservatives, while an equal amount as in the North—22 per cent—claimed that Labour had the best defense policies. Nationally, 11 per cent of those surveyed said they believed that the Alliance had the best policies to deal with defense.

Law and order was listed as the first or second most important issue by 12 per cent of those in the South and 10 per cent of those in the North. As with the issue of defense, residents of both the North and the South agreed that the Conservative Party had the best policies on the issue, with 48 per cent of those in the South and 46 per cent of those in the North believing this to be the case. The survey showed, however, that only 7 per cent of those people living in the North and 8 per cent of those from the South claimed they felt the Alliance had the best policies on law and order. Although on no issue was the Alliance ranked higher than third in terms of their policies, the national average figure of 8 per cent who felt the Alliance was the best party for dealing with law and order was among their worst showings on a single issue.

Analysis

While the data cited throughout this paper may be a bit overwhelming, when given careful consideration, it reveals many things and explains several facts concerning electoral behavior. To begin with, it has been shown that the voters in the North consider economic factors to be more pressing an issue than do their southern counterparts. From the economic data seen earlier, such sentiment is justified. The current recession Britain faces has had its harshest effects on the North. Unemployment, as well as other statistics, such as GDP per capita and levels of income, show the North to be faring much worse than the South in this present economic climate.

Furthermore, the North of Britain has traditionally been supportive of Labour. Apart from the fact that more Northerners may work in manufacturing jobs or be working-class citizens, the fact that the North is highly supportive of Labour is not unexpected. This is the region which feels most strongly that the economy is the most important issue facing Britain, and thus they are likely to vote largely on economic issues and their perceptions of which party is best at solving Britain's economic problems. When asked who they feel this is, voters clearly respond in favor of the Labour Party. They may feel that the Conservatives are best when it comes to defense or law and order, (which the polls indicate they do), but it is the economy which is most clearly their largest concern.

Voters in the South, on the other hand, do not perceive the

economy to be quite as important an issue as do the voters in the North. Again, this is to be expected; unemployment (ranked nationally as the greatest of the economic issues) is much lower there compared with the North, and income levels are higher. Simply put, Southern voters perceive the economy to be not as important an issue as their Northern counterparts because for them, it has not affected them with as great intensity as it has affected the North.

Again, when traditional voting habits are examined, one sees that the South is largely supportive of the Conservative Party. They also feel that when it comes to the economy, although Labour has slightly more effective policies, the Conservative Party is better than the North thinks it is for managing the economy. When it comes to the issues of defense and law and order, however, issues to which the South attaches greater importance than does the North, the Conservatives perform far better than Labour or the Alliance.

It would appear, then, that the voters in the North cast their ballots largely on the basis of economics, which they feel are best left to Labour. Voters in the South give greater consideration to non-economic issues such as law and order and defense, which are clearly issues the Conservatives score well on. Even on economic issues, Southern voters feel less confident of Labour's policies than does the North.

Whether any of the parties want it to, Britain's economic picture is likely to get more defaced by recession in the near future. Even the Government, although they will not admit it publicly to the electorate, have tacitly admitted that they do not expect the economy to improve much either. From the conclusions previously drawn, this would indicate that, all things being equal, economic issues would come to have even greater significance to voters around the country. In the North, where Labour is perceived to be the party with the best policies on the economy, this would probably translate into more Labour votes, since other issues would accordingly shrink in importance.

In the South, however, a good portion of the voters are lifelong Conservative supporters. Many would not desert the Party for any reason. Conservative voters, it has been shown, tend to "be more rigid in their voting habits" (Rothman, et al: 1976: 87) than other voters. It is highly doubtful whether there would be a mass defection in favor of

the Labour Party, traditionally the party of the working class. The Alliance, however, could take advantage of the situation. Given a credible economic policy, it is quite possible that they could receive increased support in the South, where they are already the Conservatives' main rivals.

The alternative to this scenario of further economic deterioration, though seemingly improbable given today's economic forecasts, is that the economy will greatly improve. In the South, this would probably lead to fewer voters casting ballots on the basis of their pocketbooks, translating into greater importance for issues in which the Conservatives are perceived to have the best policies. In a sunny economic climate, therefore, (or at least one which is perceived to be sunny), the Alliance is not likely to greatly increase its support in the South. The most recent figures show that nationally, the Alliance's defense policies are perceived to be the best by only 11 per cent of the populace. No doubt the Alliance lost an important opportunity to increase its credibility on defense during the Conference Season, with the debacle of a non-uniform policy attracting the attention of the media for a solid week.

An improved economy might result in a loss of support for the Labour Party in the North, with fewer people choosing candidates because of economics, but to which party would they turn? Any defection of voters might be split between the Tories and the Alliance. On one hand, many voters might be loathe to support the Conservatives, but the Alliance's credibility on leadership and defense is far from overwhelming. Most probably, there would be a slight increase for the Alliance in the North, as the call of socialism often loses some appeal during periods of prosperity.

Overall, a deteriorating economy might be of benefit to the Alliance in attracting votes, but how large would the effect be, and for how long would it last? The Alliance's standing in the polls (22 per cent) is far below what they received in the last General Election, when they only received 23 seats as a result. Unfortunately, like all third parties in Britain in the past, the Alliance has been (and continues to be) a victim of the British electoral system. Unless it can mount strong, well-focused campaigns in key regions, it is likely to receive far fewer seats than it would deserve under a system of proportional representation. Taking a few seats in Southern England

would do little for enhancing the Alliance's credibility as a major political party.

Another disadvantage the Alliance has is the fact that it has yet to find major issues on which the public supports its policies more than the other parties. The Alliance still ranks third on every major political issue, according to the most recent Gallup survey. Part of the problem may be the very fact that it is a centrist party within the scope of British politics.

If it intends to remain a major force in British politics, the Alliance must do two things: First, it must campaign selectively, yet vigorously, in key areas with the understanding that the rules are already "stacked against them"; secondly, it must find policy which can capture the imagination and approval of the public. Many people are beginning to wonder whether the party which had such great aspirations of "breaking the mold of British politics" has not already been cast aside. Even today, respected politicians scoff at suggestion that the Alliance is a major party. As Austin Mitchell, Labour MP for Great Grimsby put it, "We have, in our country, 2.2 parties . . . well, okay, maybe 2.3." (Hansard Scholars' Lecture: 1986).

BIBLIOGRAPHY

- British Public Opinion, Nov. 1986. Market and Opinion Research International. London: 1986.
- British Public Opinion, General Election 1983. Market and Opinion Research International. London; 1986.
- Brown, Gordon. "Cheating Millions". The Guardian. 31 October, 1986
- Childs, David. Britain Since 1945: A Political History. 2nd ed. Meuthen and Co., Ltd. London: 1986.
- Crick, Bernard, ed. Unemployment. Meuthen and Co., Ltd. London: 1981.
- Dowse, Robert E. Left in the Centre. Longmans, Green and Co., Ltd. London: 1966.
- Fothergill, Stephen, and Gudgin, Graham. Unequal Growth: Urban and Regional Employment Change in the U.K. Heinemann Educational Books, Ltd. London: 1983.
- Fothergill, Stephen and Vincent, Jill. State of the Nation: An Atlas of Britain in the Eighties. Pan Books, Ltd. London: 1985.
- Gallup Political Index, October 1986. Social Surveys, Ltd. London: 1986
- Her Majesty's Government. UK Regional Development Programme 1986-90 European Regional Development Fund. London: 1986.
- House of Commons Research Division. Voting in the Local Elections of 8 May 1986: London, the Metropolitan Districts and the Scottish Regions.
- Madwick, George, et al. Britain Since 1945. Meuthen and Co., Ltd. London: 1986.
- Norton, Philip. The Commons in Perspective. Basil Blackwell, Ltd. London: 1985.

- Oakeshott, Matthew. *The road from Limehouse to Westminster – Prospects for a Radical Re-Alignment at the General Election*. Omega House. London: 1981.
- Peston, Maurice. "Economic Aspects of Unemployment" in *Unemployment*, Bernard Crick, ed. Meuthen Books, Ltd. London: 1981.
- Rothman, Stanley, et al. *European Society and Politics: Britain, France, and Germany*. West Publishing Co. St. Paul: 1976.
- The Times Guide to the House of Commons*. Times Books, Ltd. London: 1984.

Barbara McClintock

Looking at the Whole Picture

By Christi L. North

James A. Peters once wrote, "Genetics is properly a science of biology, requiring a knowledge of both botany and zoology." (Peters, 1959) This statement gives one a better understanding of Barbara McClintock's unquestionable prominence in the field of genetics. Having received her doctorate in 1927 from Cornell University with a major in cytology and a minor in genetics and zoology, McClintock's research focuses on *Zea mays*, or indian corn. Refusing to limit herself to corn, though, she extrapolates her findings to all organisms, believing in the essential oneness of all things. She integrates the minute details of her research into the function of the whole organism. For this reason, McClintock is often called a naturalist—and to a large degree she is, basing her research upon observation and intimate knowledge of the organism. On the other hand, as Marcus Rhoades comments, she documents her findings "meticulously." (Lewin, 1983) She enjoys the element of surprise in research which results from the "hidden complexity" of life (Keller, 1983), and she is always searching for the unusual. The impact of Barbara McClintock was predicted by her onetime professor, Rollins Emerson, in 1934: "It would be a scientific tragedy if her work did not go forward." (Keller, 1983)

However, Barbara McClintock has not always been so highly esteemed. Born June 16, 1902; McClintock was an independent child—a nonconformist. She greatly enjoyed reading and ice skating, and whenever she chose to attend school, her father was adamant that neither she nor her brother and sisters be assigned homework. From an early age, McClintock frequently did things that "girls were not supposed to do," (Keller, 1983) preferring the

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athletic pursuits of most young boys to the domesticity expected of young girls. She was a very intense girl, and as a result her mother removed her from both school and piano lessons at times. McClintock hardly missed the piano, but she had become addicted to learning and was quickly determined to receive a college education.

Many of these childhood characteristics continued to be manifested in Barbara McClintock as she matured. In response to her mother's initial opposition to college, McClintock began a program of self-education after high school, working during the day and reading avidly during her free time. When her father returned from the Great War and gave his support, she was off to Cornell to enroll in the College of Agriculture. Begun in 1919, McClintock's program of study culminated in 1927 with the receipt of her doctorate, also from Cornell.

Following her doctoral degree, McClintock remained at Cornell, formally as an instructor and assistant in Emerson's lab, actually as an independent research scientist. In this position, two of her most important associations developed. One of these was her teamwork with George Beadle and Marcus Rhoades, both of whom were at Cornell to work on their doctorates. The comradeship and mutual respect that the three developed has caused them to maintain close contact over the years, and this investigator believes that this contact encouraged all three to perhaps greater accomplishments than would have resulted otherwise.

McClintock's other association was with Harriet B. Creighton. Creighton's doctoral work at Cornell included the widely acclaimed research with McClintock on the relationship between genetic recombination and chromosomal crossing-over, published jointly in 1931.

In 1933, unable to continue at Cornell, McClintock journeyed to Germany as the recipient of the Guggenheim Fellowship award. She returned at Christmas, severely shaken by the politics of the Nazis.

Due to support from Emerson and T.H. Morgan, McClintock was able to remain at Cornell during 1934 and 1935 as the recipient of grants from the Rockefeller Foundation. But at Cornell McClintock had no hope of advancement, much less permanent stature, so in 1936 she accepted an assistant professorship at the University of

Missouri, engineered for her by Lewis Stadler. Five years later, McClintock remained at Missouri on sufferance. Her unorthodox behavior (such as climbing through a window when she'd forgotten her keys) and her lack of institutional loyalty (such as supporting students who wished to enroll in better programs elsewhere) had caused the university administration to look upon her with great disfavor. (Keller, 1983)

Deciding to move once again, McClintock accepted a research position with The Carnegie Institution's establishment at Cold Spring Harbor, New York. Ironically, when a permanent position was offered, McClintock was unsure. A permanent position meant that her freedom to move about as she pleased would be restricted, and Cold Spring Harbor was very isolated. She did accept the position in the spring of 1942 and actively maintained her close professional contact with her colleagues nationwide. As she has always been a very private person (Keller, 1983), the social isolation was of no concern. So, at Cold Spring Harbor laboratories, Barbara McClintock continues to demonstrate the autonomy, the self-determination, and the capacity for total absorption (Keller, 1983) which have always characterized her personality.

In her research, McClintock follows a unique approach. As has been stated previously, she is expert in using the tool of observation. She commented that "when I look at a cell, I get down in that cell and look around." (Keller, 1983) In order to better understand her organism, McClintock combined the traditionally separate pursuits of genetic breeding and cytological study of chromosomes. Her intimate association with her primary object of study, indian corn, is evidenced by the observation that in the experience of this investigator, the only publication titled with the formal *Zea mays* was the jointly published Creighton and McClintock paper—others use the informal name, maize. Thus, Barbara McClintock is on a first name basis with her pet organism.

Further, McClintock's qualitative, observation-oriented approach to research, unlike the quantitative, numbers-oriented approaches of many of her colleagues, focuses on seeing—even one unusual kernel of corn—and explaining its existence. She is committed to the whole organism, believing the minute details to be the keys to the larger whole. Keller stated in her McClintock biography: "Her

virtuosity resides in her capacity to observe, and to process and interpret what she's observed." (Keller, 1983)

Barbara McClintock's early research consisted of several studies of maize chromosomes. As a graduate student, she quickly modified existing cytological techniques, allowing her to identify and characterize individual maize chromosomes (10 total). These she classified on the basis of length, shape, and structure. Following her doctorate, McClintock researched linkage groups in maize, inspired by similar work in *Drosophila*. Continued cytological studies allowed her to observe the occasional pairing of non-homologous chromosomes, a finding which had direct applicability to her next topic of research: chromosomal crossing-over.

The correspondence of chromosomal crossing-over with genetic recombination began to make itself evident. McClintock included Harriet Creighton, a doctoral student, in this research and the two published their findings in 1931—providing conclusive evidence for the chromosomal basis of genetics. (Keller, 1983) The stated aim of their paper was "to show that cytological crossing-over occurs and that it is accompanied by genetical crossing-over." (Creighton, 1931) Their method involved the use of genetic

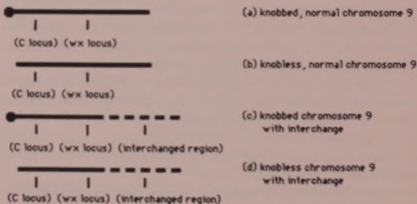


Figure 1. Maize Chromosome 9 With Various Markers
(adapted from Creighton and McClintock, 1931)

markers on maize chromosome nine to identify crossover events during meiosis. Chromosome nine is a sometimes knobbed chromosome carrying the genes for colored kernels (dominant *C*) and waxy endosperm (recessive *wx*) (Fig. 1). Their markers included a mutated form of chromosome nine which resulted from non-homologous interchange with chromosome eight. Their conclusion was firm:

Pairing chromosomes, heteromorphic in two regions, have been shown to exchange parts at the same time they exchange genes assigned to these regions. (Creighton and McClintock, 1931)

McClintock followed the theme of mutation, next researching X-ray-induced chromosome mutagenesis.

In her observation of maize, McClintock became interested in the many patterns of kernel coloration—especially those classified as variegated patterns. (Fig. 2) She hypothesized that these patterns result from the formation of a ring chromosome (unexpressed) from a fragment of chromosome nine. The ring may later be incorporated back into the chromosome proper, resulting in the propagation of colored cells in patches.

Further maize cytology allowed McClintock to identify a small body at the end of chromosome six. This she pursued, finding that the

particle of heterochromatin directs the breakdown and reformation of the nucleolus during karyokinesis. Because of its function, McClintock named this body the nucleolar organizer region (NOR) in 1934. She speculated that the importance of this region is still unrecognized. (Keller, 1983)

Having observed the breakage or fragmentation of some chromo-

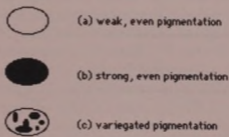


Figure 2. Maize Kernel Pigmentation Patterns
(adapted from Miller, 1983)

somes, Barbara McClintock went on to research the reannealing of chromosomes. She identified dicentric chromosomes which appeared to participate in a "breakage-fusion-bridge" cycle. (Keller, 1983) McClintock postulated that this cycle could explain large-scale mutations within an organism or species.

Next, taking a break from maize chromosomes, McClintock accepted an invitation from George Beadle to visit Stanford—and crack the cytology of *Neurospora*. This task presented a new challenge to McClintock, which she surmounted with her established procedure of extensive observation and profound insight. She completed her visit, in 1943, by giving seminars on her results.

Returning to her laboratory at Cold Spring Harbor, Barbara McClintock noticed some unusual variegation patterns in her newest, self-pollinated crop of maize. It appeared that mutations had occurred, but further study demonstrated that the mutations were unstable within the life of a single plant. McClintock determined that the only stable part of the process was a characteristic, generally unchanging rate of mutation for each organism. Again, the exception makes the rule, for McClintock identified adjacent regions within a single plant with differing rates of mutation. For each pair, one showed an increase in mutability, and the other showed a corresponding decrease. As McClintock observed, "one cell gained what the other cell lost." (Keller, 1983)

By 1946, McClintock has determined that the cause of mutation was a controlled breakage of chromosomes. Included were the hypotheses that the dissociation occurred in response to some activator, that increased dosage of controller delays initiation of mutation, and that the element that was gained/lost between sister chromatids to cause the inverse mutability in adjacent regions was one unit of activator (*Ac*). (Keller, 1983) Also, variegation was not caused by a gene deletion because it involved a reversible change of state.

Next, McClintock described the "transposition" of the dissociator (*Ds*) between gene loci and determined that such activity required the presence of *Ac* (1949).

As per usual, Barbara McClintock proceeded to apply her findings to the development of maize and to generalize that application to all organisms. Embryologists had not been able to determine the

mechanism which produced clearly differentiated tissues from identical genetic complements. According to McClintock,

the key to understanding development is the recognition that, rather than genes per se, 'it is organized systems that function as units at any one time in development.' (Keller, 1983)

Finally, Barbara McClintock published her results—results which began to systematically erode the foundations of the contemporary concept of genetics. In 1950, she gave her first brief account of transposition in *The Origin and Behavior of Mutable Loci in Maize*, a paper which "establishes the mutagenic effect of one member of the gene complex upon another, and provides an internal source of mutation." (Peters, 1959) In that paper, McClintock delineates two classes of mutable loci: (1) those which require a separate activator for instability to be expressed, and (2) those which are autonomous with respect to the factor which controls the onset of mutability. (McClintock, 1950) Each of these classes can effect the various events attributed to mutable loci. This is achieved by a "stickiness" of the material at the mutable locus which arises at precise times during the development of a tissue. (McClintock, 1950) McClintock hypothesizes that mutability may be related to the quantity of chromatin inserted at the mutable locus, and that *Ds* and *Ac* are composed of essentially the same material—probably heterochromatin. (McClintock, 1950) She also goes on to further describe the transposition of *Ds* and *Ac* between gene loci, or even chromosomes. (Fig. 3) McClintock concludes that

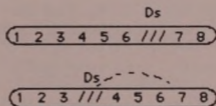


Figure 3. *Ds* Instability (in presence of *Ac*)
(adapted from Miller, 1983)

the changed phenotypic expression of such [mutable] loci are related to changes in a chromatin

element other than that composing the genes themselves, and that mutable loci arise when such chromatin is inserted adjacent to the genes that are showing the variegated expression. (McClintock, 1950)

Barbara McClintock followed this paper with a presentation of her findings at the Cold Spring Harbor Symposia of 1951 and 1956.

Throughout her career, McClintock has been the recipient of numerous honors and awards. For example, in 1939 she was elected vice-president of the Genetics Society of America, and she served as president in 1944. In 1945, she was selected to be the third female member of the National Academy of Sciences.

Yet, upon the publication and presentation of her latest research, a project of six years duration, Barbara McClintock was rejected and ridiculed. Without regard for the precision of her painstaking research or the brilliant logic of her deduction and inference, McClintock's theory of gene transposition was rejected out of hand by the vast majority of her colleagues.

Perhaps this was because McClintock's theory implicitly challenged three of the most basic assumptions of her contemporary geneticists. First, and foremost, it challenged the "central dogma"—that Avery, McCarty, and Macleod's DNA was the unchanging unit of heredity. Second, it challenged the belief that, as Jacques Monod stated, "no information from outside, of any kind, can ever penetrate the inheritable genetic message." (Keller, 1983) Third, it challenged the belief that uninduced mutations were entirely random events by proposing organismal regulation of those mutations.

In spite of her great opposition, Barbara McClintock persevered. She has always said that the key to scientific research is to "just let the material tell you," (Keller, 1983) and she had paid careful attention to her maize—she had to be correct. As a result, McClintock was plunged into professional isolation; not only did many not accept her ideas, they were not even willing to listen, calling her "mad" or her ideas "wild speculation." (Keller, 1983) Amazingly, rather than become better toward her colleagues—an entirely justifiable response—McClintock regarded them with generosity. Looking back, she claims to have learned an incredible

amount during those years. Since others were unwilling to hear about her discoveries, all she could do was listen to them describe their findings. (Keller, 1983).

However, over time, other geneticists began to discover parallels to the systems that McClintock had described. Royal Brink published supportive findings in 1952 and 1954. Rhoades, to whom McClintock has sent intermittent reports of her progress, suggested to his student Peter A. Peterson a problem involving the mutability of a "pale green" gene in maize which evidenced similar variegated expression. (Peterson, 1960) Peterson published his findings, which were in direct support of those of Barbara McClintock. Richard Goldschmidt published, in 1950, a paper drawing parallels between his *Lymantria* and McClintock's maize, relying heavily on her work and discussing its possible applications, including evolutionary speciation. (Goldschmidt, 1950) And, in 1960, Jacques Monod and Francois Jacob published a description of a similar "operator-regulator" system in *E. coli*, but ignored transposition. (Keller, 1983)

Finally, the merit of McClintock's work began to be recognized, with "jumping genes" popping up in all sorts of organisms. And the awards piled up. In 1981, she received the Wolfe Prize in Medicine, the prestigious Lasker Award, and was named the MacArthur Foundation's first Prize Fellow Laureate. Then, in 1983, Barbara McClintock was awarded the Nobel Prize "for her discovery of mobile genetic elements." (Lewin, 1983)

Characteristic of McClintock's attitude, she responded:

The prize is such an extraordinary honor. It might seem unfair, however, to reward a person for having so much pleasure, over the years, asking the maize plant to solve specific problems and then watching it responses. (Miller, 1983)

For Barbara McClintock, six years of dedicated research, followed by nearly thirty years of rejection, had finally borne fruit. The new genetics had opened it eyes, looked deep within organisms, and seen the accuracy of her results. Barbara McClintock has solved many of the minute details, with her exceptional vision she has integrated those details into a meaningful structure, and she has tried to pass on to others her great ability of looking at the whole picture.

LIST OF SOURCES

- Biological Abstracts* Philadelphia, PA: Biosciences Information Service of Biological Abstracts, 25:4,1951, entries 9840 and 12813.
- Brink, R.A. and R.A. Nilan, "The Relation Between Light Variegated and Medium Variegated Pericarp in Maize," *Genetics* Madison, WI: Genetics, Inc., 37:5, 1952, pp. 519-544.
- Creighton, Harriet B. and Barbara McClintock, "A Correlation of Cytological and Genetic Crossing-Over in *Zea mays*." Reprinted in *Classic Papers in Genetics* (pp. 155-160) from *Proceedings of the National Academy of Science* 1931, Vol 17, pp. 492-497.
- Goldschmidt, Richard B., "Marginalia to McClintock's Work on Mutable Loci in Maize." Summarized in *Biological Abstracts* from *American Naturalist* 84:819, 1950, pp. 437-455.
- Keller, Evelyn Fox, *A Feeling for the Organism: The Life and Work of Barbara McClintock* New York: W.H. Freeman and Company, 1983.
- Lewin, Roger, "A Naturalist of the Genome," *Science* Washington, D.C. American Association for the Advancement of Science, 222:4622, 1983, pp. 402-405.
- McClintock, Barbara, "The Origin and Bahvior of Mutable Loci in Maize. Reprinted in *Classic Papers in Genetics* (from *Proceedings of the National Academy of Sciences* 36, 1950, pp. 344-355).
- McClintock, Barbara, "Induction of Instability at Selected Loci in Maize," *Genetics* Madison, WI: Genetics, Inc., 38:6, 1953, pp. 579-599.
- Miller, J.A., "Nobel Prize to McClintock and Her Mobil Elements," *Science News* Washington, DC: Science Services, Inc., 124:16. 1983, p. 244.

- Morgan, Thomas H., *The Theory of the Gene* New York: Hafner Publishing Company, Inc., 1964.
- Morris, Rosalind, summary of Barbara McClintock's "The Origin and Behavior of Mutable Loci in Maize." Summarized in *Biological Abstracts from Proceedings of the National Academy of Sciences* 36:6, 1950, pp. 344-355.
- Peters, James A., *Classic Papers in Genetics* Englewood Cliffs, NJ: Prentice Hall, Inc., 1959, pp. 155-160 and 199-209.
- Peterson, Peter A., summary of Peters A Peterson's "A Mutable Pale Green Locus in Maize." Summarized in *Genetics* (38:6, pp. 682-683) from the 1953 *Meetings of the Genetics Society of America*.
- Peterson, Peter A., "The Pale Green Mutable System in Maize," *Genetics* Austin, TX: Genetics, Inc., 45:1, 1960, pp. 115-132.
- Russell, Peter J. *Genetics* Boston, MA: Little, Brown and Company, 1986, pp. 172-173 and 535-536.

From Pit . . . to Privy . . . to Watercloset . . . to . . . a Clivus Multrum?

By Joy Peterson

Humans have few necessities: eating, wearing clothes, having shelter, and relieving themselves. The toilet has evolved through time to become the convenient consumer item we all take for granted. It is now easy to use, efficient, and odorless (well, most of the time). However, the toilet used to be a luxury that only the wealthy had – outhouses were common from the 1800's to the 1940's. And, because of the waste of water with the current siphonic toilet, society may eventually resort to the low-tech privy again.

From Pit to Privy

The earliest contraption found that resembles a toilet dates back to circa 3,250 B.C. in Mohenjo-Daro, India. Here, archaeologists discovered two holes in the ground connected to drains; these drained the sewage onto the streets. The seats were on the ground; squatting was required (Palmer 13-14). The next oldest toilets were discovered in Samaria, dating back to c. 2350-2130 B.C. The six found here showed the movement from ground level seats to the Western design of high seats we have today (Palmer 14).

Early on, people realized that a sanitation system was necessary. The Bible has made references to how people 2,000 yrs. ago dealt with human waste; in Deuteronomy, 23:12-3, it states,

Thou shalt have a place also without the camp . . .
and it shall be when thou wilt ease thyself, thou shalt
dig therewith, and shalt turn back and cover that
which come from thee. (King James)

This paper was written for Science and Society in the Fall of 1986.

The Romans were the first to construct public urinals in their marketplaces – progress would have continued, had the Empire not fallen in 476 A.D. Instead, throughout the Middle Ages humans threw their waste onto the streets for pests and bacteria to grow happily in. This was one of the reasons for the rapid spreading of plagues throughout the ninth-thirteenth centuries (Palmer 18).

In 1449, Thomas Brightfield came up with the idea of flushing a stone toilet with water. His bowl was flushed by collected rainwater contained above the toilet. However, few considered this idea; they continued to dispose of their wastes in ditches, lakes, and rivers (Palmer 19). In 1596, Sir John Harington invented the valve closet, an important forerunner of today's Western design. The valve closet consisted of a pan with an opening at the bottom that was sealed by a leather-faced valve. The complicated flushing process involved moving counter-weights, levers, and a handle simultaneously; this moved the valve and allowed water to rinse out the bowl. Unfortunately, society was not prepared for this breakthrough. Sir John Harington was 200 years ahead of his time. Both peasants and rich continued to dispose of sewage "a bow's shot" away (Palmer 26).

During the 1700's, people were uncomfortable with the idea of going to the bathroom in their country house. Bathing was considered unsanitary and unhealthy. The garden was the recommended place to "pluck a rose." Jonathan Swift, in his pamphlet, "Directions to Servants," (1745) condemned women who wouldn't relieve of themselves in the garden. He stated,

I am very much offended with those Ladies, who are so proud and lazy, they will not be at the Pains of stepping into the Garden to pluck a Rose, but keep an odious implement, sometimes in the Bed-Chamber itself . . . which they make use of to ease their worst Necessities, and, you are the usual Carriers of the Pan, which maketh not only the Chamber but even their cloaths offensive, to all who come near. Now, to cure them of this odious Practice . . . convey away this utensil, that you will do it openly down the great Stairs and in the presence of Footmen (Palmer 21).

Of course, this was part of his anti-feminism beliefs; this idea of using the garden disappeared as people began to accept this as a function

that could be done in the house. This revolution of moving the "pan privy" into the house caused people to be more sanitary: bathing was no longer condemned as unhealthy.

When Alexander Cummings of London took out the first patent for a water closet in 1775, England remained indifferent. The wealthy were the ones who could afford this luxury, and they were too busy being concerned about their economic involvement with the U.S. (Palmer 22). It was not until 1875 when English Parliament got involved with sanitary regulations; the Act of 1875 required all new houses to be built with a room for a privy (Palmer 24).

With these new regulations, more inventors and curious people experimented with the existing toilet to find a more efficient one. In 1870, John Randall Mann patented the siphonic toilet, a follow-up of the water-valve toilet. In this design, pipes shot in water from three different angles to provide a quicker and cleaner flush (Palmer 43). This is the type of toilet that is used today.

Although Thomas Crapper is often credited with inventing the toilet, he merely perfected the flush and cistern system. In 1884, he invented the "Super-Flush," an incredible one step operation to empty the bowl. There was no longer the hassle of shifting weights and pulling levers. To prove its efficiency, at one county fair Crapper flushed 10 apples, one sponge, and soil with one tug of his chain lever. Reyburn stated,

One can visualize the sense of excitement among these pioneers . . . crowding around the toilet as the Old Man stands, chain-pull in hand, ready to give his brain child the big test. And the exuberance of success . . . "It works!" (17).

Country folks were still using outhouses in the 1940's; some urban families still had their waste periodically picked up by the "honey wagon" (Van der Ryn 23). However, through the work of Crapper and Harington, the mechanics were set for the next 50 years. The only job for every Western home was to adopt the toilet.

Convincing every home to adopt the watercloset was not difficult. Society greeted this technique of disposing wastes with open arms. With one flush, they no longer had to deal with the "dirty" part of life. Going out in the cold of winter to the outhouse was no longer necessary; it could be speculated that people now took their time—one no longer

froze as she sat on her porcelain throne. Who knows? Literature sales might have even picked up: people needed something to do while sitting there, waiting for nature to take its course. Companies like American Standard and Crown developed toilets that were inexpensive; as long as hook-up to a sewage system or septic tank was available, installation was easy.

The W.C. In Action

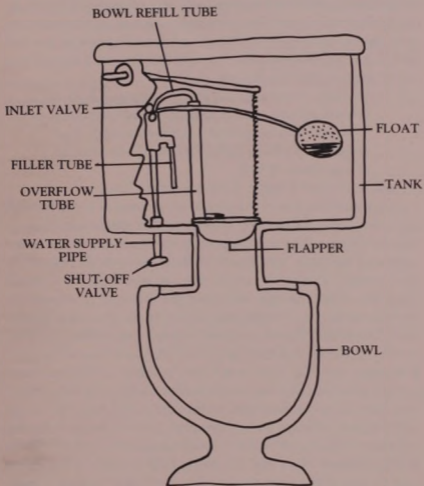
The system of flushing the siphonic toilet is simple. The bowl and tank both contain water; when the handle is pushed, the flapper is lifted from the tank discharge pipe. The water from the tank goes through the tank discharge pipe, enters the bowl, carries the contents into the drainpipe and down the soil stack, a sturdy pipe made of cast iron, copper, or steel ("Plumbing" 527). The filling process is longer. (See Illustration). The float lowers as the water is emptied, causing the inlet valve to let water in from the supply pipe. Water from this supply pipe also enters the bowl refill tube, which fills the bowl. And, as the tank fills up, the float raises and turns off the inlet valve; the toilet is ready to flush again (Daniels 515).

Flush and Forget?

"At a time when 70% of the human race has no piped water at all, the annual consumption rate of a North American family is 88,000 gallons" (Stoner 236). Flushing a toilet once consumes about five to eight gallons. This means one person uses 40 tons of fresh water to dilute a few hundred pounds of waste a year. Having this comfort of technology is wasting our finite water supply. And, converting this greywater back to fresh costs the U.S. an estimated \$10–100 billion per year. According to Ron Davis, designer of a compost toilet,

The ultimate result . . . is that valuable minerals are mined from the soil. . . and not returned. . . Instead, they wind up being flushed into our rivers and oceans. As our land and our bodies become depleted, our water supplies become over-fertilized. Both suffer (Strycker).

Some people are concerned about the water waste; they are taking control of the situation by replacing their siphonic water-flush toilet



with a type of dry toilet, a simpler, less wasteful, and more ecologically sound method of disposing of waste material.

In a dry toilet, water is not used; the waste is usually converted into usable nutrients. They have been legal in Oregon since 1977, although they are still illegal in many parts of the country (Strycker). In the oil flush toilet, one type of dry toilet, mineral oil transports the waste into a holding tank. Waste is periodically pumped out and hauled to a land disposal site; it cannot be composted because it is coated with oil. Van der Ryn stated,

Oil flush toilets seem to be an example of how a mastery of complex technology combined with biological ignorance often complicates rather than simplifies a problem. Each unit costs almost as much as a compact car (41).

Obviously, it is not a highly recommended technique.

One alternative that many people are turning to is the Swedish Clivus Multrum, a toilet that decomposes the wastes, from feces to vacuum cleaner dirt, and evaporates the moisture of them; the volume of the waste is eventually reduced by up to 90 percent. As these wastes fall down the chute, they are spread out on a slanted plane; air passes through vents and the moisture is evaporated. Bacteria and other microorganisms decompose the remaining materials into a "black tea." This nitrogen-rich residue is an excellent fertilizer; it can be used as a soil enricher on non-edible plants (Van der Ryn 38). If working properly, there is no odor problem in the bathroom: aerosols, matches, and room deoderizers are unnecessary. Of course, it does have some disadvantages. In the Clivus Multrum, the storage tank where this decomposition takes place must be directly below the toilet (in the basement). Another disadvantage is the cost—\$1,300 to \$1,700 (Stoner). And, like the owner-built compost toilet, guests tend to treat it like an outhouse: they don't like "hearing it drop" (Stryker B1).

There are other ways to save on water where the consumer doesn't need to invest \$500–\$2,000. Several books recommended placing two bricks, one on each side of the tank to save water—up to two gallons per flush. However, one must be sure the bricks are high quality ceramic; otherwise, they might deteriorate and clog the system. Another suggestion was placing capped plastic bottles (filled

with rocks) in the tank on both ends. This serves the same purpose as the brick: water displacement. Water displacement can save approximately 4,000 gallons of water per person per year (Stoner 237).

People in the future will not have the opportunity to have the philosophy of "flush and forget." Currently, our Western Civilization does; they accept this technology and use it to their individual benefit. We eventually will have to pay for this nonchalant attitude. Many are not aware of the impact this wasting of fresh water has on our ecosystem; some do not care. Most enjoy this comfort, and, if your toilet is working and you've got \$1,000, what are you going to do— buy a Clivus Multrum or a hot tub? AH! I thought so!

BIBLIOGRAPHY

- Carr, Donald E. *Death of the Sweet Waters*. New York: Vail-Ballou Press, 1966.
- Daniels, George. "Plumbing." *World Book Encyclopedia*. 1985 ed. International Association of Plumbing and Mechanical Officials. *Uniform Plumbing Code*. U.S.A.: 1975.
- Palmer, Roy. *The Water Closet*. Newton Abbot, England: David and Charles, 1973.
- "Plumbing." *Encyclopedia Britannica*. 15th ed 1985.
- Reyburn, Wallace. *Flushed With Pride*. Englewood Cliffs, N.J.: Prentice Hall, 1969.
- "Splish Splash, It's More Than a Bath," *Newsweek* 5 May 1986: 80.
- Stoner, Carol Hopping, ed. *Goodbye to the Flush Toilet*. Emmaus, Pa.: Rodale Press, 1977.
- Stryker, Lisa. "Author promotes a no-flush toilet." *The Register Guard* 20 Oct. 1986: B1, col 2-4; B2, col 1-2.
- Van der Ryn, Sim. *The Toilet Papers*. Santa Barbara: Capra Press, 1980.

The Moral Implications of Star Wars on Nuclear Ethics

By Christopher Ross

Our scientific power has outrun our
spiritual power. We have guided
missiles and misguided men.

—Martin Luther King, Jr.

Nuclear war petrifies us. It puts not only our own existence into question, but that of all humanity. Since the great advances in nuclear weapon technology resulting from the Manhattan project (1945) and the development of the hydrogen bomb (1950's), man now has the power unparalleled in human history to exterminate his very species and living environment. Such a situation has raised considerable moral and ethical questions demanding a full re-evaluation of the traditional moral views on war. The debate has thus centered around Just War theory, the ethics of deterrence, and limited nuclear war. This debate, however, now risks further complications with the advent of space-based weapon systems. I propose a brief study of these complications and how they affect the current nuclear ethics debate. I will argue that the introduction of "Star Wars" technology may also result in a destabilization of the international system and make nuclear war a more likely possibility. Finally, the full moral and ethical implications of Star Wars technology cannot be fully understood without a discussion of its impact on other qualitative dimensions of the nuclear ethics debate.

In order to fully comprehend the impact of Star Wars technology on nuclear ethics, it is first necessary to examine the ethical debate

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surrounding the nuclear war issue as it existed prior to President Reagan's Strategic Defense Initiative (SDI). One of the major components of this debate is Just War theory. The Just War theory is actually an amalgamation of Western thought on war. It finds its historical roots in a mosaic of thought fashioned by theologians, philosophers, jurists, statesmen, and soldiers. For centuries, it has provided restraints on the conduct of war.

The essential elements of Just War theory can be traced back to Saint Augustine who sought to provide a rationale for Christian participation in war. He accepted that violence was part of human life and hoped to use it for the good of people rather than evil. He thus attempted to harness force and develop a "fully elaborated theoretical defense of Christian participation in conflict with a series of restraints both on ends and on means," (Davidson, p. 3) The result of this attempt was a tradition representing a middle path between pacifism and militarism where war would be just if fought with the right intention (*jus ad bellum*) and adhered to specific requirements in means (*jus in bello*). Among the objective restraints on war were means which allowed a reasonable chance of success, were proportional to the stakes, and provided for non-combatant immunity. The major subjective restraint consisted of the double effect rule. This rule stated that any act of war having an evil effect was morally tolerable if two essential conditions were met: that the direct intended effect be morally acceptable (and superior in proportion to the evil effect) and that the evil effects be unintended, and not a means towards the end. (Hoffmann, p. 48)

During the last half century, for ideological and technological reasons, the Just War theory has been the focus of serious debate. Stanley Hoffmann argues that the just war doctrine was elaborated for three sets of circumstances which no longer exist. The church no longer has the authority nor the power to define and interpret morality. The very nature of war has changed so that in order for there to be a reasonable chance of success, the means will often be disproportionate to the stakes. Finally, the doctrine was elaborated for circumstances in which there existed a clear distinction between war and peace, a distinction which has become ever more difficult in the modern world of non-declared and proxy wars. (Hoffmann, p. 50-51)

Hoffmann's views are echoed by many scholars who, drawing concrete examples from nuclear war scenarios, believe that nuclear weapons have simply exploded the war doctrine. They argue that no end can justify nuclear war and that nuclear weapons are immoral means. An excellent analysis of this position can be found in Michael Walzer's *Just and Unjust Wars*. Here, Walzer demonstrates that although "tactical and counterforce warfare meets the formal requirements of *jus in bello*," it is unacceptable because it violates proportionality limits. Even if legitimate targets were attacked, the cost in human life would exceed the value of the target. (Walzer, p. 267-77) Thus, in an exchange of strategic missiles, the number of people killed as "collateral damage" could not be justified by the goals of the war. Furthermore, it is next to impossible to distinguish between combatants and specific military targets without non-combatants being directly affected by either the blast itself, radiation fallout, or environmental pollution.

The question then becomes: If it is morally wrong to use nuclear weapons, is it also morally wrong to possess them? In other words, is the possession of nuclear arms for deterrence morally justified? Various positions are taken on this question, but each must deal with the basic dilemma of nuclear deterrence. This dilemma is quite simply that in order for nuclear weapons to constitute a credible deterrent, their use in case of conflict or aggression cannot be ruled out. Hence, the potential use of nuclear weapons is vital if the deterrent is going to be effective. For some scholars, such as Germain Grisez, the answer is clear. It is morally wrong to threaten what it is morally wrong to do. Grisez points to present U.S. countervailing strategy and quotes a United States Military Posture Statement for 1983 to support his argument that counter-city attacks are conditionally intended as a last resort by the United States. (Hollenbach, S.J., p. 70) This, Grisez contends, is an unacceptable intention to kill vast numbers of civilians through counter-city attacks, should deterrence fail. By taking this position he, along with those who share his views, implies that having a deterrent strategy and having a nuclear war are morally equivalent. The argument is not, however, fully convincing. One could argue that in strategic interactions, outcomes are the result of two sets of intentions, not just one's own. Thus, one may have the intention to

preserve peace by a threat of nuclear retaliation, but the outbreak of nuclear war would also depend on the opponents' actions, not just on one's own intentions. (Nye, p. 54)

Another perspective on the dilemma of nuclear deterrence comes from the Catholic Bishops who view nuclear weapons as immoral, but state that threat does not constitute use. Cardinal John Krol provided the essential elements of this argument before the Senate Foreign Relations Committee in support of the Salt II treaty. He concluded that, although any use of nuclear weapons is immoral and the threat to use them indicates an intention to do so, the possession of these weapons is also compatible with the intention not to employ them. (Hollenbach, S.J., p. 69) This type of reasoning nicely frees one from the "usability dilemma" if it could work, but such reasoning has actually been attacked by both those who reject the moral legitimacy of nuclear deterrence and by those who support deterrence, but contend that it cannot exist without the intention to use weapons. (Hollenbach, S.J., p. 70)

Finally, many scholars share the view of Michael Walzer. He rejects "all-out nuclear war," which he describes as morally unthinkable, and further rejects the use of tactical nuclear weapons because of the likelihood of escalation. However, to the question of whether the possession of nuclear weapons is morally justified, Walzer answers, "yes, . . . but." It is wrong to threaten the use of nuclear weapons, but not as wrong as their actual use; and if possession of them prevents their actual use, it is necessary to keep a "balance of terror" until a better solution can be found. (Walzer, p. 247) Thus, according to Walzer, the temporary possession of nuclear weapons is needed in the present political context in order to prevent the use of nuclear weapons. Nevertheless, deterrence is an immoral threat to use immoral means, and "our familiar notions about *jus in bello* require us to condemn even the threat to use them." However, he also adds that other notions having to do with aggression and the right of self-defense "seem to require exactly that threat, so we move uneasily beyond the limits of justice for the sake of justice (and of peace)." (Walzer, p. 282)

The above positions, for the most part, have been reactions to the nuclear doctrine of Mutual Assured Destruction (MAD). For decades, this doctrine has been the cornerstone of U.S. nuclear

policy. The theory holds that no matter how the Soviets attack, enough U.S. missiles will survive (on submarines, bombers, etc.) to destroy the Soviet Union. No reason, it is argued, would justify the millions of deaths, scorched cities, and the inevitable total destruction of the human species and its environment. (Peebles, p. 173) However, recent statements by President Reagan and Defense Secretary Weinberger reveal a movement away from MAD to the possibility of fighting and "prevailing" in a limited nuclear war. Published reports clearly demonstrate this reorientation of strategic nuclear doctrine. The Reagan administration's National Security Decision Document on the topic clearly instructs the Defense Department to prepare to win protracted nuclear wars, and the 1982 Defense Guidance plan contains a strategy for fighting and winning such wars. (Smoke, p. 223) While testifying to Congress, Secretary of Defense Weinberger assigned "top priority" to acquiring "nuclear force parity across the full range of plausible nuclear war fighting scenarios." (Smoke, p. 223)

Surprising as it may seem, several positive moral arguments were made for a move towards limited nuclear war. After all, advocating a doctrine which purports to limit damage and save thousands of lives is a much more morally comfortable and superior position than being restricted to the morally repugnant position of massive retaliation. From a strategic point of view, one could even argue that limited nuclear counterforce warfare would enhance deterrence because nuclear weapons would be more likely to be used in a limited fashion and would therefore reinforce deterrence.

There are of course immense difficulties with this position. Proponents of this doctrine make unrealistic assumptions about rationality and control. In order for nuclear war to be limited, the key factors will be command, control, and communication. (Nye, p. 51) The most impressive characteristic of all scientific study of the impact of nuclear war is its marked uncertainty about the extent of the resulting damage, and it is precisely this damage which will affect the capacity of political leaders to maintain control should hostilities break out. For instance, is it possible to assure communications even after limited nuclear attacks, especially if those attacks include command centers as targets? The main finding of the Office of Technology Assessments's report on *The Effects of Nuclear War*

(1979), was "the effects of nuclear war are at least as important as those for which calculations are attempted" and even the effects of a "small" or "limited" nuclear attack would be enormous. (Clark, p. 223) In addition, the report concludes that the certitudes of limited nuclear war options are essentially unpredictable. (Clark, p. 224)

On a strategic level, the arguments that advocacy the limited use of nuclear weapons reinforces deterrence because those weapons are more likely to be used in a limited fashion, also implies that by making the United States nuclear force easier to use, it is making it more likely to be used. Whether that increased threat will more effectively prevent war is a basic dilemma of deterrence theory, but given the incredible risks of controlling any limited nuclear exchange, the morality of such a doctrine can be seriously questioned.

Having reviewed the basic components of the nuclear ethics debate, how does the introduction of Star Wars technology modify the debate and what consequences will such technology have on the international system? Before beginning such a discussion, it is first necessary to define exactly what is meant by "Star Wars technology." For the purpose of this paper, I will use Star Wars technology to refer to President Reagan's Strategic Defense Initiative (SDI), as outlined in his speech of Spring, 1983. This speech calls for technology to provide the means of rendering nuclear weapons impotent and obsolete by intercepting and destroying enemy ballistic missiles before they reach their target. This is to be accomplished through the use of orbital space lasers. I will thus equate Star Wars technology with the search for a one hundred percent effective ballistic missile defense.

Strategists who advocate space-based missile defense systems make a number of arguments in support of their position. In essence, they argue that by developing anti-ballistic missile (ABM) defenses, the United States would reduce the vulnerability of American land-based missiles to a preemptive Soviet first strike, and would enhance deterrence by increasing Soviet uncertainties about the effectiveness of any nuclear attack they might contemplate launching. (Kavka, p. 680) By eventually being able to form an effective shield against any Soviet nuclear attack, the United States would enjoy complete strategic and nuclear superiority over the

Soviet Union and would benefit from the tremendous political advantages of such a situation. However, it would be quite naive to assume that the Soviet Union would not pursue space-based missile defense research of its own. In fact, therein lies the mortal threat to any sort of functional deterrence should ballistic missiles be pursued.

During the research phase, the dangers associated with ballistic missile defenses would be acute. Both nations would have incomplete knowledge of the effectiveness of the other's defenses and would be highly suspicious of their intentions. In such a climate, even defensive measures could be perceived as highly offensive by the Soviet Union. Star Wars would in essence permit the United States to have first-strike capability against a depleted Soviet retaliatory strike. Once military leaders on both sides believe that war is a real possibility and that they can have an advantage by striking first, they are more likely to contemplate a preemptive attack. (*Fallacy of Star Wars*, p. 160) Fear of the military or political consequences of strategic vulnerability might even lead the nation that perceives itself as disadvantaged (in this case the Soviet Union) to consider waging war to prevent ballistic missile defense deployment. (*Fallacy of Star Wars*, p. 159) . Within the context of Just War theory, the Soviet Union could justify such action as self-defense, and international law and modern theologians have accepted this as a legitimate, morally justified right. (Nye, p. 46) Thus, Star Wars would undermine the whole notion of deterrence.

Another line of reasoning advanced in favor of anti-ballistic missile defense systems follows much of the same logic behind the arguments defending limited nuclear war. A ballistic missile defense system would save lives and reduce the threat of assured destruction. It would also improve our "destruction inflicted/destruction suffered" ratio enough so that we would be more likely to prevail in a nuclear war if deterrence failed. (Kavka, p. 680) These arguments are not plausible, however, when one takes into account the immense destructive capacity of both superpower nuclear arsenals. The overkill capacity of both superpowers is such that only a nearly perfect defense (far from being realized) could hope to reduce fatalities appreciably in the event of major nuclear exchanges. The Union of Concerned Scientists gives the following example to demonstrate this point. If the Soviet Union were to target its

missiles to maximize damage to the American population, it would only need five percent of its current ballistic missile warheads to kill up to half of the United States' urban population immediately. (*Fallacy of Star Wars*, p. 163) In other words, even with a ninety-five percent effective American ballistic missile defense system, the United States could still lose half of its urban population and be subject to the ravages of radiation fallout, permanent environmental pollution and subsequent deaths from fire, disease, and social disruption.

One of the greatest challenges of Star Wars technology is to the doctrine of MAD. The reason for this is that deployment of missile defenses poses a threat to the assured destruction capability of each side. Thus, the fewer the number of warheads the Soviet Union can expect to penetrate an American ballistic missile defense, the more likely they are to swamp the system with massive amounts of warheads, decoys, and other penetration aids in order to overcome the system. (*Fallacy of Star Wars* p. 155) Under such a scenario, the incentives and capabilities of the two powers to contain nuclear war below the threshold of all-out exchanges are considerably reduced. Given the devastating damage that would result from just a five percent leakage of Soviet missile capacity through a ninety-five percent effective American ballistic missile defense, one could even argue that the development of Star Wars technology may represent a trend towards the moral acceptance of a sizable number of nuclear related deaths.

Up to the present, my approach has essentially focused on a moral assessment of the strategic implications of Star Wars technology and the consequences for the international system resulting from the development of such technology. But there are other qualitative dimensions to the introduction of Star Wars technology on the nuclear ethics debate. Robert Lifton, in *Indefensive Weapons: The Political and Psychological Case Against Nuclearism*, evokes man's fundamental sense of helplessness in the face of the enormous, almost incomprehensible, power of nuclear weapons. "Compared to the bomb's infinite, mysterious killing power, we feel ourselves to be nothing - to be vulnerable creatures whose lives and very humanity can be snuffed out instantaneously. We feel ourselves unable to break out of the death trap we know to be of our own

making.” (Lifton, p. 3) Lifton also speaks of the dangerously developing relationship between individuals and nuclear weapons. According to this view, weapon systems have so expanded, technologically and bureaucratically, that no one person or group has complete control over them. (Lifton, p. 8)

The addition of space-based defenses risks aggravating man’s sense of helplessness and lack of control. By transferring the nuclear battle field from our own earthly environment into outer space, one is further distancing oneself from nuclear weapons (despite the fact that the end result on earth is the same – massive destruction). Part of the problem also comes from the sophisticated technology of Star Wars systems. Already, computers make a vast number of decisions regarding when, where, and how targets will be attacked. With the advent of space-based beam-weapons, these decisions will be made by orbiting satellites with computer operated sensors to detect the launching of enemy missiles. Control will thus be further undermined as these manmade space machines combine with ground automation of nuclear fighting capacity and the immense bureaucratic expansion of nuclear weapon systems.

There are also definite moral implications to the use of space for militaristic purposes. The Outer Space Treaty of 1967 serves as the prime reference point for most international discussions relating to space activities. Among the principles encompassed by the treaty are:

1. Space research is to be carried out in the interest of furthering international cooperation, understanding, and peace everywhere.
2. Outer space may not be used for the placing of nuclear weapons or other weapons of mass destruction, nor shall there be any military bases, installations or fortifications, maneuvers, or weapons testing in outer space. (Katz, p. 207)

The second principle, or Article 4 of the treaty, has been the subject of debate as to what constitutes acceptable military use of, or involvement in, outer space activities. Much of the interpretation, not surprisingly, has been left to the superpowers. For example, strategic agreements such as the ABM Treaty of 1972 limited the capabilities and uses of anti-ballistic missiles, and the 1963 Limited

Nuclear Test Ban Treaty attempted to force nuclear testing underground. (Katz, P. 210) Should the United States or the Soviet Union deploy a ballistic missile defense system, this would surely lead to the demise of the ABM Treaty and represent a clear violation of the letter, if not of the spirit, of the 1967 Space Treaty.

Another argument might link the abuse of space to the evil of polluting and destroying the earthly environment. Gregory Kavka contends in *Space War Ethics*, that "it would somehow be obscure or shameful for mankind to clutter the peace and serenity of outer space with weapons of war to settle our merely earthly conflicts." (Kavka, p. 675) Such misuse and spoilage of the beauty of outer space is morally suspect, independent of the harm that space-based weapons may cause to human beings. One could compare such abuse to the polluting and destruction of the environment. However, Kavka recognizes the difficulty in pursuing this line of reasoning in any systematic fashion.

Finally, the development of Star Wars technology poses serious moral problems given the competing claims on scarce resources. According to official estimates, the research and deployment of a ballistic missile defense would cost anywhere between 100 billion and one-half trillion dollars. (Kavka, P. 683) This is nearly half of the sum total of all expenditures devoted to national security since 1946. (Barnet, p. 5) In order to truly comprehend the enormity of these figures, it is necessary to examine their opportunity cost. The American people would in fact be devoting more resources to Star Wars than is spent by all federal, state, and local governments on health and hospitals, education, old-age and retirement benefits, public assistance and relief unemployment and social security, housing and community development, and support of agriculture. (Barnet, p. 6) More resources will be devoted to supporting an economy of death, to provide a very fragile if not destabilizing international climate, than to support an economy of life.

However, research and development of strategic defenses will not be limited only to the United States. On an international level, especially among American allies, Star Wars research will also be undertaken. Chancellor Kohl of the Federal Republic of Germany and Prime Minister Thatcher of the United Kingdom have both shown a certain warmth towards Reagan's defense initiative and

have agreed to conduct their own programs along the lines of the American effort. Besides the financial commitment, the United States and her allies will also devote tremendous human resources to the development of Star Wars technology. Some of the brightest, most able, and creative of scientists will be dedicating more of their time, energy, and knowledge to new methods of fighting nuclear wars and possibly exterminating the human species than to research designed to promote the species. (e.g., cancer research). Moreover, the financial and human resources allocated to Star Wars research and development will take place in a world where between 780 million and 1 billion people live in absolute poverty. (Kim, p. 139)

Having examined the essential elements of the current nuclear ethics debate, the complications posed by the development of ballistic missile defenses to that debate, and the moral and ethical implications of Star Wars technology on other qualitative dimensions of the nuclear ethics debate, several observations can be made. Clearly, Star Wars research risks destabilizing the international system and makes nuclear war a more likely possibility. If one evaluates President Reagan's SDI in terms of its contribution to the goal of nuclear war prevention, the undermining of the whole notion of deterrence is a clear example of its failure. Soviet leaders would never allow the United States to enjoy complete strategic superiority, much less the capability of launching a first-strike against the Soviet Union and being able to defend itself against a Soviet retaliatory strike. Thus, a highly dangerous period of intense research and development in which even defensive measures could be perceived as aggressive would result. Under such circumstances, either party could resort to Just War theory and specifically self-defense as a justification for any military action to prevent ballistic missile defense deployment. Indeed, it is in their interest to do so.

The development of Star Wars technology may also represent a trend towards the moral acceptance of a sizeable number of deaths. As the example given by the Union of Concerned Scientists so vividly demonstrates even a ninety-five percent effective ballistic missile defense would allow the penetration of enough Soviet missiles to destroy over half of the United States' urban population.

Faced with these facts, it is difficult to accept arguments that a ballistic missile defense would save lives to any appreciable degree.

Finally, the morality of developing such highly costly destabilizing technology, given the intense competition for scarce resources, can be seriously questioned. The financial and human resources devoted to Star Wars research represent an immense opportunity cost in terms of what will be sacrificed for its development: domestic welfare programs, medical research, community improvements, and so on. Furthermore, strategic defense research will take place on an international scale and will thus also tie up substantial resources among allies. How can one justify such an incredible cost in human and financial resources for a highly destabilizing ballistic missile defense system, in a world where over 780 million people live in absolute poverty?

There are, of course, incredibly strong forces working to push for SDI research despite this negative assessment of its impact. Besides President Reagan's personal, and somewhat idealistic, vision of rendering nuclear weapons obsolete, economic as well as bureaucratic factors go far to explain much of the dynamic behind Star Wars technology development. Just the amount of funds to be allocated to Star Wars research is incentive enough for those industries most likely to benefit from SDI-related government contracts to lobby in its favor. The different departments of the vast federal bureaucracy also stand to gain from the additional funds and new jurisdictional duties and control made available by Star Wars research and development. These forces, along with those who simply hope to achieve military superiority over the Soviet Union, constitute the primary actors in the vigorous drive for ballistic missile defense development. Their ability to influence policy should not be underestimated.

In conclusion, the prospects for maintaining peace seem to be directly threatened by the development of ballistic missile defense systems. Moreover, it is extremely difficult to justify the development of such systems given their likely negative consequences on the maintenance of a "balance of terror." The end result is an increase in the likelihood of nuclear war, a morally unacceptable possibility given the next-to-impossible task of containing such a war within the confines of Just War theory. Finally, in light of the

urgency of the many difficult and pressing problems facing all of humanity, it is difficult to justify the immense economic and human resources devoted to the development of such highly destabilizing technology.

BIBLIOGRAPHY

- Barnet, Richard. *The Economy of Death*. New York: Atheneum, 1970.
- Bauer, Alfred W. "Dear Mr. President"; an open letter to Ronald Reagan about War and Peace. Kirkland, Washington: A. W. Bauer, 1984.
- Bertsch, Kenneth A. *The Nuclear Weapons Industry*. Washington, D.C.: Investor Responsibility Center, 1984.
- Burns, Grant. *The Atomic Papers*. Metuchen, N.J.: Scarecrow Press, 1984.
- Castelli, Jim. *The Bishops and the Bomb*. Garden City, New York: Image Books, 1983.
- Clark, Ian. *Limited Nuclear War: Political Theory and War Conventions*. Princeton, N.J.: Princeton University Press, 1982.
- Cousins, Norman. *Albert Schweitzer's Mission: Healing and Peace*. New York: Norton, 1985.
- Davidson, Donald. *Nuclear Weapons and the American Churches: Ethical Positions on Modern Warfare*. Boulder, Colorado: Westview Press, 1983.
- Fallacy of Star Wars*. Studies conducted by the Union of Concerned Scientists. New York: Vintage Books, 1984.
- Goodwin, Geoffrey, ed. *Ethics and Nuclear Deterrence*. New York: St. Martin's Press, 1983.
- Hecht, Jeff. *Beam Weapons*. New York: Plenum Press, 1984.
- Hoffmann, Stanley. *Duties beyond borders: On the limits and possibilities of Ethical International Politics*. Syracuse, N.Y.: Syracuse University Press, 1981.
- Hollenbach, David. *Nuclear Ethics: A Christian Moral Argument*. New York: Paulist Press, 1983.
- Katz, James E. *People in Space: Policy Perspectives for a "Star Wars" Century*. New Brunswick, N.J.: Transaction Books, 1985.

- Kavka, G.S. "Space War Ethics." *Ethics* 95 (April 1985): 673-92.
- Kim, Samuel. *The Quest for a Just World Order*. Boulder, Colorado: Westview Press, 1983.
- Lifton, Robert Jay. *Indefensible weapons: The Political and Psychological Case Against Nuclearism*. New York: Basic Books, 1982.
- Nacht, Michael. *The Age of Vulnerability: Threats to the Nuclear Stalemate*. Washington D.C.: Brookings Institution, 1985.
- Nye, Joseph. *Nuclear Ethics*. New York, N.Y.: The Free Press, 1986.
- Peebles, Curtis. *Battle for Space*. New York: Beaufort Books, 1983.
- Ral'anan, Uri, and Robert L. Pfaltzgraff. *International Security Dimensions of Space*. Hamden, Conn.: Archon Books, 1984.
- Smoke, Richard. *National Security and the Nuclear Dilemma*. New York: Random House, 1984.
- Stein, Jonathan B. *From H-bomb to Star Wars: The politics of Strategic Decision Making*. Lexington Books, 1984.
- Sterba, James P. *The Ethics of War and Nuclear Deterrence*. Belmont, Calif.: Wadsworth, 1985.
- Taylor, Trevor; Fenske, John; and Bluth, Christophe. "European Allies and SDL" *International Affairs* 62 (Spring 1986): 217-264.
- U.S. Congress. Office of Technology Assessment. *Balistic Missile Defense Technologies*. *Balistic Missile Defense Technologies*. Washington, D.C.: GPO, 1985.



