

DISCUSSIONS

Undergraduate Research Journal of CWRU

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Letter from the Editor

Dear readers,

First and foremost, I would like to thank you for taking the time to read our newest issue of Discussions. For those who are unfamiliar, Discussions is the peer-reviewed undergraduate research journal of Case Western Reserve University (CWRU). At Discussions, our primary goal has always been to promote undergraduate research from all disciplines by publishing the best undergraduate research articles.

Although based at CWRU, Discussions has grown in recent years to receive attention from students across the country and around the world. For this issue, we received one of our most competitive submission pools to date. The four articles featured in this issue were selected from over thirty submissions sent from fourteen undergraduate institutions located in the United States, United Kingdom, Canada, and Ukraine.

Your interest in Discussions is of utmost importance to us. By reading Discussions, you are supporting undergraduate research involvement in a variety of fields. This issue specifically features novel discoveries in both the sciences and humanities. The Editorial Board and I sincerely hope that you find these articles of interest.

As Discussions continues to grow, I ask that anyone interested in working with Discussions visit our website at case.edu/discussions or reach out to me at wwq@case.edu. We are constantly looking for new reviewers, copy editors, layout designers, and public relations specialists. Moreover, if you are interested in submitting your research to us, our next submission deadline will be in February 2016. You can learn more about our guidelines for submission on our website as well.

Finally, I would like to thank our Editorial Board and committee members for all of their help in the publication of our journal. I would also like to personally thank Sheila Pedigo, Bethany Pope, and the SOURCE office for their continual support of Discussions.

Sincerely,



William Qu

Editor-in-Chief

Discussions: The Undergraduate Research Journal of Case Western Reserve University



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Faculty Spotlight

AN INTERVIEW WITH:

Dr. Chris Haufe

by Saloni Lad and Daniel Mendez

Dr. Chris Haufe is an Assistant Professor at CWRU whose research regards problems in the history and philosophy of science, particularly in biology. Here, we interviewed Dr. Haufe on his recent manuscript, "A Nearly Complete Evolutionary Model of Scientific Inquiry," which strives to explain the progress and value of science through evolutionary mechanisms (e.g. mass extinction and speciation).

Q: Let us start with a brief introduction; with what issues does the history and philosophy of science concern itself as a discipline?

A: I would sort of divide it into two really broad domains. The history of science could be seen as describing the pattern of scientific change and determinants of scientific decisions over time. The philosophy of science is concerned with articulating the underlying rational basis for changes in scientific commitment.

Q: What are some of today's unanswered questions in the philosophy of science?

A: A big issue concerns whether scientists aim to discover true theories or whether they strive for theories that work best—whether or not they're true. I look at various aspects of scientific practice in relation to that question. One example is the well-known use of aesthetic criteria in which scientists explicitly express preference for beautiful and elegant theories.

First, I want to see whether we can explain the use of aesthetic criteria in a way that reveals its contribution to science and making our knowledge better. Then, I particularly want to see if we can explain the role of aesthetics in a way that doesn't require them to be 'truth detectors.' In other words, could preference for simple theories improve scientific knowledge without it being the case that such theories are just more likely to be true?

Q: The model you propose is very mechanistic, like how organisms are subject to natural selection whether they realize it or not. Are scientists even aware that these forces act on them? Should they be?



Photo Credit: Case Western Reserve University

A: In the same way that natural selection doesn't need organisms to know that the next generation will need to adapt to environmental factors, individual scientists don't need to know that successful future iterations of science will need to adopt certain traits. Nevertheless, the fact that they do know is useful for explaining why science progresses at an extraordinary rate.

For example, suppose we replaced all scientists with a bunch of robots that make and try to fit random theories statistically with data from their sensors. We'd expect them to develop more accurate theories over time, but it'd be at a slower pace than that at which the human scientific community actually does.

We can frame this as directed versus random variation. The variation that appears in science (i.e. new ideas) doesn't come out of nowhere; it is strongly conditioned on the ability of expert scientists to synthesize evidence to produce the best theory or use new problem-solving methods. If science is genuinely an evolutionary system, I guess I do have some faith in the ability of zombie scientists to make progress (albeit very slowly). Lucky for us, we have extraordinarily competent scientists who direct variation into the most adaptive form possible.

Q: You've recently completed a manuscript on the evolutionary nature of science. Please explain some core concepts of your model.

A: Fundamentally, what philosophers, historians, and sociologists of science have been interested in is the directionality to scientific inquiry. Directionality might just be an illusion based on how we arrange historical facts, but it might not be, and some philosophers have tried to interpret this pattern as a form of evolutionary adaptation. As a result, we would expect science to unfold along a certain trajectory if it were adapting to something.

The thought among these philosophers has been that if we can show that scientific inquiry evolves in this adaptive way, we'll have understood something about why science actually makes progress—that progress is not just an illusion. It's a real thing in the same way that populations of organisms develop better responses to factors in their environment.

What I've tried to do is provide a far more comprehensive evolutionary framework than has been previously attempted. First, these philosophers have traditionally focused just on the population-level adaptation of scientists. But, there are many more evolutionarily significant traits in science that we can distinguish. Second, saying that a scientific community adapts over time presumes that it is an entity capable of adaptation, and that's not something that can just be assumed. It needs to be demonstrated, independently. I try to characterize how scientific communities resemble forms that partake in the adaptive process. They reproduce reliably, stabilize the factors to which they adapt, and handle variation in their communities much like populations of organisms do.

Besides adaptation, there are two evolutionarily vital phenomena associated with science I think merit special mention. One is the emergence of new scientific disciplines. Here is an example of a clear historical pattern that has manifested throughout the past 200 years. One branch of inquiry tends to give birth to another, which begets another, and so on. This is the expected result of an evolutionary form that's adapting to its environment, and it's akin to the process of adaptive speciation. Thus, I try to draw exact parallels between speciation in biological populations and the birth of new disciplines in scientific communities.

The other major phenomenon with an evolutionary flavor is what has traditionally been called scientific revolution. The most famous work on the topic is Thomas Kuhn's *Structure of Scientific Revolutions* where he describes a process by which scientific communities completely break with their previous worldview. This new community sees very different scientific problems and uses new means to address those problems. I argue that this process is akin to an evolutionary event known as mass extinction by which there is abrupt environmental change on a global scale that results in the proliferation of wholly new kinds of beings. Intuitively, we can

"We would expect science to unfold along a certain trajectory if it were adapting to something"

think about the extinction of dinosaurs and the subsequent radiation of mammals that previously had been a lowly, insignificant taxon.

The sudden environmental shift during the dinosaur extinction shifted the rules for what it took to be a successful, biological population. We see, predictably, the emergence of very different successful morphologies, and this is characteristic of all the mass extinctions that we know about. I argue that the same kind of fundamental re-organization that we associate with mass extinction is what's at play in scientific revolutions. It's a central change of the set of problems to which scientific communities and theories must adapt.

Q: How is the philosophy and history of science overall beneficial to us? Why is it relevant to practical science and society?

A: Good question. I think that the human race is facing a lot of really hard problems, and for most of them, scientific inquiry is going to be our only way out of those problems—really productive, well-funded, scientific inquiry. Given that so much scientific funding relies on some level of public support, we need to be able to provide an accessible and convincing picture of why scientific knowledge is superior to other species of inquiry for certain sets of questions. I think that the job of historians and, in particular, philosophers of science is to provide that accessible, convincing, and accurate picture of why we must defer to science for these really complex issues.

We don't want to lie to people about what makes scientific knowledge superior to other forms of knowledge. In fact, it's a trivially easy task to look across the history of science and find radical shifts in the commitments of scientists themselves. When people see that, I think they tend to associate it with a lack of constraint on scientific communities' propensity to adopt new views. I don't think that's accurate, but I do think that philosophers of science have a responsibility to explain how that tendency to change views, even radically, is consistent with the production of better and better knowledge over time.

E-Fluid Induces Inflammation Responses in Lung Epithelial Cells

Hayley Tartell - Williams College

BIOGRAPHY

Throughout Hayley's life, she has been a problem-solver, whether confined to daily activities or within an academic setting. Though this project was her first foray into world-class, cutting edge research that could impact human lives, she has always had an intellectual curiosity. Hayley's interest in and appreciation for the natural sciences was spurred by experiences outside the classroom through the eyes of a curious naturalist. These have led her to develop a sense of appreciation and awe for the natural world. With that newfound amazement came questions and a desire to learn more and further understand the world in which we live.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank Dr. Foronjy for his time and enthusiasm in supervising this project. Moreover, I thank Dr. Geraghty and Dr. Turino for their guidance and encouragement. Finally, I want to thank my family for their unconditional love and support.

Abstract

Electronic cigarettes (E-cigarettes) are devices that effectively deliver vaporized liquid nicotine to the lungs and are commercially available as a nicotine replacement therapy that is safer than conventional tobacco smoking. However, there is limited data available on the safety of E-cigarettes, and E-cigarettes currently do not fall under the regulation of the Food and Drug Administration (FDA). This study investigates the potential inflammation effects of E-cigarettes by utilizing lung cell culture techniques. Lung cells (A549 cell line) were exposed to the liquid that is vaporized by E-cigarettes (E-liquid), and toxicity and inflammatory markers were investigated. The E-liquid was found to be toxic to cells at concentrations greater than 2% E-liquid 0.72 mg/mL nicotine, 1% propylene glycol (PG), and 1% vegetable glycerin (VG) to media. Cells were also exposed to a nonlethal concentration of E-liquid, and the effects on kinase activation/induction (ERK, p38, and JNK) were examined. Conventional cigarette smoke activates these kinases (Mercer & D'Armiento, 2006, p. 137-50), which has been linked to the pathology of several lung diseases including chronic obstructive pulmonary disease (COPD). This study shows that when stimulated by E-liquid, these kinases undergo activation. Exposure to E-liquid also increases the activation levels of a specific target of kinases, NF- κ B. Activation of NF- κ B suggests that exposure to the contents of E-cigarettes could induce an inflammatory response in the lungs. Together, these findings highlight the potential harmful effects of E-cigarette exposure on the cells within the lung.

Introduction

There are projected to be more than a billion tobacco users on a global scale (Jha, 2006). Cigarette smoke exposure is the primary factor associated with disease initiation and progression for numerous diseases. Chronic obstructive pulmonary disease (COPD) is a progressive disease that induces airflow obstruction and is currently the third leading cause of death in the United States ("What is COPD", 2012). In the US, smoking prevalence has decreased over

the past fifty years with approximately 19% of the population continuing to smoke. Therefore, several nicotine replacement therapy strategies have been implemented to aid smokers in quitting the habit. However, whether these strategies are a safer alternative for those individuals who cannot quit has yet to be determined.

In an effort to find a safer replacement for smoking, many people have turned to electronic cigarettes (E-cigarettes). E-cigarettes are comprised of a battery and a replaceable cartridge with a propylene glycol or glycerin liquid solution containing differing quantities of nicotine. Upon inhaling, the subject breathes the vaporized liquid into the lungs. In contrast to traditional cigarettes, this apparatus releases far fewer toxicants (Pellegrino et al., 2012, p. 279-288) (Goniewicz, Knysak, & Gawron, 2013). However, recent studies performed in mice indicate that E-cigarette exposure could pose several future health problems. Exposures to E-cigarettes enhanced inflammation in mice (Lerner et al., 2015) and altered immune responses to microbial infection (Sussan et al., 2015). This study will test the inflammatory responses of epithelial cells to E-cigarettes.

Methods

Cell Culture

Human A549 cells (ATCC® CCL-185™, ATCC, Manassas, VA), which are adherent lung epithelial cells, were grown in Dulbecco's Modified Eagle Medium (gibco® DMEM(1X) + GlutaMAX™-1) supplemented with fetal bovine serum, penicillin, and streptomycin. Media was drained, phosphate-buffered saline (PBS) was used to rinse the container, and trypsin was added to the cells to sever cell adhesion to the flask. The resulting solution of cells and trypsin was transferred to a test tube and centrifuged for 5 minutes at 1100 rpm. Cells were re-suspended into fresh media and 2 mL of the resulting solution was pipetted into each well of a 6-well plate. Cells were allowed to adhere to the flask overnight to 60-80% confluency. These would be treated with PBS and liquid that is vaporized by E-cigarettes (E-liquid) with or without nicotine (inactive ingredients: propylene glycol (PG) and

vegetable glycerin 50/50 (VG)). Prior to treating the cells, E-Liquid was diluted in cell media to the concentration labeled in each figure.

Toxicity Assay

To determine the concentrations at which the E-cigarettes become toxic to cells, A549 cells were treated with the following concentrations of E-liquid without nicotine: 0, 0.1, 1, 5, 10, and 20%. PBS was used as a negative control. Cell death was examined by lactate dehydrogenase (LDH) release. Media was collected from cells 24 hours after performing the exposures.

An LDH assay was performed, and 50 μ L of each media sample was distributed to a well. Each sample was examined in triplicate to correct for pipetting errors. A 5 mL mixture containing equal volumes of LDH assay substrate solution, LDH assay cofactor, and LDH assay dye solution (1666.7 μ L of each) was prepared. 50 μ L (standard kit volume) of the prepared LDH mixture was pipetted into each well containing media, and the 96-well plate was placed in the dark for 30 minutes.

The plate was then placed in the spectrophotometer at 410 nm to measure absorbance of the substrate. The rate of substrate turnover is measured by change in color from clear to pink/red and is proportional to LDH, as LDH is a marker for cell death.

Stimulating the Cells with E-liquid at Timed Intervals

A549 cells were treated with 1% sub-toxic concentration of E-liquid (0 or 0.36 mg/mL nicotine, 0.5% PG, and 0.5% VG) at the following time points: 0, 15, 30, 60, 90, and 120 minutes (E-cigarette liquid is toxic to cells at a concentration of 5% or higher as shown by the results of the toxicity assay).

In a sterile environment (level 2 bio-safety cabinet): nicotine and nicotine-free E-liquid (50%PG/50%VG) solutions were diluted to a final concentration of 1%, and nicotine was diluted to a final concentration of 0.01 mM. After 120 minutes, the media was drained from every well, PBS was used to rinse the wells, and 150 μ L

containing 27 μ L of protease inhibitors, 27 μ L of ethylenediaminetetraacetic acid, and 2700 μ L of radioimmunoprecipitation assay (RIPA) lysis buffer were pipetted into each well. The prepared RIPA buffer solution caused the cells to burst so that the protein could be readily extracted. These protein samples were stored on ice.

Western Blots

Western blots were performed for the following targets: p-Erk, p-p38, p-JNK, p38, JNK, ERK, and actin. 10 μ L of protein extract was mixed with 3 μ L of 5X sample buffer in micro-centrifugation tubes and electrophoresed at 100 V for one hour. The extracts were transferred to a nitrocellulose membrane, which was rinsed with distilled water, Sigma® Ponceau S, and distilled water again. The nitrocellulose membrane was then placed in a 5% milk solution of 2.5 μ L of lactose powder and 47.5 μ L of PBS solution for one hour. The primary antibody was prepared using 4 μ L of antibody solution and 4 mL of 2% bovine serum albumin (BSA). The nitrocellulose was placed in the antibody solution and incubated overnight with mild agitation. Following incubation, the nitrocellulose was rinsed thrice for 10 minutes each. It was then placed in a second antibody solution containing 4 μ L of anti-rabbit horseradish peroxidase (HRP) solution and 4 mL of 5% milk solution for two hours. For phosphorylated proteins, SuperSignal® West Femto Luminol/Enhancer Solution and SuperSignal® West Femto Stable Peroxide Buffer (1,000 μ L each) were mixed and pipetted onto the nitrocellulose membrane. For the total proteins, SuperSignal® West Pico Luminol Enhancer Solution, SuperSignal® West Pico Stable Peroxide Solution, SuperSignal® West Femto Luminol/Enhancer Solution, and SuperSignal® West Femto Stable Peroxide Buffer (500 μ L each) were mixed and pipetted onto the nitrocellulose membrane. After five minutes, the nitrocellulose was placed in the Bio Rad Gel Dock Station. A chemi-luminescence camera was used to detect the HRP (secondary antibody). The amount of anti-rabbit HRP detected was proportional to the amount of protein present. Western blots were performed using antibodies that recognized the targets MMP-9, EGR1, TLR3, and p-Src 416.

Densitometry Analysis

The proteins on the nitrocellulose membrane were analyzed through densitometry analysis. A schematic representation of densitometry analysis is shown in Figure 1.

Nuclear and cytoplasmic protein fractionation

Cells were processed with the compartment protein extraction kit (EMD Millipore) to isolate cytoplasmic and nuclear protein. Briefly, cells were mixed with 150 μ L of cytoplasmic fractionation buffer. The fraction was then incubated at 4 $^{\circ}$ C for 30 minutes (rotating). It was centrifuged at 10,000 rpm for 10 minutes at 4 $^{\circ}$ C. The pellet was isolated and washed with 1 mL PBS to remove any remaining cytoplasmic contents. The fraction was centrifuged again at 10,000 rpm for 10 minutes at 4 $^{\circ}$ C, and PBS was removed. The remaining nuclear pellet was lysed with 70 μ L of nuclear lysis buffer and incubated at 4 $^{\circ}$ C for 30 minutes (rotating). The nuclear solution was centrifuged at 14,000 rpm for 10 minutes at 4 $^{\circ}$ C. The supernatant was stored at -80 $^{\circ}$ C for later use and the nuclear pellet was discarded.

Transcription Factor Assay to Detect Activation of NF- κ B and AP-1

TransAMTM NF- κ B, p65, and AP-1 (active motif) assay kits were used to detect and quantify transcription factor (NF- κ B and AP-1) activation in nuclear fractions of cells. Cell extract containing activated transcription factor was added to the oligonucleotide coated plate. The activated NF- κ B subunit bound to the oligonucleotide plate was detected by using antibodies that attach to NF- κ B/AP-1, p65, or c-jun AP-1 subunits. The secondary antibody conjugated to HRP was added to provide a sensitive colorimetric readout that was measurable by spectrophotometry. The amount of DNA binding was proportional to NF- κ B activity. Then, 30 μ L complete binding buffer was added to each well. 20 μ L of nuclear extract sample diluted in lysis buffer was added to each well. 1 μ L of Jurkat nuclear extract in 19 μ L of complete lysis buffer was added as the positive control. 15 μ L of lysis buffer was added as the negative control. The plate was incubated for one hour at room temperature (RT) with mild agitation (100 rpm). Each well was washed

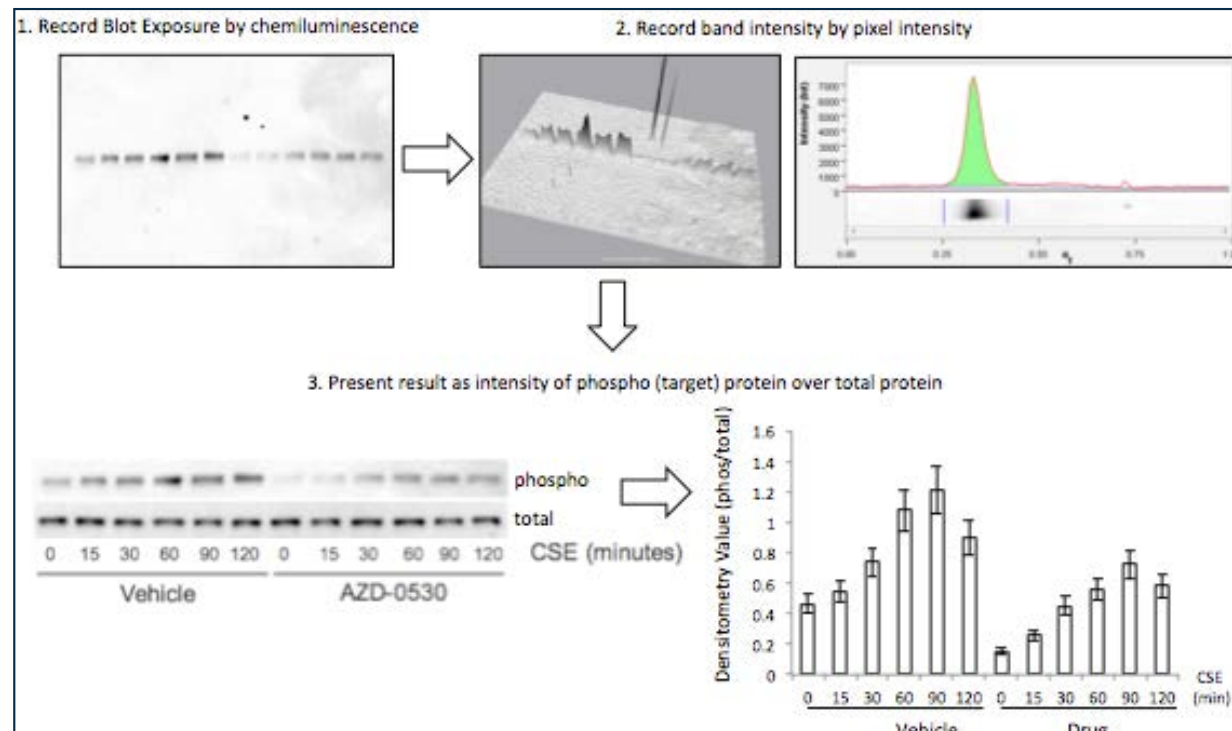


Figure 1. Densitometry analysis was used to semi-quantify the level of activation of proteins by calculating a ratio of phosphorylated protein to total protein. The ratio was proportional to the level of activation of the protein. Also, total proteins were represented as a ratio of β -Actin.

three times with 200 μ L 1X wash buffer. 100 μ L of diluted NF- κ B antibody (1:1,000 dilution in 1X antibody binding buffer) was added to each of the 32 wells. The plate was covered and incubated for one hour at RT without agitation. The wells were washed thrice with 200 μ L 1X wash buffer. 100 μ L of diluted HRP-conjugated antibody (1:1,000 dilution in 1X antibody binding buffer) was added to all 32 wells and incubated as before. All wells were then washed four times with 200 μ L 1X wash buffer. 100 μ L developing solution was added to all wells. The plate was incubated for five minutes at RT in darkness until the sample wells turned from medium to dark blue. 100 μ L of stop solution was added. In the presence of the acid, the wells turned yellow. Absorbance was read on a spectrophotometer within five minutes at 450 nm.

Results

The LDH toxicity was performed to examine whether E-liquid induced airway epithelial cell death. Increased levels of LDH were observed in the media from cells exposed to greater than 5% E-liquid.

Accordingly, cells were treated with a sub-toxic concentration of 1% E-liquid following the

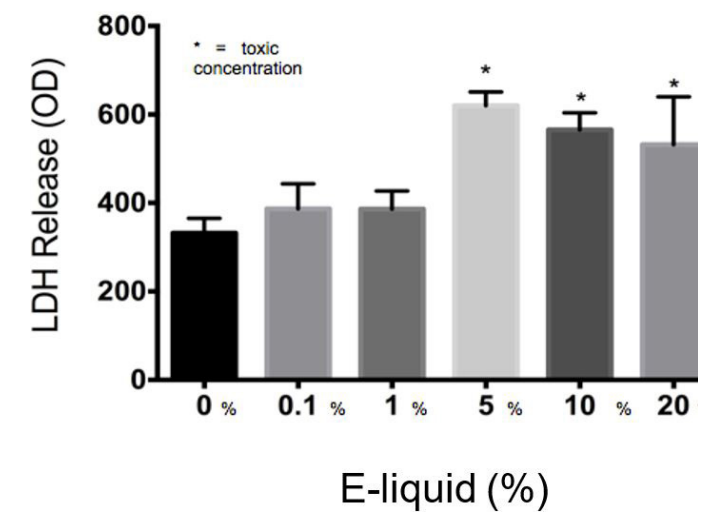


Figure 2. The results of the LDH Assay show that E-liquid without nicotine is toxic to cells at a concentration of 5% or higher.

data in Figure 2. Cells treated with 1% E-liquid were examined for MAP kinase activation, as these kinases are typically observed to undergo activation in lung diseases such as COPD and cancer. Western blots were performed for the following targets: p-ERK, p p-38, p-JNK, p38, JNK, ERK, and actin. The effects of 1% E-liquid on MAP kinase signaling were examined.

As indicated by the dark bands in Figure 3, MAP kinases were activated by the E-liquid without nicotine and nicotine alone. To semi-quantify the level of activation of MAP kinases, a ratio of phosphorylated to total proteins was calculated through densitometry analysis (Figure 4).

ERK, JNK, and p38 were activated by nicotine alone. When treated with nicotine alone, ERK's densitometry value peaked at the 15-minute mark (Figure 4a). This ERK activation was prolonged over the 15 to 30 minute interval and steadily declined thereafter. When treated with nicotine alone, p38 has a more prolonged densitometry value at the 15 and 30-minute marks and a slow decline thereafter (Figure 4b). The densitometry value for JNK remained relatively stable and prolonged at the 15 and 30 minute marks (Figure 4c). JNK's densitometry value peaked at the 120-minute mark. Western blots were also performed to qualitatively assess the level of activation of the kinases induced by E-liquid containing nicotine.

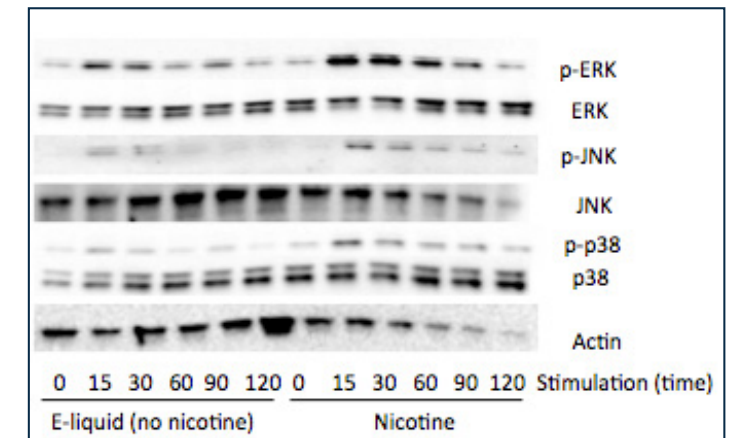


Figure 3. Nicotine activates MAP kinases. Western blots of MAP kinases.

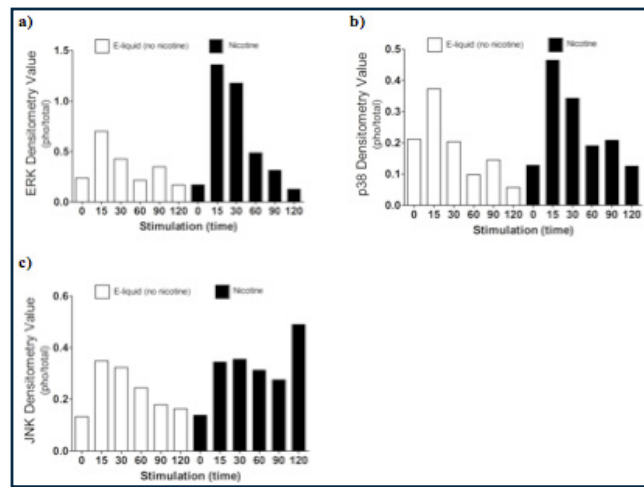


Figure 4. Semi-quantitative analysis of Western blots. Time 0 is a negative control. E-liquid (no nicotine) is a control. Nicotine activates (a) ERK, (b) p38, and (c) JNK.

The level of activation of proteins induced by E-liquid with nicotine was semi-quantified by calculating a ratio of phosphorylated protein to total protein.

When treated with E-liquid without nicotine, ERK's densitometry value peaked at 15 and 120 minutes (Figure 6a). When treated with E-liquid without nicotine, p38 steadily rose in densitometry value from 0 to 30 minutes (Figure 6b). The densitometry value remained constant from 30 to 60 minutes. When treated with E-liquid containing nicotine, JNK steadily increased in densitometry value (Figure 6c).

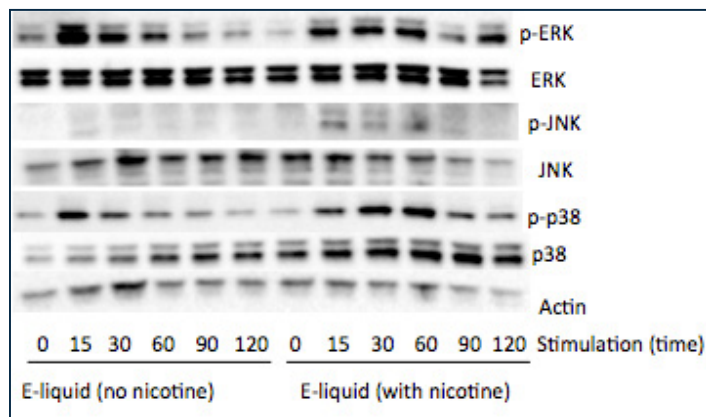


Figure 5. E-liquid with nicotine activates MAP Kinases. Western blots of MAP kinases.

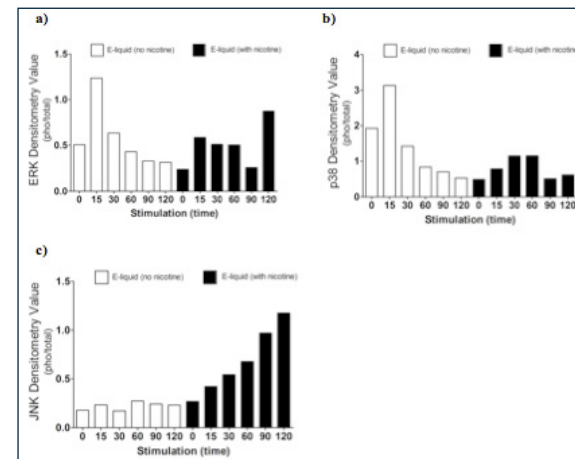


Figure 6. Semi-quantitative analysis of Western blots. Time 0 is a negative control. E-liquid (no nicotine) is a control. Nicotine activates (a) ERK, (b) p38, and (c) JNK.

Increases in MMP-9, EGR1, TLR3, and p-Src 416 are associated with cigarette smoke exposure in individuals with COPD (Foronjy et al., 2008, p. 1149-57) (Reynolds, Cosio, & Hoidal, 2006, p. 314-9). Western blots were performed to qualitatively assess their level of activation when treated with E-liquid containing nicotine. Cells were examined that had normal and silenced levels of a phosphatase PP2A. PP2A can block smoke induced inflammation and loss of PP2A results in greater lung inflammation (Wallace et al., 2012, p. 589-99).

The darker bands in Figure 7 indicate a higher protein turnover induced by the E-liquid with nicotine. The densitometry bar graphs below were used to semi-quantify the levels of protein synthesis.

Semi-quantitative analysis of the Western blot showed that there was little change in MMP-9 protein levels (Figure 8). However, silencing PP2A produced less of the protein MMP-9, as shown in Figure 8, while protein levels did increase in TLR3 and p-Src 416. Cigarette smoke increases EGR1 levels (Mercer & D'Armiento, 2006, p. 137-50) and the data from Figure 8 suggests that E-liquid also increases EGR1 levels. The effects of E-liquid containing nicotine were tested on NF-κB and AP-1. The transcription factor assay

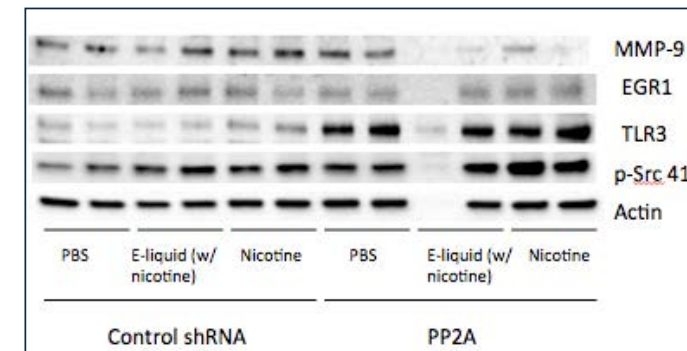


Figure 7. Western blots of targets.

was performed to determine whether E-liquid activated these transcription factors. NF-κB can undergo activation by MAP kinases (Jiang et al., 2003) and Src (Lee et al., 2007, p. 7001-11). EGR1 also modulates NF-κB activity (Parra, Ferreira, & Ortega, 2011, p. 345-52).

NF-κB is also activated by cigarette smoke in mice (Wallace et al., 2012, p. 589-99), and E-liquid containing nicotine strongly activated NF-κB. However, not all transcription factors are activated by E-liquid containing nicotine. There is no statistically significant difference in AP-1 activation following stimulation by E-liquid containing nicotine (Figure 9b).

Discussion

Given the data, activation of JNK and NF-κB suggests that signaling associated with inflammation occurs when the cells are exposed to E-cigarette vapor. ERK had a relatively short period of activation, implying less intense signaling. It can be deduced from the data that JNK's prolonged activation implies more intense signaling. The data indicates that p38 has a prolonged level of activation and, accordingly, more intense signaling. Therefore, as indicated by the results, nicotine enhances the activation of the aforementioned MAP kinases.

Cigarette smoke activates MAP kinases (Mercer & D'Armiento, 2006, p. 137-150). This study was proposed to determine whether nicotine alone could activate these MAP kinases as well. The data show that E-liquid containing nicotine

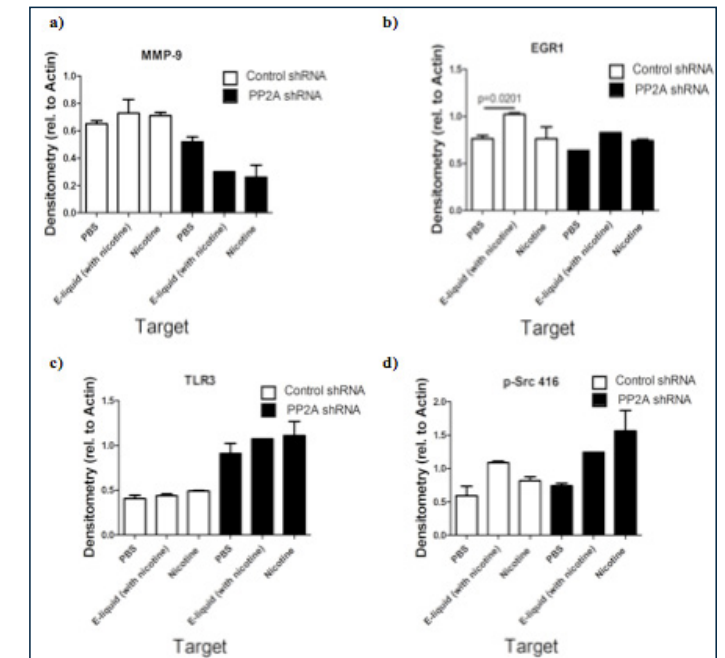


Figure 8. Semi-quantitative analysis of Western blots using the ratio of total protein to actin. PBS is used as a control. “Silencing PP2A produces (a) less of the protein MMP-9, (b) a 25% increase in protein levels from PBS to E-liquid with nicotine (statistically significant; $p < 0.05$), (c) an increase in TLR3 protein levels, and (d) an increase in p-Src 416.

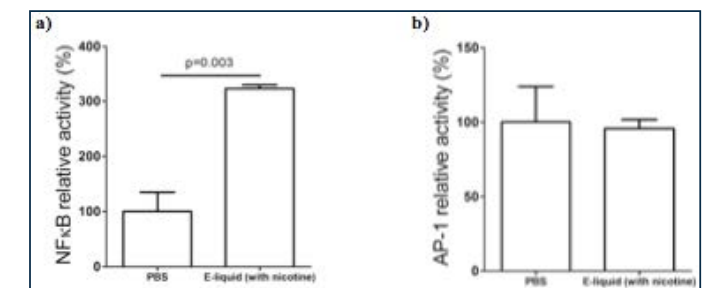


Figure 9. The amount of DNA binding detected during the transcription factor assay was proportional to the activity of NF-κB and AP-1. In graph (a), a significant difference ($p < 0.05$) suggests that NF-kappaB was activated.

activates ERK, JNK, and p38 MAP kinases. The next step would be to repeat the experiment to substantiate the results as well as to determine whether the protein's level of activation is greater when treated with E-liquid containing nicotine, E-liquid without nicotine, or nicotine alone. Greater activation may imply greater inflammation and protease activity. Additionally, studies in animals would further enhance the results established in this study and suggest the potential human implications of using E-cigarettes.

MMP-9 is a protease (Foronjy et al., 2008, p. 1149-57). As mentioned before, proteases play a key role in the development of COPD ("Protease", 2013). MMP-9 levels were unaltered by E-liquid in this study. However, the extracellular levels and activity of this important protease were not determined. Despite not identifying a change in intracellular MMP-9, this mechanism cannot be fully eliminated because MMP-9 gene expression and protease activity must be fully investigated to draw a conclusion.

The data also indicate that when cells are treated with concentrated E-liquid, NF- κ B is activated. When cells are treated with cigarette smoke, MMP-9 gene expression and levels increase and ultimately contribute to the development of emphysema (Thorley & Tetley, 2007, p. 409-428). Dr. Foronjy (unpublished data) recently found that when primary lung epithelial cells are treated with E-liquid, cytokine and protease gene expression (e.g. MMP-7, MMP-9, Cathepsin L1, TLR3, and c-Src) rises. This study hypothesizes that when cells are treated with 1% E-liquid, MMP-9 levels increase. The cells utilized in this study are not a primary cell line and expression of MMP-9 may not be the same as primary cells. Nevertheless, the results of either study must be verified through repeated experimentation and clinical samples.

When cells are exposed to cigarette smoke extract, ERK, JNK, or p38 is silenced and MMP-9 levels drop (Mehra et al., 2012). In future experiments ERK, p38, and JNK could be knocked down using siRNAs, and MMP-9, EGR1, TLR3, and p-Src 416 levels could be analyzed.

These experiments could determine whether the aforementioned MAP kinases are integral to protein synthesis. Cigarette smoke induces cells to produce more proteases and inflammatory signaling (Mercer & D'Armiento, 2006, p. 137-150). Future studies ought to attempt to show whether E-liquid induces cells to produce more proteases and inflammatory signaling such as Cathepsin L1, MMP-7, TLR3, and c-Src. This study determined that the use of nicotine delivery via E-cigarettes may impact lung inflammation and consequently lead to disease initiation and progression.

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Sediment Mass and Nutrient Accumulation Rates in Lake Erie Using Geographic Information System



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BIOGRAPHY

Jinyu Seo is a fourth-year student studying environmental geology at CWRU. He is involved with CWRU Geology Society and Korean Student Association. He wishes to study more about surface water and problems affecting our water supply in graduate school.

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Supplementary online tables for this article can be found on our website at case.edu/discussions/archives.html.

SEDIMENT MASS AND NUTRIENT ACCUMULATION RATES IN LAKE ERIE

Abstract

This study emphasizes the reconstruction of sediment deposition rates, sediment concentrations of nutrients, and nutrient fluxes in Lake Erie through the creation of geological maps using geographic information system (GIS). Sedimentation rates, nutrient sediment concentrations, and nutrient flux data from Lake Erie were collected from a variety of sources and used to generate contour maps of the sediment deposition rates, nutrient concentrations, and nutrient fluxes. These maps are helpful in determining post-depositional sediment, sediment focusing, and internal cycling of nutrients in the lake.

Introduction

Due to the continuous release of contaminants, including phosphorus, from agricultural development in the Maumee River drainage basin of Ohio (Logan, 1987), nutrients and contaminant loadings have increased in Lake Erie continuously since the 19th century (Matisoff, 1999), leading to cultural eutrophication. Although eutrophication is a natural process, it is easily seen in Lake Erie because it is accelerated by human activities (Bentley, 2000). In addition, phosphorous is a primary element in eutrophication, a process that naturally occurs underwater. Phosphorous is a significant mineral required by photosynthesis that, in excess, can promote algae growth.

In the Western Basin of Lake Erie, algal blooms are a major environmental problem since the Maumee River discharges high concentrations of these contaminants. In the Central Basin of Lake Erie, a major water quality problem are dead zones, areas that have low oxygen concentrations in the hypolimnion during summer thermal stratification. The temperature and density of water during winter is the same from the surface to the bottom of the lake, but it changes during summer since the sun heats the lake's surface. Thus, warmer surface water overlies the colder, deeper water (Ullyott & Holmes, 1936). In contrast to the Western and Central Basins, the Eastern Basin is not affected by oxygen depletion since it has a large volume of water below the summer thermocline relative to

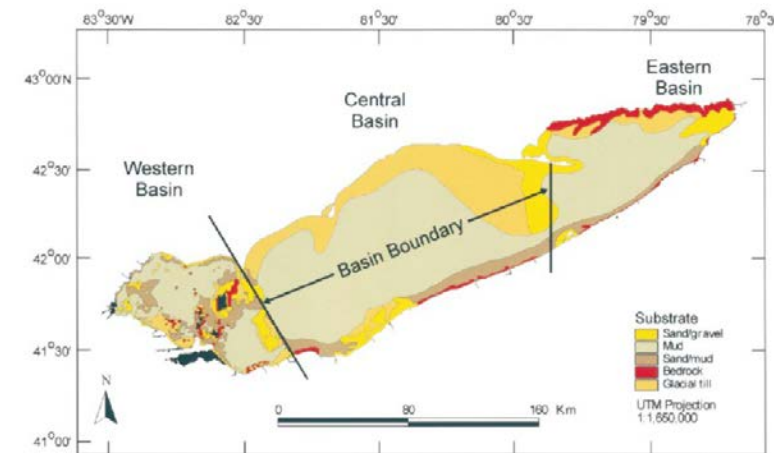


Figure 1. The map shows the three basins of Lake Erie: Western Basin, Central Basin, and Eastern Basin (Hal-tuch et al., 2000).

the bottom surface area. However, since the water flows from west to east, it is necessary to focus on the origin of water flow—the Western Basin.

Beginning in the 1960s, the increasing flux of nutrients into the lake resulted in larger and more frequent algal blooms. During this time, the Western Basin suffered damage due to increased algal growth and industrial waste that came from the Maumee River and Detroit River (Bertram et al., 2009). For instance, phosphorus dissolved in water fertilizes algae, which grow and expand on the surface of water. But when algal blooms die, they sink to the bottom of the lake and decompose. Fungi and bacteria require dissolved oxygen during decomposition, so they use all the nearby oxygen (“Lakewide Management Plans”, 2002). Oxygen is a necessary factor of survival for most organisms, but large algal blooms require vast quantities of oxygen during decomposition, leading to a dead zone—an area with insufficient oxygen for aquatic organisms’ survival.

However, before solving the issues of this environmental problem, it is imperative to understand the current state of the lake. To do so, the distribution of the sedimentation rates, water depths, and chemical parameters must be analyzed. To understand sediment deposition and focusing, it is important to know the distribution of these parameters in the surface sediment of Lake Erie.

Until now, many researchers have gathered new data on sedimentation rates for Lake Erie. This particular study aims to provide updated sediment mass accumulation rates and other chemical deposition distributions using data from previously conducted research and newly compiled data sets. Most sedimentation rates and chemical deposition data for Lake Erie were obtained from Klump et al. (2005) and augmented with data for sedimentation rate, bulk density, organic matter, and phosphorous in the Western Basin (Matisoff, unpublished data). The lake data from this research is crucial to determine various locations and magnitudes of sediment and chemical deposition and depositional fluxes.

The main reasons for separating maps of the whole Lake Erie from the Western Basin are both scientific and practical. From a scientific perspective, Lake Erie is a major lake in central North America that, especially in its Western Basin, is heavily impacted by agricultural and industrial development. Therefore, further analysis of the basins' current conditions is required in order to seek out solutions to better their conditions.

Methods

This study focuses on using the geological sedimentation rate map, created with geographic information system (GIS) to visualize, analyze, and understand the sediment deposition and nutrient distribution in Lake Erie. In this research project, GIS technology was used to create a map and compare the locations and patterns of sediment and other chemical elements between Lake Erie and its Western Basin. This GIS map will provide a rigorous visualization tool for noting similarities and differences of sedimentation rates depending on many conditions, such as water depth and water flow.

To begin mapping for the whole Lake Erie, sedimentation rates determined from radionuclide and pollen dating of sediments, nitrogen, nitrogen flux, carbon, and carbon flux data were collected from Klump et al. (2005), unpublished data (Online Tables 2-5), and data for sedimentation rates from Matisoff (unpublished, Online Table 6).

According to previous research, sedimentation rates at 40 stations (Online Table 1) were determined through coring (Klump et al. 2005).

Sedimentation rates in cores were determined from ¹³⁷Cs and ²¹⁰Pb radio-chronometry using high-purity germanium (HPGE) spectroscopy (Mahmood & Yii, 2013). Yet, since the sedimentation rate data used in this research was taken more than two decades ago, it is crucial to compile recent data before observing the changes that occurred through the years.

Figure 2 shows ranges of sedimentation rates taken in each station marked using different colors. Darker colors indicate higher sedimentation rates while lighter shades indicate lower sedimentation rates. Since the map of Lake Erie has to be in the same scale of the original map that in Klump et al. (2005) (unpublished data), it was made using a Digitizer program that helps to produce the same scale of the map. Using thousands of data points on the original map with the Digitizer, the GIS program connected them to make an analyzable coordinate map, which was used to locate and identify the coring stations.

Along with sedimentation rates from Klump et al. (2005) (Online Table 2) and Matisoff (Online Ta-

ble 6), several types of chemical and pollen data from Kemp et al. (1974) as reported in Klump et al. (2005) (Online Tables 3-5) were plotted into the GIS program. This was done for sedimentation rate and chemical element coring stations to produce contour lines for each map of the whole Lake Erie. For the complete Lake Erie map, two types of maps were created using the GIS application. First, natural neighbor plots showed contouring of sedimentation rates and chemical elements with different color shades to represent high or low rates of sedimentation or chemical concentrations at the surface (1 cm). The other map type was graphed using bathymetry plotting, as shown in Figure 2 (bathymetry of Lake Erie and Lake Saint Clair, 1998).

Figure 3 represents an overlay of sediment accumulation rates (color) and bathymetry (contours). This overlap provides a visualization of the potential significance that bathymetry is a major control on sediment focusing. For example, high sedimentation rates occurring at deeper locations are an indication of sediment remobilization and focusing, whereas high sedimentation rates at river mouths is an indication of little post-depositional remobilization.

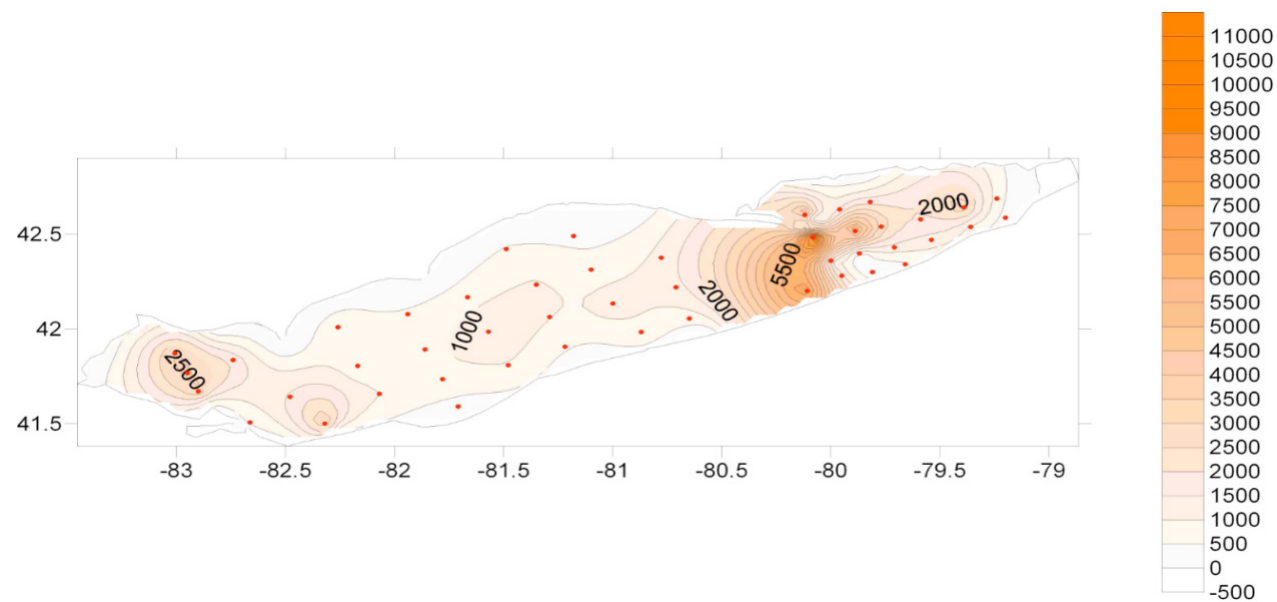


Figure 2. Sediment deposition rates in 1991 ($g\ m^2\ yr^{-1}$) (Klump et al., 2005). The dark dots indicate the coring locations used to determine these rates. A darker color indicates a higher sedimentation rate.

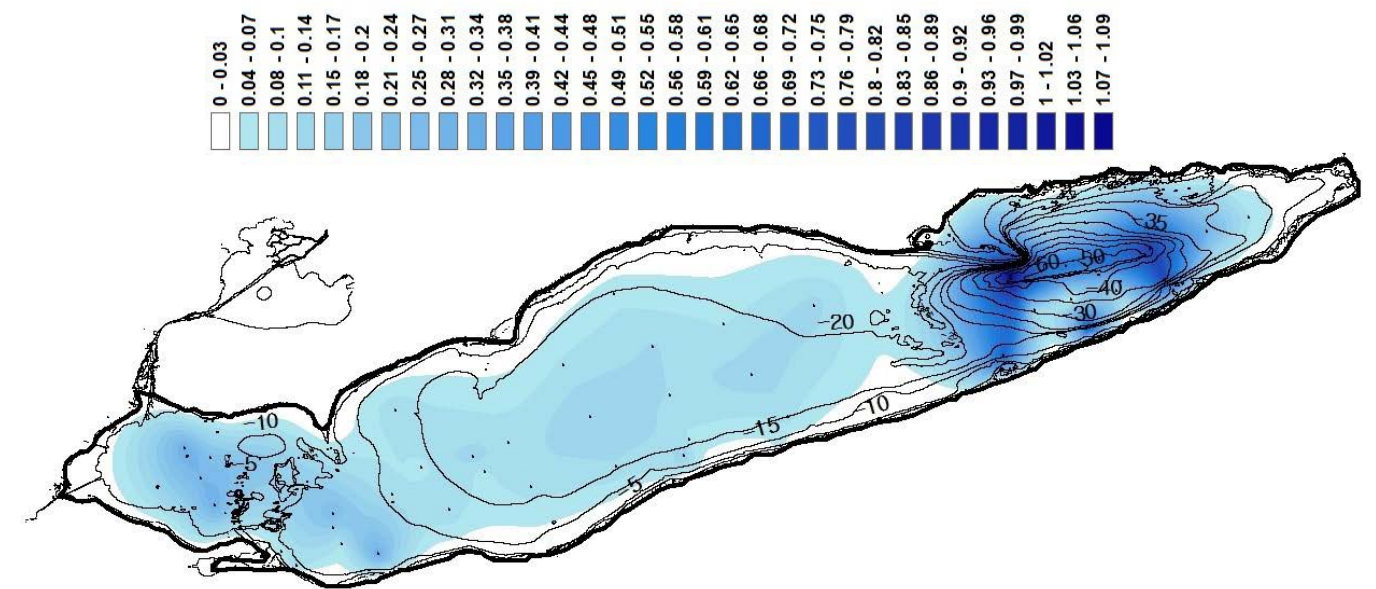


Figure 3. Colored map of the sedimentation rates superimposed on a map of the Lake Erie bathymetry shown with contours for visual representation only.

As mentioned in the contouring method above, there are two types of contouring methods in GIS. One is called natural neighbor, which interpolates a raster surface from points using at most 15 million data points. An alternative method, called inverse distance weighting (IDW), uses at most 45 million points, though it requires higher point density. The results and procedure of generating these contours is modeled in the online supplement. After various maps of Lake Erie were made, Western Basin maps were produced separately. However, the Western Basin dataset consisted only of bulk density, organic matter, and phosphorous data from 13 different locations. This data was collected from Matisoff (Online Table 7). For the Western Basin map, the same Digitizer method was performed to create a base map of the Western Basin of Lake Erie. Then, the points of outline were connected through GIS application and the sample locations were plotted and graphed.

After bulk density, organic matter, and phosphorous datasets were plotted onto the map, the same natural neighbor contouring technique was used. A value of '0' on the shoreline was used for the whole Lake Erie to force the contouring to follow the shape of the lake. This helps provide focus on how the sediments settle down and spread out in the lake.

Results

The data for each core is given in the online tables and is plotted in the figures below. All the maps of sediment accumulation rates and other chemical elements for Lake Erie and for the Western Basin are created using two different types of contouring options in GIS program. The Lake Erie maps came from using natural neighbor contouring technique, while both natural neighbor and IDW methods were used for the Western Basin.

Figure 3 shows the distribution of sedimentation rates in Lake Erie, based on Klump et al. (2005) sedimentation rate data with augmented data from Dr. Matisoff (Online Table 6). The map shows that high sedimentation rates occur in the Eastern Basin (0.04~1.09 g/cm²/yr), low sedimentation rates occur in the Western Basin (0.03~0.31 g/cm²/yr), and very low rates occur in the Central Basin (0.03~0.14 g/cm²/yr). Figure 3 also shows the sedimentation rate in color superimposed on the contour lines of bathymetry. The background color indicates sedimentation rates and the black lines are bathymetry contours. It is apparent that areas of high sedimentation rate occur in deeper water, indicating the movement of sediment from shallow depths to deeper locations in the lake, a process called sediment focusing.

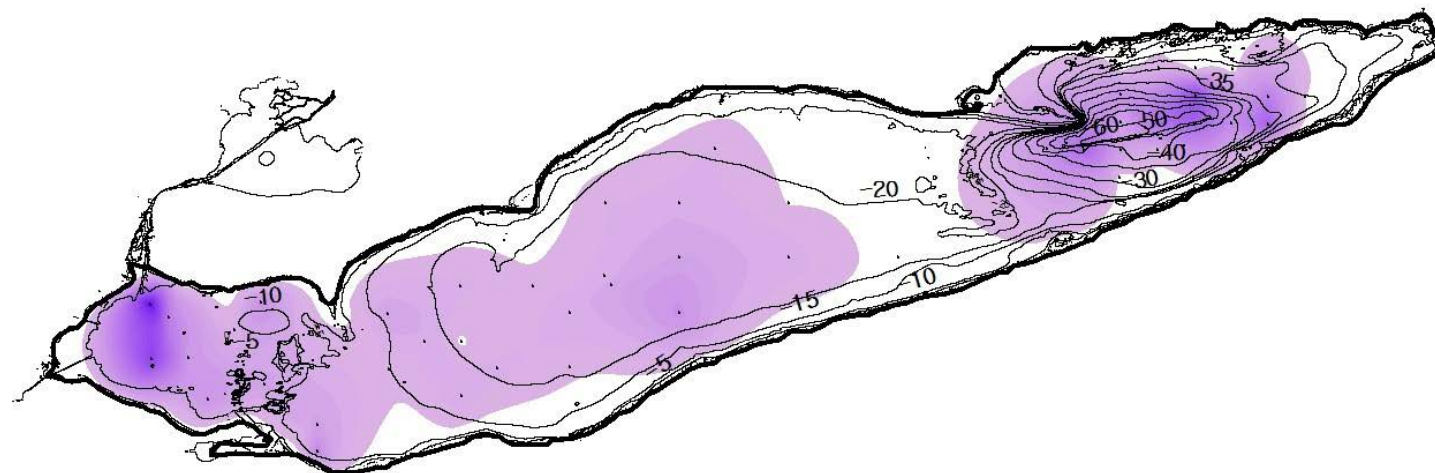


Figure 4. Colored map of sedimentation rates (g/cm²/y) from pollen data superimposed on a contouring of Lake Erie bathymetry (m).

Sedimentation rates determined by pollen are not based on concentrations. Instead, the change in pollen provides a time marker (around 1850) for when the forests were cleared for farming. Figure 4 shows the map of the sedimentation rates in Lake Erie based on the pollen data (Kemp et al., 1874, as reported in Klump et al., 2005; Online Table 3). Although there are some differences, the sedimentation rates obtained from the pollen data shown in Figure 4 are similar to those obtained by the radionuclide data shown in Figure 3. The high accumulation rates in the Western Basin are 0.431, 0.459, and 0.645 g/cm²/yr. According to Figure 4, the highest sedimentation rates occur in the Western Basin where the water depth is shallow, while lower accumulation rates occur in the Central Basin. However, higher accumulation rates are also seen in deep water in the Eastern Basin.

In Figure 5a, most high concentrations of carbon deposition are observed in the Central Basin (2.16~3.14 mmol g⁻¹), and moderate deposition is observed in the Western basin and Eastern Basins (1.72~2.06 mmol g⁻¹ and 0.55~2.06 mmol g⁻¹). The concentration of carbon deposition decreases as distance to the shoreline decreases. Notable carbon deposition is present in the Central Basin at a depth of 25 meters.

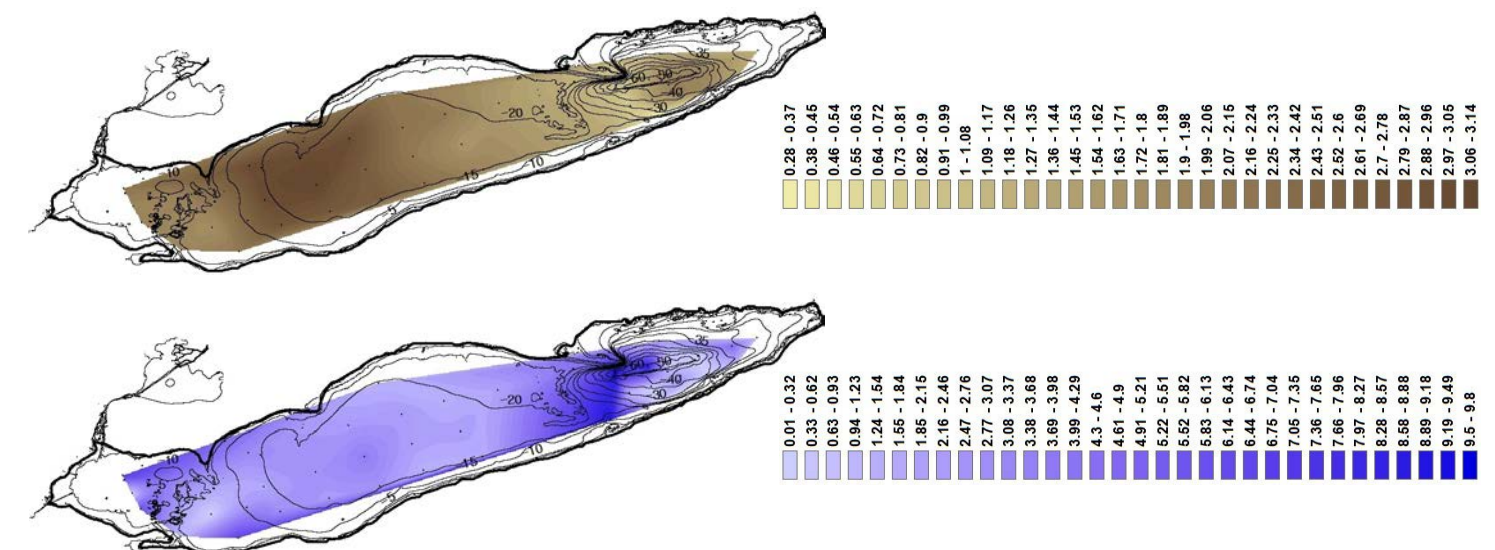


Figure 5. (a) The top map shows carbon concentrations (mmol/g) with contours superimposed on Lake Erie bathymetry, whereas (b) the bottom map displays carbon flux (mol/m²/year) over the same map. Water depth is measured in meters.

Figure 5b shows high concentrations of the carbon flux in the Eastern Basin (1.24~9.8 m² yr⁻¹), while concentrations in the Western Basin and in the Central Basin are lower (0.62~3.07 m² yr⁻¹ and 1.54~3.98 m² yr⁻¹, respectively). The highest carbon flux occurs in the Eastern Basin of Lake Erie. Moderate carbon flux occurs in the Western Basin, where many nutrients are delivered by watershed river flow.

The nitrogen map in Figure 6a displays very similar contours as those in the carbon map. It shows high concentrations in the Central Basin (0.29~0.39 mmol g⁻¹) but somewhat lower concentrations in the Western and Eastern Basins (0.24~0.27 mmol g⁻¹ and 0.06~0.28 mmol g⁻¹, respectively). This figure further shows that most nitrogen deposits occur in approximately 25 meter deep of the Central Basin.

The nitrogen flux map in Figure 6b is very similar to the carbon flux map. The contouring of nitrogen flux shows high fluxes in the Eastern Basin (0.06~1.48 m² yr⁻¹) and moderate fluxes in the Western and Central Basins (0.06~0.74 m² yr⁻¹ and 0.19~0.51 m² yr⁻¹, respectively). This figure shows that most nitrogen flux occurs in deep waters of the Eastern Basin. Less flux occurs in shallow waters of both the Western and Central Basins.

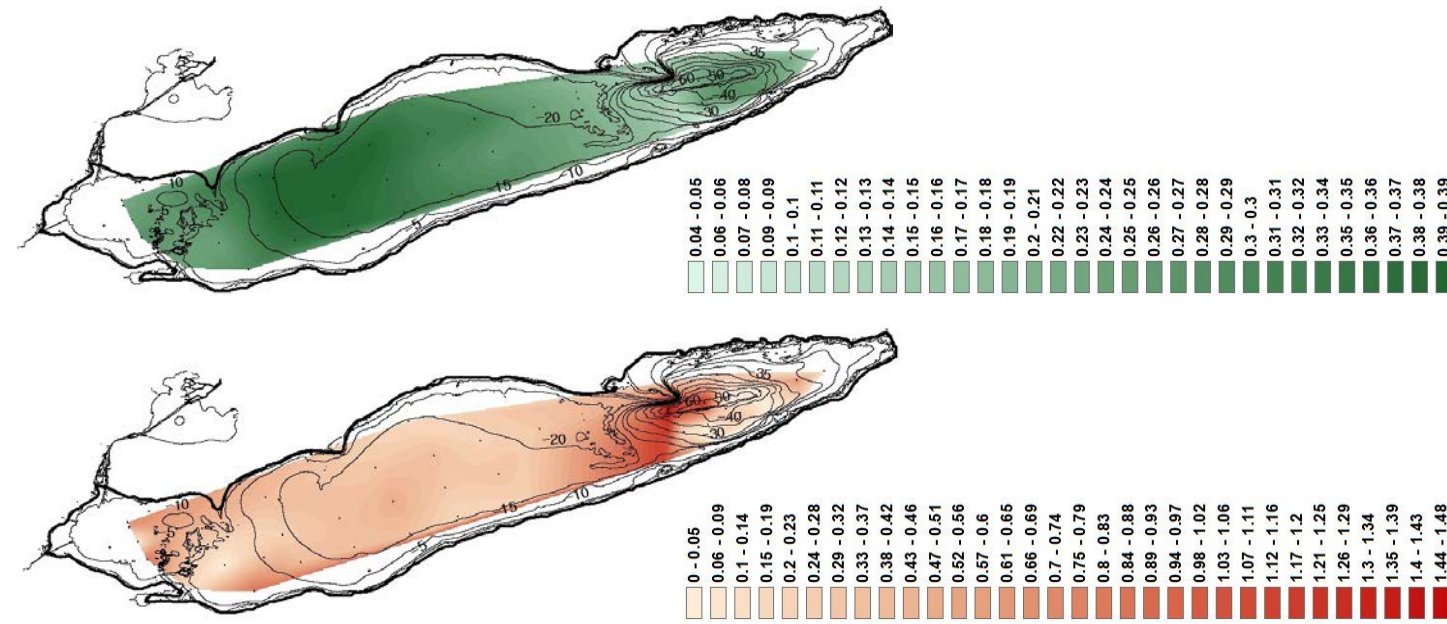


Figure 6. The top graph (a) is a colored map of nitrogen concentration data (mmol/g) with contours superimposed on the Lake Erie bathymetry. Water depth is measured in meters, whereas the bottom graph (b) displays nitrogen flux (mol/m²/year) over the same mapping. Water depth is measured in meters.

Bulk densities are high near the western shoreline and the Lake Erie islands, as shown in Figure 7a. Intermediate bulk densities are found north of the islands and in the middle of the Western Basin, which spreads toward the shoreline. The highest bulk densities are found on the west side of the Western Basin (0.79~1.55 g/cm³), while moderate bulk densities occur near the islands (0.39~1.18 g/cm³). In Figure 7b, the highest organic matter concentrations are located in the middle of the Western Basin with concentrations as high as 7.46~9.25%. Organic matter concentration decreases towards the shoreline to a minimum of 1.3%. This figure shows high phosphorous depositions near the Maumee Bay and across the central portion of the Western Basin (0.71~0.98 mg TP/g). The contouring of phosphorous gradually decreases towards the northern shoreline (0.7~0.13 mg TP/g).

Discussion

There are several important points found in the GIS mapping. By creating the Lake Erie map using sedimentation rate, pollen, and other chemistry data, a strong correlation between sediment deposition and bathymetry called sediment focusing was observed. When water is deeper, sedimentation rates increase, as reflected by high concentrations and fluxes in the Eastern Basin

and lower sedimentation rates in the shallower Western and Central Basins.

Another finding in the complete Lake Erie map was the similar pattern of contours between the map of sedimentation rates determined by radio-chronology and that produced by pollen, nitrogen, and carbon analysis with the natural neighbor contouring method. Sediment accumulation rates determined by radio-chronology and pollen dating showed high accumulation rates in the Eastern Basin and low accumulation rates in the Central Basin.

The maps plotting nitrogen and carbon data also show very similar contour patterns. The highest concentrations were observed in the Central Basin for both maps (0.4~3.13 mmol g⁻¹). The Eastern and Western basins have lower concentrations compared to the Central Basin. Lastly, in the maps using nitrogen flux and carbon flux, the pattern of contours is nearly the same. These maps represent not only a similar shape of contours, but also high values of nitrogen flux and carbon flux in the Eastern Basin.

Unlike the map of the whole Lake Erie, the patterns of contours using the bulk density, organic matter, phosphorous, and fluxes in the Western

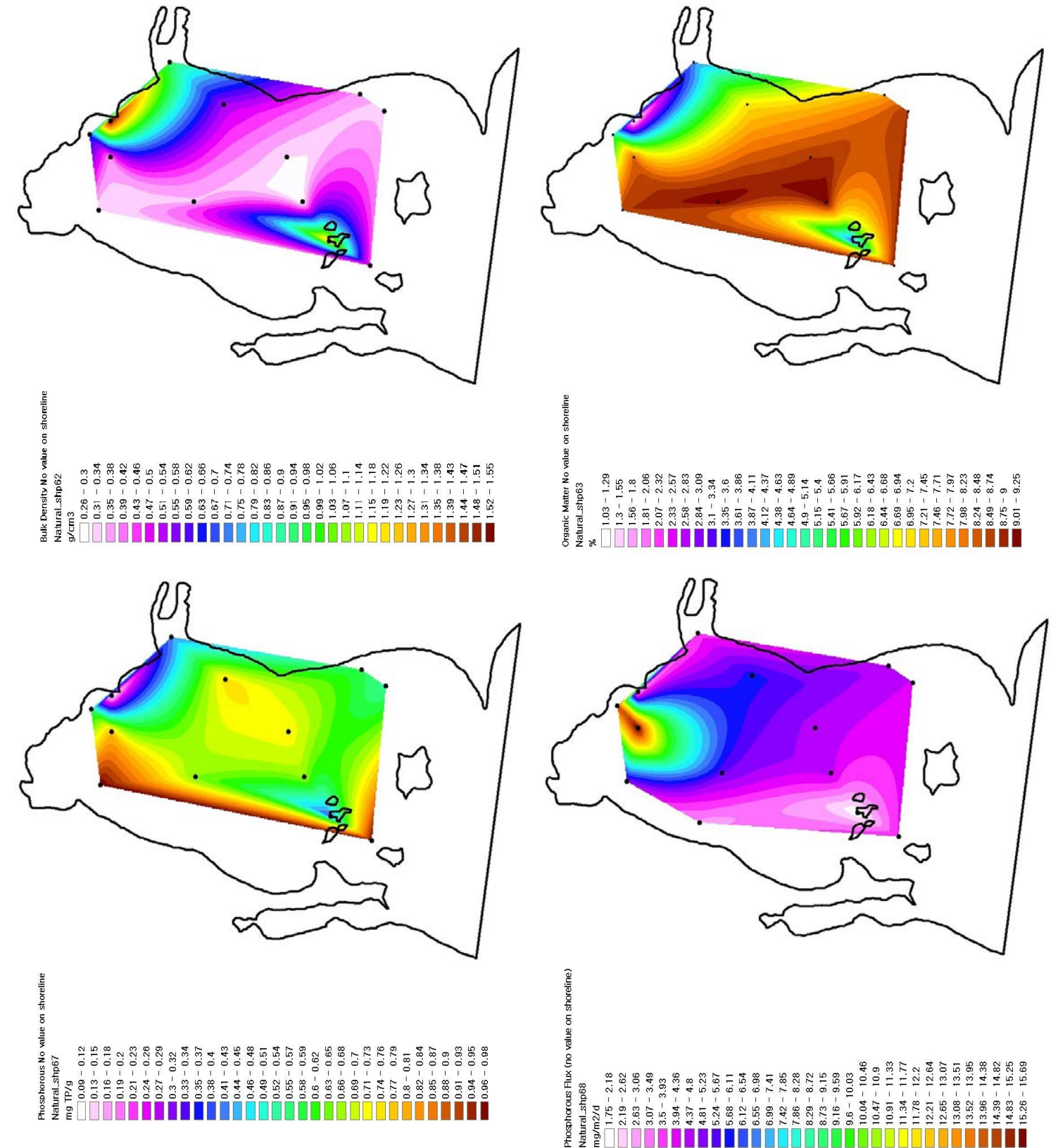


Figure 7. These figures are GIS models of the Western Basin of Lake Erie derived from natural neighbor contouring. (a) The top-left graph shows organic matter bulk density (g/cm³). (b) The top-right graph represents organic matter concentration as percent by mass. (c) The bottom-left map shows phosphorous concentrations as mg (P)/g (water). (d) The last map shows phosphorus flux in mg/m²/d. Data from Matisoff (Online Table 7).

Basin are slightly unique, possibly due to uniform shallowness in the basin. For example, in Figure 7d, the map shows high fluxes of phosphorous in the west side of the Western Basin since most phosphorous comes from Maumee River in west. According to the Great Lakes Water Quality Agreement (1972), the total load limit set for Lake Erie is 11,000 tons/year, with a target reduction of 40% in the 2012 Amendment. However, of the 11,000 tons of load, 7012.366 tons are deposited in the sediment (Horne *et al.*). The annual depositional flux of phosphorous flux can be calculated from the daily depositional flux and the area of the Western Basin:

$$\text{Flux (mg/m}^2 \text{ day)} * \text{Area of Western Basin (m}^2\text{)} * 365 \text{ (day/year)} = 7.012366 \cdot 10^{12} \text{ mg/y} = 7012.366 \text{ tons.}$$

Finally, the result of maps using sedimentation rates, pollen, carbon, carbon flux, nitrogen, nitrogen flux, organic matter, bulk density, phosphorous, and phosphorous flux data can be used as an input into computer models to make better predictions for algal blooms, which would help prevent high frequencies of dead zones.

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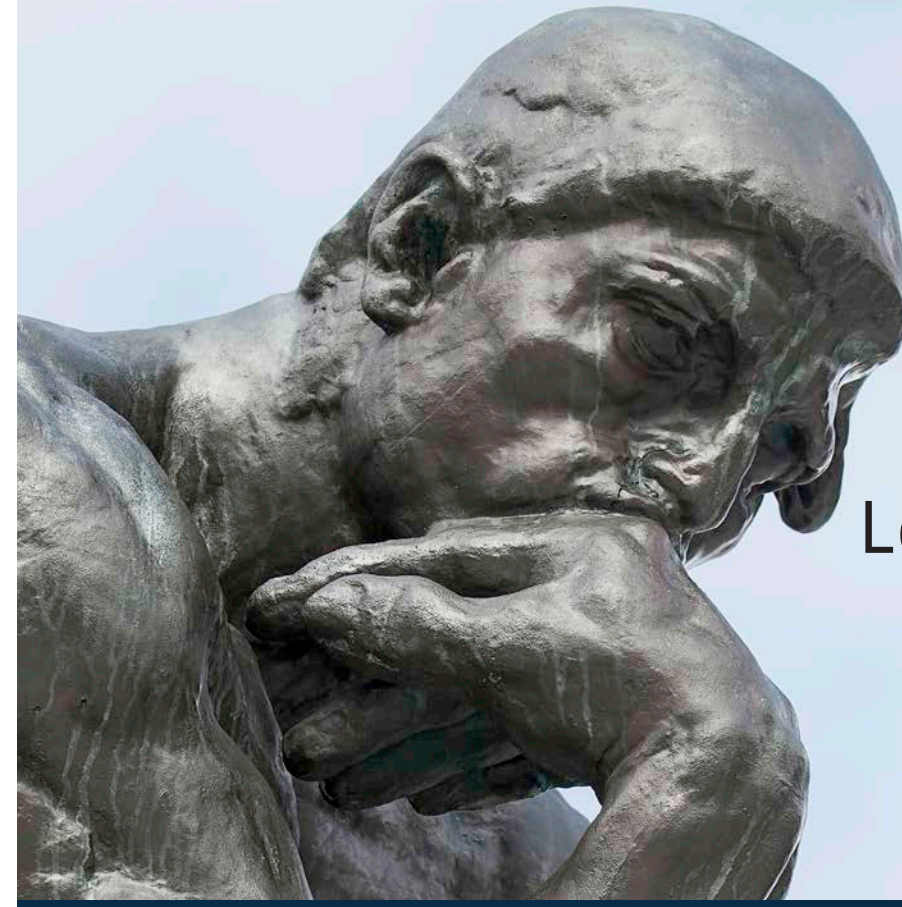
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Virtue Ethics and its Potential as the Leading Moral Theory

Auguste Rodin (French, 1840-1917)
The Thinker (Le Penseur), 1880-81, Bronze

Alexandra Marie Sakellariouv - McGill University

BIOGRAPHY

Alexandra is currently a student at McGill University in the Joint Honors Political Science and Philosophy program with a minor in Sexual Diversity Studies. She is an aspiring writer and regularly contributes to various international publications including *Her Campus*, *The Prospect*, and *Unwritten*. Her work has been featured in publications such as *The Huffington Post* and *Elite Daily* as well as several of her academic pieces have been published in *The McGill Pre Law Review* and the *McGill International Review*. Alexandra is currently the Editor-In-Chief of the *McGill Ambassadors Program* and is an Editor for the Canadian political publication *The True North Times*. In her future, Alexandra hopes to pursue a law degree and eventually work in the criminal justice system while still contributing to the academic community. She hopes her written work will one day be able to influence dialogue and discussion as well as further academic exploration in related fields.

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Abstract

There has been a modern revival of interest in virtue ethics as a plausible moral theory. There has been dissatisfaction with the way many modern moral theories emphasize moral obligation and law at the expense, some argue, of the individual (Slote, 1997, p. 175). Hence, virtue ethics now stands as one of the leading moral theories in ethics. This paper will explore the potential of virtue ethics as a plausible moral theory. It will begin by explaining the main arguments of a virtue ethical approach and the advantages it has over other moral theories. It will then go on to discuss three of the main varieties of virtue ethics; care ethics, neo-Aristotelian virtue ethics, and agent-based virtue ethics. For each, it will explain how they distinctly define right action with regards to the virtues or the virtuous agent. The final section of this paper will explore two main objections to virtue ethics as a general moral theory. First, virtue ethics is self-effacing, as Simon Keller (2004) argues, for the considerations it advances should not always serve as motives for action. Second, the 'indeterminacy problem' states that virtue ethics fails to be action guiding. In light of these issues, there is no particular advantage of virtue ethics over other moral theories.

Virtue Ethics

Virtue ethics is a moral theory that emphasizes the role of an individual's character and virtues in evaluating the rightness of actions. It is one of three major moral theories. It is often contrasted with deontology, which emphasizes following moral rules, and consequentialism, which determines the permissibility of an action from its consequences. Virtue ethics offers an account of right and wrong based on what a 'virtuous agent' would do. It believes that an action is right if and only if it is what a virtuous agent would perform in the circumstances (Oakley, 1996, p. 129). The right thing to do is whatever the virtuous person would do. The virtuous agent is a person whose character traits are virtues and does not have any vices. Virtues are character traits that are positively valued in a person. They are generally said to encompass traits such as honesty, kindness, and generosity. Vices, on the other hand, are character traits that are negatively valued (Timmons, 2002,

p. 270). This can include traits such as dishonesty, cruelty, and selfishness. The virtuous person is an ideal to emulate. As Simon Keller (2004) explains, "we should not, according to virtue ethics, seek merely to act like the virtuous agents... we should seek to be virtuous agents" (p. 224). Excellence in virtues is acquired over time. Virtues are different from excellences of nature, such as musical pitch or good eyesight, with which people are born. Instead, the more people practice the virtues and attempt to act as the virtuous agent would, the more virtuous people will become.

It can be seen in virtue ethics that goodness is prior to rightness (Oakley, 1996, p. 138). One must have an account of what a virtue is before one can decide if an action is right or wrong. Thus, one must have an account of good before an account of right. Virtue ethics uses aretaic classification—determining whether a trait is a virtue or a vice—before giving a deontic classification of right or wrong (Timmons, 2002, p. 278). The very fact that a trait is classified as a virtue or vice allows for the determination of a right or wrong action. This paper will later discuss how different varieties of virtue ethics use different approaches to aretaic classification. Virtues will be classified as such because they are valuable in their own right. In this sense, virtue ethics believes the virtues are a plurality of intrinsic goods (Oakley, 1996, p. 139). The virtues are valuable in a way that cannot be reduced to a single, main value. They are valuable intrinsically rather than instrumentally. Virtue ethics differs in this way from other moral theories that tend to be monistic, meaning they believe all goods can be reduced into a single value. Utilitarianism, for example, is a popular form of consequentialism that believes all good can be reduced to the single value of pleasure (Oakley, 1996, p. 140). An action is right if and only if it produces the most pleasure, since that is the most important good of all. Different varieties of virtue ethics will prefer certain virtues to others, depending on how they define right action.

Moral Schizophrenia

The main advantage virtue ethics has over other moral theories is that it does not fall victim to 'moral schizophrenia' as it does not compromise

one's motivations and reasons. First, the problem moral schizophrenia poses, which most moral theories face, must be understood. Michael Stocker (1976) identifies the problem, which he calls 'moral schizophrenia', in many modern moral theories such as consequentialism and deontology. Moral schizophrenia, he explains, causes a split between motives and reasons, so an indicator of a 'good life' is having harmony between motives and reasons (p. 454). If one wants to lead a good life one "should be moved by [one's] major values and [one] should value what [one's] major motives seek" (p. 454). A moral theory should support personal motives. However, the reasoning in many moral theories conflicts with personal motives. They require that people do "what is right, obligatory, [their] duty no matter what [their] motive for so acting" (p. 454).

Specifically, the impartialist nature of most moral theories does not allow people to treat anyone else differently. People cannot treat their family and friends any differently from strangers, even though moral intuitions support preferential treatment. Whatever personal motivation one may have to do something does not matter; one must always follow the reasoning of the moral theory, even if it conflicts with his or her motives. Moral schizophrenia in moral theories will prevent the agents from ever achieving the good life. Stocker explains that these moral theories "allow [people] the harmony of a morally impoverished life, a life deeply deficient in what is valuable... people who do let them compromise their motives will, for that reason, have a life seriously lacking in what is valuable" (p. 455). A life cannot be very fulfilling if everyone who performs his or her duty very rarely actually wants to. Moral schizophrenia means that, in most situations, individuals will end up discontent from following the reasoning of the moral theory. Modern moral theories do not allow for personal pursuits such as love, friendship, and community, which are valuable sources of pleasure. These theories do not recognize the value people can bring to lives. Stocker writes "there is a whole other area of values of personal and interpersonal relations and activities; and also of moral goodness, merit, and virtue" (p. 453-456). People's motives need to be in harmony for these values to be realized.

Virtue ethics avoids moral schizophrenia because it allows for virtues that harmonize motives and reasons. Recall that virtue ethics believes virtues are a plurality of intrinsic good; there are various reasons why certain virtues are valuable. It does not believe one overarching principle is the ultimate guide to live by, which generally would compromise other values in our life. Virtue ethics considers traits such as love, friendship, and community as virtues that are important for the wellbeing of the individuals involved. Specific varieties of virtue ethics will sometimes value certain virtues above others that are imperative to maintaining the personal and interpersonal connections other moral theories do not. Neo-Aristotelian virtue ethics values what is good for the wellbeing of the individual. Certainly acting upon personal motives is important for one's wellbeing, so it would value traits such as friendship and love that allow one to maintain personal connections.

Consider the following example to help further explain. A man has recently saved up a considerable amount of money in order to visit his friend in Iceland for a week. Instead of spending money on the trip, he could always donate it to a local homeless shelter to help directly feed the hungry. Surely donating his money to such charitable efforts would produce more happiness than would spending the money to see his friend. It would most likely be agreed that there is nothing wrong with him spending the money to see his friend. He saved the money himself and would gain personal satisfaction from seeing his long-distance friend. According to utilitarianism, a theory plagued by moral schizophrenia, the right thing to do is donate the money because it would produce the most pleasure.

However, think about what the virtue ethicist would say. The virtuous person would take all the virtues into account. They would consider the virtues of love and friendship. They would most likely conclude that the right thing to do is take the trip to Iceland. The reasons may include the fact that the person would be acting as a good friend or acting in their own best interest by going on the trip. This decision would satisfy the virtuous person because it harmonizes motives and reasons. Virtue ethics allows people to

maintain personal and interpersonal connections important for the good life. Virtue ethics does not fall victim to moral schizophrenia, which is one advantage it has over most other moral theories.

Care Ethics

After understanding what makes a virtue ethics approach so appealing, some common varieties of this moral theory can be considered. Care ethics believes that the virtue of care is central to understanding morality (Timmons, 2002, p. 282). Most moral theories employ a conception of justice. The self is considered an individual and the primary concern is “to protect individual interests in a manner that preserves equal respect for all” (Timmons, 2002, p. 283). Care ethics, on the other hand, employs a conception of care where “the relationship becomes the figure, defining self and others... (and the moral agent) responds to the perception of need” (Timmons, 2002, p. 283). Care ethics seeks to maintain and promote relationships with one another. It asks people to approach a moral issue with sensitivity. In care ethics, the virtuous agent is one who acts with the virtue of caring. They become the ‘caring agent’. Care ethics believes an action is right if and only if it is what the caring agent would perform in the circumstances. The big appeal of care ethics is that it accommodates a person’s intuition to give preferential treatment to those closest to him or her (Timmons, 2002, p. 282-285). It realizes and protects the value in personal and interpersonal relationships and activities. It avoids the problem of moral schizophrenia because it allows such intuitive motives to align with the reasoning.

Neo-Aristotelian Virtue Ethics

A second variety of virtue ethics is neo-Aristotelian virtue ethics. This variety is based on the work of Aristotle. Aristotle believed all actions aim at some good. Some things are ‘ends’ in themselves because they are done for their own sake. Other things are a ‘means’ to an end because they are done for the sake of something else. Aristotle believed all things contribute to a higher good; he called this ‘eudaimonia’. Eudaimonia roughly translates to mean happiness, fulfillment, and human flourishing. It is the highest good because it is the

end all other ends pursue; it is pursued for itself, never as a means to another end. Therefore, the highest good for humans is a life of eudaimonia or, roughly, a life of happiness. Aristotle explained that the highest good is reached when people perform human function well. Aristotle explained that it is humans’ ability to reason or rationalize. This rational capacity allows people to “grasp truths, and practical reason, by means of which they are able to determine which ends to pursue and how best to pursue them” (Timmons, 2002, p. 274). Virtue is an acquired disposition that promotes excellence in actions. To perform humanly function well—to rationalize well—one must be in accordance with the virtues. Aristotle concluded, “the highest good (and hence eudaimonia) of human beings is a life of rational activity of the soul in accordance with virtue” (Timmons, 2002, p. 272-274).

Modern neo-Aristotelian virtue ethics build off of Aristotle’s original argument to create its theory. Consider the neo-Aristotelian argument that Rosalind Hursthouse (2003) proposes. She agrees that the distinctive feature of humans is their rational capacity. Exercising rational capacity in accordance with virtue—thus, to exercise it excellently—will lead people to the good life of eudaimonia. Hursthouse gives her requirements for virtues. She offers three theses:

- (1) The virtues benefit their possessor. (They enable her to flourish, to be, and have a life that is eudaimon)
- (2) The virtues make their possessor a good human being. (Human beings need the virtues in order to live well, to flourish as human beings, and to live a characteristically good eudaimon human life.)
- (3) The above two features of the virtues are interrelated (p.167).

Virtues allow people to perform his or her function excellently; when people perform his or her function excellently, people reach eudaimonia. Since eudaimonia is the greatest good, reaching it makes one a good person. This both benefits people and makes them good. Hursthouse emphasizes that this approach is not in conflict with self-interest. Instead, the virtues are constitutive of a good life. They help people lead the best life and become the best they can be.

From a neo-Aristotelian approach, people can see the virtuous agent will act in a way that leads to their wellbeing because the virtues are what allow people to flourish. Right action, in this sense, is characterized by wellbeing. The virtuous agent will act in a way that accords with his or her own wellbeing.

Agent-based Virtue Ethics

The final variety of virtue ethics that will be looked at is agent-based virtue ethics as proposed by Michael Slote (1997). He explained that virtue ethical theories are typically ‘agent-focused’; they are concerned with what it means to be a virtuous agent and to have particular virtues (p. 177). The more radical a virtue ethics approach is, however, the more ‘agent-based’ and concerned with the agent’s inner life it becomes. Slote explains that a

“[r]adical kind of virtue ethics would say that the ethical character of actions is not thus independent of how and why and by whom the actions are done... the evaluation of actions is entirely derivative from and dependent on what we have to say ethically about (the inner life of) the agents who perform those actions. The more radical kind of virtue ethics is thus agent-based, not merely, like Aristotle’s view (on one common interpretation), agent-focused” (p. 178).

Slote proposes agent-based virtue ethics as a radical form of virtue ethics. Both care ethics and neo-Aristotelian ethics were not concerned with the ‘inner life’ of the agent that Slote speaks of. All that matters is that people perform the action the virtuous agent would. But Slote says people need to look into the ‘inner life’ of the agents to see if they have the correct motivations for performing right action. An agent-based approach will “derive its evaluations of human actions—whether aretaic or deontic—from independent and fundamental aretaic characterizations of the inner traits or motives of individuals” (p. 206). It is essential that the agent be guided by the right motives and traits for the action to be right. The inner life of the agent—their motives and inner traits—is the basis for evaluating actions. Different varieties of agent-based virtue ethics will have different accounts of what traits an agent must innately express in

order for right action. Slote touches on several varieties. For example, one version may appeal to the notion of inner strength. This account would treat strength “as an ultimately admirable way of existing” (p. 218). There would be something innately admirable about being strong inside. Other accounts may treat morality as beneficence. It would say that an agent performs right action if they acted out of beneficence (p. 212-223). The action is right because the trait is being expressed from within the agent, and the trait is motivating the agent in the right way. An individual cannot simply copy the actions of the virtuous person; they must act out of the right motivations.

Objections Against Virtue Ethics

There are two objections against virtue ethics. Consider the charge Simon Keller (2004) makes that virtue ethics is self-effacing. A moral theory is self-effacing when “the considerations that it posits in telling that story sometimes should not serve as motives for action, according to the theory itself” (p. 221). Recall Stocker’s moral schizophrenia, where he claimed most moral theories cannot allow for harmony between motives and reasons. Moral theories facing this problem are self-effacing because people would intuitively agree that the considerations they propose should not act as motives in every situation.

Keller identifies two things wrong with self-effacing theories. First, they do not properly tell people what should motivate them, “so they fail to perform a function that an ethical theory should perform” (p. 222). Secondly, they do not allow for a “psychologically harmonious life” because they do not allow the agent to be motivated by what is important to them (p. 222). Keller asserts that “if the virtue ethicist is to avoid self-effacement then she must make the following claim: it is never undesirable for an agent to be moved to action by the thought that her act is in accordance with the virtues, or by the thought that she is acting as the fully virtuous person would” (p. 224-225). Virtue ethics would have to allow one’s motivations to be acting like the virtuous person, not acting out of the good of a virtue. Keller says that virtue ethics cannot commit to such a statement.

Keller offers a thought-experiment to further explain. He details the story of three campers—Arthur, Benjamin, and Christine—who decide to invite a family who cannot set their own tent up to stay in their cabin one stormy night. However, all three campers have different motives for inviting the family to stay with them. Arthur wanted to relieve the family of their misery, Benjamin acted out of generosity, and Christine wanted to do what the virtuous agent would do. Arthur seems to have the best motive of the three. Keller explains, “it is clear that Arthur is the most generous, and the one who most resembles the fully virtuous person... (because) Benjamin and Christine each fail to have as a primary motive the truly generous one of using what one has to relieve the suffering of others” (p. 225-226). Arthur was the one who acted truly out of generosity and is therefore most like the virtuous agent. But, Christine did exactly what virtue ethics wanted of her. She thought about the virtuous agent and acted as they would. However, it would not be concluded that she had the best motives. Keller explains that people

“[m]ust say that what makes an act right is its being what the fully virtuous person would do, but add that having the governing motive of acting like the fully virtuous person precludes the possibility of being like the fully virtuous person—so it is often undesirable to take as their motives the considerations that provide reasons for acting. Virtue ethics, it seems, is self-effacing...” (p. 227).

It can be seen that if people follow the reasoning of virtue ethics—think of and do what the virtuous person would do—people will not really be virtuous. People will not have the right motives; people will not act out of the goodness of the virtue, but rather because it is what they think is the right action. Thus, virtue ethics does in fact seem self-effacing. It does not seem satisfactory that the criteria for right action be only to emulate the ideal of a virtuous agent. Most people would agree that one should perform good acts because they recognize the goodness in acting a certain way. If this is accepted, then it must be agreed that virtue ethics is self-effacing and should not be favored over other moral theories.

It is worth noting that this objection may not apply to all varieties of virtue ethics. Recall Slote’s radical agent-based virtue ethics. He said that one needs to consider the ‘inner life’ of an individual in order to evaluate right action. If the inner motivations and traits of the agent for evaluating an action were considered, then self-effacement would be seemingly avoided. People would have to consider whether they are acting for the goodness of the virtue, instead of merely emulating the virtuous agent. However, in the other variations considered, they did not give weight to the inner motivations of the agent. They would still fall victim to the self-effacement complaint. Self-effacement is thus a valid criticism of most varieties of virtue ethics, but not all. Only when individuals are willing to accept a radical version of virtues ethics, such as agent-based, will they be able to avoid this objection all together.

The second and final objection that will be considered is virtue ethics’ indeterminacy. This objection simply states that virtue ethics fails to be action-guiding; it cannot tell what one should do (Hursthouse, 2003, p. 28). It fails to resolve moral conflict. It seems that virtue ethics does not tell someone what to do; it says to think of the virtuous agent and act as they would, but it is unclear how people would know how to do so. Some virtue ethicists say if one is in conflict, one should ask someone they consider a virtuous agent. But this raises two problems. First, it is unclear how a virtuous agent can be identified. Perhaps it is someone that is admired. However, the criteria of what makes someone admirable varies from person to person, and an individual that may be admired may not actually be a virtuous agent. Secondly, there may not always be an opportunity to ask someone else for advice. It seems inconvenient to have to seek out a virtuous agent—who may not even be virtuous—every time one is in moral conflict. It is not plausible to do this in every scenario.

Furthermore, the requirements of different virtues may point people in different directions. What would be right according to one virtue may not be right according to the next. There is no ranking of the virtues that explains what the virtuous agent would do (Timmons, 2002, p. 292). For example,

in *Normative Virtue Ethics*, Hursthouse (2003) writes “honesty points to telling the hurtful truth, kindness and compassion (point us) to remaining silent or even lying” (p. 28). Other moral theories will give an overarching principle or rule to follow in order to resolve moral conflict. But virtue ethics fails to do this. As in the example, people are confronted with a dilemma whether to abide by the virtue of honesty or the virtues of kindness and compassion.

In response to this objection, Hursthouse says the problem is merely apparent. She explains in *Normative Virtue Ethics* that the problem results from the agent not knowing how to correctly apply the virtues. She writes that

“[t]rivially, the explanation is that they lack moral knowledge of what to do in this situation; but why? In what way? The lack, according to virtue ethics’ strategy, arises from a lack of moral wisdom, from an inadequate grasp of what is involved in acting kindly (unkindly) or charitably (uncharitably), in being honest, or just, or lacking in charity, or in general, of how the virtue (and vice) terms are to be correctly applied” (p. 29).

Achieving the virtues takes practice and one must learn how to properly apply them. The problem is only apparent; there really is no problem, except anyone who asks these questions has demonstrated a lack of moral knowledge. Hursthouse admits this is not the most satisfactory answer, but it is the one most virtue ethicists will give (p. 29). She then goes on to discuss anti-theory in ethics, where philosophers are beginning to reject normative ethical theories. They deny the ability of normative ethics to ever provide a ‘decision procedure’ for deciding right and wrong (p. 31).

It does not seem like an agreeable response to say that anyone who does not know what the virtuous agent would do lacks moral knowledge. Without a guiding principle or hierarchy of the virtues, it is obvious that virtue ethics lacks determinacy. It cannot guide people in the same way that other moral theories can. It is very troublesome that a moral theory cannot give a way to resolve moral conflicts. For this reason, along with the problem of self-efficacy, there does not seem to be any

reason virtue ethics should be favored over other moral theories. It suffers from the same problems as many alternative moral theories and is even arguably worse than other theories because of its indeterminacy.

Conclusion

In conclusion, the three main varieties of virtue ethics—care ethics, neo-Aristotelian virtue ethics, and agent-based virtue ethics—do not stand well against the two main objections to general virtue ethics. In particular, multiple kinds of virtue ethics are indeed self-effacing. While some varieties may escape this problem (agent-based virtue theories in particular), the moral theory as a whole suffers alongside alternative moral theories. In addition, we have seen how virtue ethics suffers from indeterminacy as it fails to be action-guiding. In light of these criticisms, virtue ethics has no particular advantage over other moral theories. It is victim of self-effacement, just as other major moral theories in ethics, and fails to resolve moral conflict, which is arguably a crucial feature of a plausible moral theory. Unless such conflicts are resolved, virtue ethics cannot be regarded as more promising than any of the other moral theories.

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Questioning Community in the Ku Klux Klan

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BIOGRAPHY

Born in Manila, Phillippines, Alan Songer lived as a missionary kid until he was 12. He then moved to Tomball, Texas, north of Houston where he attended Providence Classical School. Throughout high school, he was an All-State Academic and an All-Star Basketball player, before being accepted to participate in the JUST program at Abilene Christian University. Alan is a third-year student double majoring in Criminal Justice and Sociology with a minor in Political Science. After graduating in 2016, he intends to enter law enforcement and work his way up to federal criminal investigation.

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QUESTIONING COMMUNITY IN THE KU KLUX KLAN

Introduction

“This is an institution of Chivalry, Humanity, Mercy and Patriotism.” This is the first line from the Ku Klux Klan’s (KKK) “Objects and Character of the Order” (Horn, 1939, p. 38). Although these are not words that most modern Americans would ascribe to the Klan, one will find descriptions that depict the Klan as “instruments of justice” (Horn, 1939, p. 46). Some even say that they, “against overwhelming odds, daring exile, saved the lives of a people” (Dixon, 1967, p. 10). Despite this, however, most people certainly do not view the KKK as many scholars agree it once was. Words such as terror, murderous, or law-breaking are often associated with the Klan (Trelease, 1971, Title Page). So, why the disparity? Of course, the KKK is a horrific blemish on American history. They were a group that terrorized not only a race or community, but also an entire nation. The Klan, like any group, had its beginnings. A strong sense of brotherhood and loyalty existed in its community. It was this community that led to the violence and destruction for which the Klan was all too well known.

Origins of the KKK

What were these initially “innocent” origins of the Klan? The Ku Klux Klan was originally founded in the town of Pulaski, Tennessee by six young, bored, white men. It all began one night, when one of the men said, “Boys, let’s get us up a club” (Martinez, 2007, p. 8). The six men who were all of high standing in their community had served in the army and had unblemished records (Horn, 1939, p. 9). Elaine Parsons even said that they were a “group of young men who went around town playing string instruments to the ladies” (Parsons, 2013, p. 811). These are not the kind of men that one might think created the Ku Klux Klan, since the Klan they created is not the same Klan it eventually became. It started out by participating in social activities, entertaining gatherings, inventing secret codes, and engaging in practices that one would expect from a group of young men who had just started a new, secret club. The sole purpose of these early gatherings was to basically function as the initiation process. They first modeled themselves

after college fraternities, with their name even coming from the Greek word Kuklos, meaning circle or band (Trelease, 1971, p. 4). Mysterious and haunting names such as “Grand Cyclops” and “Magi” were only created because the men were tired of the ordinary military ranks.

Initial Activity of the Klan

For the first few years after the Klan was created, the founding members mainly involved themselves with the initiation process and carried out fraternity-style pranks (Martinez, 2007, p. 13). In 1869, they drafted the “Objects and Characters of the Order,” which outlined an organization devoted to justice and aimed directly toward helping those affected negatively by the civil war, mainly the widows and orphans. For a while, the Klan adhered to these policies; there are numerous reports of sums of money, as well as food and other necessities, being left at doorsteps of those in need with notes signed by a mysterious “Grand Cyclops of the Order” (Horn, 1939, p. 44).

Secrecy of the Klan

Due to the initiation process and the fraternity environment in which the Klan first lived, strong bonds were formed among the men. Because they underwent such a strenuous and often embarrassing initiation, they felt as if they had accomplished something, as if they had earned a spot with their fellow brothers. Another factor in the men’s closeness was the secrecy within the Klan. The KKK, from its very beginning, maintained utmost secrecy about all of its actions in order to accomplish two goals. First, it made prospective members eager to join; the KKK never openly advertised itself or solicited possible future members (Horn, 1939, p. 15). Every once in a while, a man was approached and given the opportunity to undergo initiation if the Klan deemed him worthy of the robe. Secondly, the Klan’s secrecy kept its actions hidden from all but those who were a part of it. This oath to secrecy brought the men closer together, as they had to remain completely loyal to one another and were not allowed to discuss Klan business with anyone else.

Showmanship of the KKK

The final piece to the strength of the KKK's community was its showmanship. Ritual and performance were vital elements of the Klan. At first, showmanship was the only thing besides initiation and charity in which the men could engage. Even once the Klan became dangerous, they would frequently make purely performative appearances before they moved on to violent attacks (Parsons, 2013, p. 817). These performances were strange and often confusing components of the Klan. It seemed, sometimes, that they put on these elaborate shows simply to amuse themselves. Other times, it seemed as though the Klan had clear purposes behind its midnight shows. Whatever the case, the Klan's showmanship augmented its mystique.

Performances

These performances began with the "Pulaski 6" as the founders were called (Martinez, 2007, p. 9). Due to boredom, one night they donned the popular Halloween costume of a ghost, and clad in their white sheets, rode through town as a joke. Many of the former slaves were scared due to their superstitious nature, and though it did not act on this immediately, the Klan realized the potential of scare tactics early on. As the Klan grew, the performances became more and more elaborate and were imbued with symbolism and tradition. However, those were not the only reasons for its theatrics, as the Klan knew potential victims were not its only audience. Parsons writes that "Klansmen had everything to gain by encouraging northerners to read their attacks as theatrical, rather than political or military" (Parsons, 2013, p. 813-814). This scheme proved to be successful. For the longest time, Northerners believed the Klan to be "farical" and a "piece of the broadest and most ridiculous fun" (Parsons, 2013, p. 813). Even when the Klan began its more violent raids, its theatrics succeeded in keeping the North clueless as to its real purpose.

Eventually, the Klan grew tired of simple social activities, and began to use the former slaves' superstitions to its advantage. Often, they used

ghost-like tactics to scare freedmen into "keeping in line" (Horn, 1939, p. 18-20). They claimed that they were "upholding justice" and "keeping the peace," both phrases that the Klan would use to justify its actions throughout its active years. At first, the Klan only used violence as a defensive measure. They began by harming those who had betrayed the organization or government spies who had attempted to infiltrate the Klan. But once it got a taste of blood, the Klan spread its acts of violence quickly to its theatrical raids.

Due to its mysterious nature and sonorous name, the Ku Klux Klan spread like wildfire, and local Klans, known as dens, began to pop up all over the South (Horn, 1939, p. 11). They began to conduct raids, claiming to be ghosts of Confederate soldiers. For a while, these little shows, often involving elaborate tricks to prove that they were, in fact, ghosts, were effective. But slowly, people began to take the threats less seriously, and more drastic measures had to be taken. It was at this point that the modern Klan truly began to develop. As it grew, its motives became far more political, and it began to target not only African Americans who were attempting to exercise their new rights, but also any white republicans who stood up for African Americans (Foner, 1988, p. 127). In support of this, one author writes, "Violence had a profound effect on Reconstruction politics. For the Klan devastated the republican organization in many local communities" (Foner, 1988, p. 442).

The quickly multiplying dens, all behaving erratically, led Klan leadership to attempt an organization of the KKK on a national scale. To some extent this worked, setting up a government with positions that began with the Grand Cyclops of a den up to the Grand Wizard. The first person who held this title was reportedly Nathan Bedford Forrest, a Southern Civil War hero (Ashdown & Caudill, 2005, p. xiii). However, the very fact that there is still some debate over whether or not this well-known figure actually held this position, or was even in the Klan at all, shows the true depth of the Klan's secrecy and covertness.

Although this new leadership did bring the Klan into a somewhat more orderly state, it also

resulted in the elevation of preexisting violence. Foner writes, "One should not think of the Klan, even in its heyday as possessing a well-organized structure or clearly defined regional leadership. Acts of violence were generally committed by local groups on their own initiative. But the unity of purpose and use of common tactics..." (Foner, 1988, p. 425). Not only was the violence becoming slightly more organized, but the dens were working more cohesively. They began employing tactics such as having the neighboring den carry out the more violent raids while alleged members of that town's Klan remained conspicuously uninvolved that evening. This ploy made the already weak attempts of law enforcement to halt Klan activities even more futile, giving the KKK more confidence, which resulted in even more violent crimes (Horn, 1939, p. 48).

One extremely important and somewhat obvious side effect of the Klan's popularity and growth is that it gained an astonishing number of members. Parsons writes that "What tied Klansmen together and caused them and others to understand their actions as a part of a greater whole was the powerful and multivalent image of the Klansmen that emerged in popular culture," (Parsons, 2013, p. 817). These men all stayed together because they had created their own identity. These otherwise ordinary men could become part of something else. This anonymity allowed them the freedom to perform even the most heinous acts without any remorse; they were acting as a completely different entity. Another factor in the rise of violence was that these large groups of disgruntled men became susceptible to groupthink and mob mentality. Both of these words describe situations in which the members of a large group often lose the ability to think for themselves, and instead, begin to simply engage in whatever activity they saw around them.

It was the Klan's original sense of community that led to the groupthink the Klan experienced. "Indeed, all they had in common, besides being overwhelmingly white, Southern, and democratic, was that they called themselves, or were called, Klansmen," (Parsons, 2013, p. 816). Many of the men who were involved in the Klan's raids would

not have resorted to violence as quickly as the Klan did as a whole. Peer pressure to engage in these attacks affected many of the members. The intensity and closeness of the community only served to make the situation far worse, as it allowed for groupthink to lead to ever-escalating levels of violence. Community and brotherhood are two things that are universally seen as healthy and worthy pursuits. However, the KKK perverted these ideals and began to engage in unspeakable acts of violence towards their fellow man.

Violence

The KKK's violence began with the small sporadic beatings of a few traitors, but it quickly spiraled out of control, and as the Klan grew bolder, the body count grew as well. One example of this violence can be heard from Alabama freedman George Monroe. "Klansmen came to his home, gave him a severe beating, 'ravished a young girl who was staying with my wife,' and wounded a neighbor. 'The cause of this treatment, they said, was that we voted the radical ticket,'" (Foner, 1988, p. 427). Another example can be found in the story of Jack Dupree. During a raid, his attackers cut his throat and disemboweled him in front of his wife and twin infant boys because he was the president of a republican club and a man who was known to "speak his mind" (Foner, 1988, p. 426). Often, the raids did not target a single person or family. One attack left 150 people dead in Jackson County. The most violent and bloody of the Ku Klux Klan's attacks, however, was that of the Colfax Massacre on Easter Sunday, 1873. After a siege of three weeks, the KKK broke through the town's defenses, and slaughtered 280 men, women, and children. They continued butchering even after the town had surrendered, leaving the community's members' throats cut and bodies lying in a field (Schiller, 1967, p. 437; Foner, 1988, p. 32; Fischer, 2010).

Effects of the Violence

Acts of violence such as the mass-murder at Colfax, were extremely detrimental to national growth during the time. Claude Fischer writes about the effect of these acts of violence in his book, *Made in America: A Social History of*

American Culture and Character. In it he writes, “Fuller control over the violence was delayed by the vast and bloody struggles over slavery, secession and race”(Fischer, 2010, p. 32). He then goes on to specifically mention the Colfax massacre, and how much acts like that hindered the reconstruction greatly. Another case about the Klan’s impact is made by Foner, when he writes, “Violence had a profound effect on reconstruction politics. For the Klan devastated the republican organization in many local communities” (Foner, 1988, p. 442). We are still feeling the effects of the KKK’s actions today. McVeigh and Cunningham wrote an article for *Social Forces* concerning the impact of Klan activism and violence that lasted for decades after their dissipation. He writes, “We propose that processes associated with mobilizing a racist extremist movement can lead to changes in communities that make them more prone to violence” (2013, p. 847). The hatred and violence that were cultivated by this organization are not the kinds that simply dissipate with its death, or even the death of its members. Hatred that strong is passed down from generation to generation. The consequences of the actions of the Ku Klux Klan can be seen throughout our history and are still evident today.

Conclusion

How did a group of six men trying to relive their fraternity days evolve into an organization capable of terrorizing and murdering thousands of Americans? When it started, the Klan always had a very strong sense of community. Its brotherhood and loyalty were its defining traits. Yet it was these very traits that turned the organization into something else entirely. What began as a potentially virtuous and beneficial group evolved into a terrorist organization for a few simple reasons. The community and secrecy lead to groupthink and mob mentality, which allowed a few violent men to sway an entire organization towards violence. This violence was fueled by anonymity and the environment in which the Klan operated. Their secrecy and theatricality hid their true nature from outsiders and gave them a cover under which they could work—a cover that blinds us even today. They perverted words like justice

and law and even turned towards scripture in order to validate their actions. Organization only made matters worse, due to the ease with which the Klan could carry out its raids and attacks on communities. Because of these reasons, a social club started by six bored men in Pulaski, Tennessee became the most feared organization in America, one whose ghost still haunts the nation today.

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