Volume xxxviii 2018 Number 1

Collegiate Anthropologist

State University of New York College at Potsdam

INSIDE:

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On Alzheimer's Disease

A faculty profile,
advice column,
and more...

Collegiate Anthropologist is a student-faculty journal published annually by the SUNY Potsdam Anthropology Dept.

The *Collegiate Anthropologist* is a student-faculty run journal published by the SUNY Potsdam Department of Anthropology with financial support from the Student Government Association, donors, and the Department of Anthropology. Gifts from alumni and friends, through the Annual Fund and earmarked for the Department of Anthropology, are gratefully acknowledged.

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Dedication

The *Collegiate Anthropologist* is dedicating this issue to Dr. Hadley Kruczek-Aaron and Dr. John Omohundro for their years of dedication, determination, and passion in producing this publication.

In the fall semester of 1979, a few of Dr. John Omohundro's students approached him asking if he could help them create an opportunity for students in the anthropology department to obtain publishing and editing experience. From this idea, the Collegiate Anthropologist was born. Dr. Omohundro credits his students and current students for maintaining the journal's progress and success. Faculty support was also key to the journal's success. Without student initiative and spirited faculty, the journal would not be the masterful publication it is today. Originally, the journal was published every semester, producing two editions annually. Dr. Omohundro worked as chief editor on the journal with one of his students as co-editor for 29 years.

Fall of 2008 brought Dr. Hadley Kruczek-Aaron on as chief editor and producer of the Collegiate Anthropologist. With her came numerous changes to the journal in terms of formatting and appearance. There was also a shift made to create an editorial team made up of archaeology and anthropology majors who had strong writing skills. Dr. Kruczek-Aaron wanted to change the overall look of the journal with the addition of a glossy binding and colored pictures. In order to do this, the editors used their budget to publish one issue instead of two each year. Dr. Kruczek-Aaron's goal was to create a professional looking journal in which students were proud to house their research publications. This transition took place in the 2013-2014 academic year.

Both Dr. Omohundro and Dr. Kruczek-Aaron are extremely proud of this publication. Dr. Omohundro is convinced the *Collegiate Anthropologist* is the oldest and best undergraduate journal run by students and faculty. The Collegiate Anthropologist is one of the aspects of Dr. Omohundro's career that he is most proud of. Dr. Kruczek-Aaron recognizes the importance of the journal in communicating the work the students in the department are doing. She loves to see students' growth as writers through their experience as editors or contributors. Dr. Omohundro and Dr. Kruczek-Aaron both believe the *Collegiate Anthropologist* has always reflected the goals of the anthropology department, showcased the opportunities the department offers to undergraduates, and exemplified how the students at Potsdam go above and beyond in their academic careers.

Archaeology at the John Brown Farm: The 2017 Field School Experience

Amber Rounds

Students of SUNY Potsdam's 2017 archaeological field school spent four weeks immersed in the vibrant history of the John Brown Farm State Historic Site located in North Elba, New York. Twelve students, their leader, Dr. Hadley Kruczek-Aaron, and two teaching assistants, Lissa Herzing and Jared Muehlbauer, set out to uncover the story of the Brown family. The Brown family's occupation of the small farmhouse in the heart of the Adirondacks took place over a period of only 8 years (1855-1863); a narrow time frame proving to be quite elusive in our excavation efforts. Life in North Elba was challenging for the Brown family. John Brown did not spend much time at his home in upstate New York, as he was off taking charge of his abolitionist movements. It was Mary and her children that ran the farm and supported John's reform efforts from inside the home. One of the goals of this project was to shed light on the lives of Mary and her children and the important roles they played during such a significant period in history.

Students sort, bag, and tag a large number of artifacts excavated from the site's most productive unit.(Photograph by Dr. Kruczek-Aaron).

One by one, students pulled into the North Country Community College residence building parking lot, tired from the long drives, but also eager and excited to start the next four weeks. After unpacking and settling into our respective rooms, we made our way to the common area where we had our first meeting. Here we received our archaeological toolkits, equipped with dust pans, clippers, measuring tapes, rulers, line levels, brushes, and of course our very own trowels, a significant moment for many. We were then given a packet containing information regarding the history of the site and other important instructional material. Throughout the duration of the field school, we kept a journal of our daily experiences in the field, and so we were provided a Rite in the Rain Notebook as well.

The next morning found us grabbing our toolkits and loading up the vans used to transport the students and equipment to the site every day. Being that the site is a state historic site open to the public, we spent our first day in the field going on the tours offered by the wonderfully helpful staff who work on the farm every day. They shared their knowledge of the house and its surrounding landscape, and we became familiar with the site and its deep history. The end of day one saw us learning how to carry out shovel test pits (STPs) and operate the total station as we split into groups led by the two teaching assistants and Dr. Kruczek-Aaron. The following week we put the knowledge we learned to use and continued to do survey work around the site. Paired off into groups of two or three, we took turns digging STPs, plotting in points on the total station, and metal detecting 10x10m areas of the land. These survey techniques aided Dr. Kruczek-Aaron in deciding where units should be opened and gave us a sense of the stratigraphy we might expect to find in our larger excavations.

Four 1x1 meter units were opened in spots likely to have been areas of activity: by the back door of the house, along the edge of the pond, next to the woodshed, and along the side of the house where a wraparound porch was once located. Later, a larger unit, 1x2 meters, was opened next to a particularly productive unit, and a previous unit was expanded into a 1x2 meter unit. We started our careful excavations, learning how to read the soil stratigraphy, fill out the paperwork for

Students use a screen to sift dirt from a shovel test pit as they look for artifacts (Photograph by Dr. Kruczek-Aaron).

Excavation unit surrounded by tools needed to conduct an archaeological excavation (Photograph by Dr. Kruczek-Aaron).

each level we went down, and, of course, properly bag and tag the artifacts we were finding. It was not long before evidence of historic occupation of the farm was uncovered. Most of the artifacts discovered dated to the late 19th century, which were likely associated with the Lawrence family who cared for the farm after the Brown family left in 1863. Amongst the numerous artifacts found were those likely related to the construction and destruction of the house's kitchen addition, built while the Lawrence family occupied the farm from 1870 to the early 20th century. Some of the incredible finds that had the whole crew turning their heads upon their discovery included tobacco pipe stem fragments, slate pencils, and an intact pair of embroidery scissors; objects that to many would have seemed inconsequential or mundane. Excitement resonated throughout the site during moments like these, and it served as a reminder of why we all had such a passion for this field of work to begin with.

This particular field school provided a unique and valuable opportunity to its students. As archaeologists our ability to disseminate knowledge and engage with the public is of utmost importance. The John Brown Farm is a heavily trafficked area given its designation as a state historic site, with many people from different places coming to learn about the Brown family, pay their respects, or to walk their dogs on a beautiful Adirondack morning. What this meant for the students working in the field was opportunities to engage in public outreach. People of the public would often approach us in our work and ask questions. We answered their questions and explained the work we were doing. Each day, a different student would be the leader of public outreach and would give a tour of all the units. We



A pair of embroidery scissors, a bottle fragment and a pipe bowl fragment found during the 2017 SUNY Potsdam archaeology field school at the John Brown Farm site in North Elba, New York (Photographs by Dr. Kruczek-Aaron).

were able to teach others about this wonderful and fascinating field of work that we are pursuing and bring awareness to the significance and impacts of such work. It was a rewarding experience for the students, giving us valuable skills useful in our professional lives as we continue down our respective paths in archaeology.

There were other invaluable parts of this field school. We had the honor of one of John Brown's direct descendants, his great-great-great-granddaughter, Alice Keesey Mecoy, who was able to travel from Texas to join us in the field. She regaled us with insightful stories of her family as we all shared in pizza and asked questions. Alice even participated in the digging as a new unit was opened in the front of the house. It was a privilege to be able to share these moments with her and to have her be a part of the team in this incredible project. Also, students from Akwesasne, participating in the 2 plus 2 program at SUNY Potsdam, traveled to the site for a day to participate in the dig. Some students helped out in already existing units, and others were paired up with field school members to learn how to dig STPs. It was a great way for students to interact with each other, teach one another, and get a taste of archaeological fieldwork.

Students were not the only creatures in the field however. Buddy, the dog of one of the workers at the state historic site, was in the field with us almost every day during the project. Buddy kept spirits high, greeted us warmly as we unloaded our supplies every day, and frequently checked up on us in the units. He was such a great part of the experience that his image even made it onto the field school t-shirts.

After a long day in the field, we would help our fellow crew members close up all of the units and pile into the vans once more to go back to the college's suites we were staying in. Students were able to unwind and bond. We partook in card games, puzzle-making, dinner cooking, and reflected on how things were going in each other's units. On one day when the weather was being particularly uncooperative, we set up an artifact cleaning station outside under tents and learned the basics of cleaning and processing artifacts. Weekends often saw us participating in group activities such as visiting the Adirondack Experience, going on hikes, and my favorite, going to Donnelly's ice cream shop in Saranac Lake for the best soft serve around.

This field school was an unforgettable experience, one that will follow us all as we move in our own directions through life. Our small crew

of archaeologists-in-training bonded and formed special connections to each other both in and out of the field. We came into field school knowing we all shared one thing, a love for archaeology, but we left with more than that. The challenges we faced in the field were valuable in teaching us how to overcome and succeed, despite all that was working against us. I look back on the summer of 2017 with fond memories and know we walked away from the John Brown Farm with skills and experiences that have not only shaped us as archaeologists today but will continue to impact and aide us in our future endeavors in this field.

The 2017 SUNY Potsdam archaeology field school cohort (Photograph by Dr. Kruczek-Aaron).

About the Author

Amber Rounds is a junior anthropology and archaeological studies major with a minor in Native American Studies. She attended this past summers' field school at the John Brown Farm State Historic Site in Lake Placid, New York. She was recently accepted into the Presidential Scholars Program at SUNY Potsdam where she will be experimenting with the progenitors of crops associated with the Eastern Agricultural Complex. This will be her second year editing for the *Collegiate Anthropologist*.

Mapping Spaces in the Palace at Palenque, Mexico

Alex Gregory

Introduction

Anthropology is often defined by the study of human cultures, societies and how they developed through time, but what did their development look like? Development of a culture can often be identified through its architecture and the landscape in which they have settled upon. My study in Palenque, Mexico is focused on better understanding how the ancient Maya shifted their views on social and political behaviors starting in 600AD and ending around 800AD. Before 600AD, Palenque was in disorder from a defeat by Calakmul. This disorder was said to be a disconnection from the Earth and the Heavens (Aldana 2010:81). Early in 600AD, the ruler known today as Pakal took the throne and began to restructure and rebuild the religious charter at Palenque. Pakal turned Palenque from a small Mayan village into a large city that had many roles within the Mayan empire (Aldana 2010:79). Part of Pakal's new religious charter was the remodeling of the Palace. One of the most important structures built in the Palace was named House E. House E was the only house built without a roof comb. It was built early in Pakal's rule, thus the significance of this structure is exemplified in its uniqueness. Many more houses were also built upon the Palace within Pakal's rule. These architectural additions identify how the culture changed from one in disorder to one that became a beacon of light to the Mayan empire. Therefore, I chose to digitally reconstruct the Palace in the religious center of Palenque through ArchiCAD (Figure 1), and I examined the interior layout for signs of cultural change.

Theoretical Approach

Before analyses are made, we must first discuss the anthropological theory behind this study. I utilized Spatial Syntax Theory as outlined in *The Social Logic of Space* (Hillier and Hanson 1984), to make the majority of my conclusions. Hillier and Hanson argue that the use of space defines a culture and society (Hillier and Hanson 1984:26). Based on this concept, I analyzed how space was used in the interior of the Palace in two specific time periods. Spatial Syntax Theory tells us that examining the alteration and adaptations of space, we can make inferences about how certain areas were used and the relationship between people residing in this Palace and those who were visitors to the Palace. In this study, the people who reside within the walls of the Palace will be referred to as the inhabitants, and those visiting will be referred to as the guests.

Inhabitants of the Palace have been assumed to have equal access to every room and every corridor. On the other hand, the guests are assumed to have less, more discrete, access within the Palace. This concept of inhabitant and guest is discussed by Hillier and Hanson in detail. They state that if we take two rooms in the Palace, we place an inhabitant in one and an unknown stranger in the other, the disposition of these two rooms can give us more information about the stranger (Hillier and Hanson 1984). For example, if that stranger were to walk down a corridor the inhabitant was also walking down, the unknown person is no longer a stranger but a visitor and thus, a guest in the Palace. Therefore, depending on which locations are accessible to guests, we can define how the Maya interacted with each other on a daily basis. Furthermore, by looking at the structure of the Palace from two differing political time periods, we can make inferences as to how these daily interactions may have evolved with cultural change.

Mapping Spaces in the Palace

The next step in analyzing the use of space required making a few mathematical calculations relating the amount of open space to the amount of paths between these spaces. To gather the data needed for the calculations, I took the layout of the Palace (Figure 2) and turned it into a graph by identifying all of the separate rooms and corridors within the structure. I then identified the rooms the Palace had before 621AD, and then considered the rooms present after 721AD. This chronological

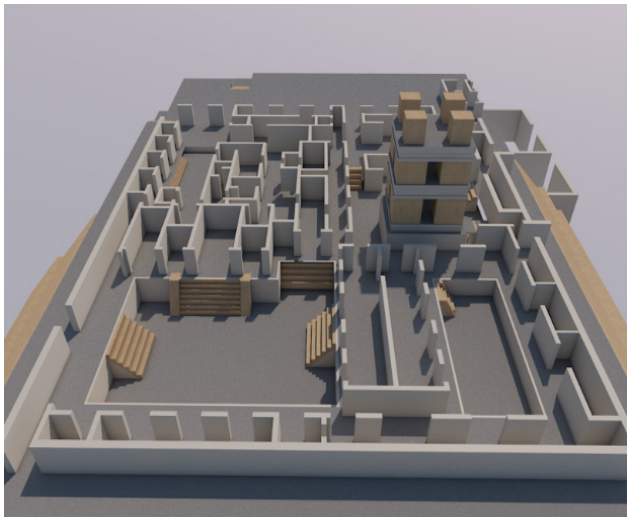

Figure 1. Reconstruction of the Palace. Originally, there would have been roofs on many of these structures but for the purpose of this study, the interior layout must be assessed.

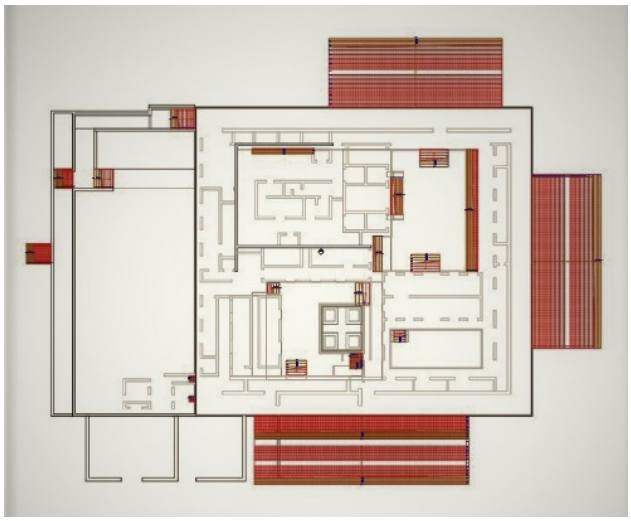

Figure 2. The Palace layout from the reconstruction. All of the white is seen as space and the red is seen as stairs.

order is found through deciphered hieroglyphs at the Palenque site. For every separate space in the Palace, I put a dot in the space to represent the entire area enclosed by walls. This dot is referred to as a 'node' in graph theory. Next, I drew a line between two nodes where there was a doorway leading from one room into the next (Figure 3). This line, sometimes referred to as 'edge', represents the most simplified path from one space into another. The graphs seen here are called gamma maps.

A justified gamma map is a representation of the Palace layout with respect to a single space. For example, Figure 4 shows a justified gamma map with respect to the main entrance of the Palace. Starting with this node at level one, we moved up one level and drew in every node that shared one edge with the first one. Then, for every node in level two, we move up to level three and drew in each node that shares one edge with every node in level two. Therefore, the node, or space, at the very top part of this justified gamma map is the space farthest away from our initial space at level one. This map is drawn in Gephi, a software for making calculations that cannot be done by hand. Four justified gamma maps were created in Gephi to compare and contrast different uses of space. For this study, I only considered maps starting with the exterior space. First, the graph of the Palace layout around 621 AD was drawn, and this graph included the three tunnels found extending to various parts of the Palace (Figure 4). Next, I drew the same graph but without the tunnels (Figure 5). My assumption is that the tunnels were only meant to be traversed by the rulers at Palenque since the tunnels found under House E contain imagery denoting Palenque's defeat by Calakmul (Aldana 2010:26-27). Therefore, I wish to compare the graphs that have full access to the Palace with those that do not. Henceforth, the next graph I drew consisted of the Palace layout as it was at 721 AD, including the tunnels. Finally, the last graph represents the whole Palace excluding access to the tunnels (Figures 6 and 7).

Calculating Results

The calculations following the construction of the gamma maps will help to identify if there was any cultural change between 600 AD and 800 AD. The spaces chosen were the ones that seemed important to analyze. The spaces chosen can be identified by color-coding in Figure 8. Relative Asymmetry (henceforth

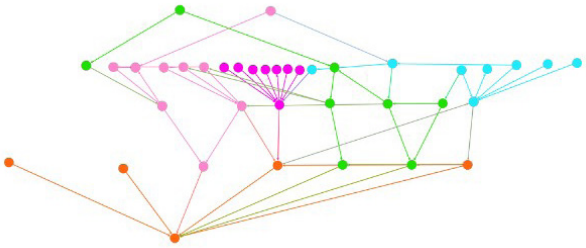

Figure 4. Justified gamma map for the Palace layout at 621AD, including the tunnels system.

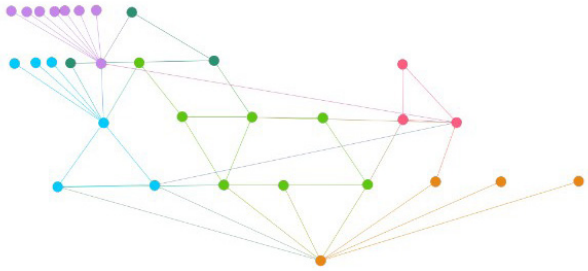

Figure 5. Justified gamma map for the Palace layout at 621AD, excluding the tunnel system.

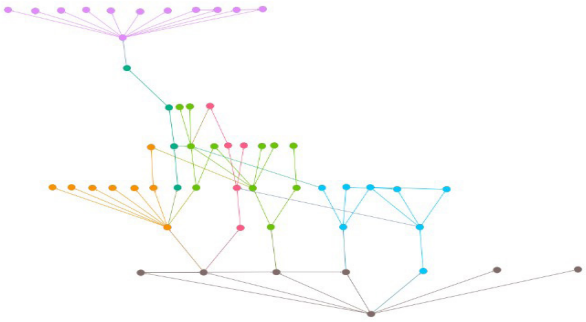

Figure 6. Justified gamma map for the palace at 721AD, including the tunnel system.

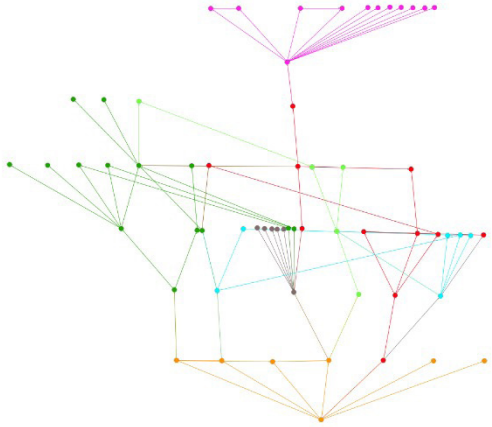

Figure 7. Justified gamma map of the Palace at 721AD, excluding the tunnel system.

RA) was the first aspect used to identify these spaces. RA is given by the formula *2 (MD-1)/(k-2)* where MD is the mean depth of a specific space and k is the total number of spaces in the graph. The mean depth represents the average of how far away each space is from the specific space being analyzed. For example, suppose the space being analyzed is in level one of our justified gamma map, then each line moving to a node in level two represents one space away from the original space. Then, any line going from each node in level two to another node that is not our original space being analyzed is two spaces away from that original space. This goes on for every node in the justified gamma map. RA can identify how well a particular space is integrated into the whole system of other spaces. In other words, RA can tell us how important any specific space is based on the distance to and from the other spaces around it. Unfortunately, due to technical problems, the RA values calculated in the software are not as accurate as I wished them

to be, because the value was rounded to the nearest whole number. However, the complete integration of the space into the system is calculated by simply taking the inverse of the RA value. Therefore, the integration of a particular space into the system, denoted by i, can be represented by $i=1/RA$. This gave much more accurate results than the RA value alone.

Lastly, the control value (E) for each of the selected spaces was calculated. Since the integration value is calculated in relation to every space within the Palace, the control value is calculated using only neighboring spaces. For example, as Figure 9 shows, suppose we have a central node representing a space with four edges leaving that node and going to four other nodes. Assign all of these nodes a value of one. Then, since the central node is connected to four other nodes, we partition the central node's value into fourths, and we add one fourth to each of the adjacent nodes. We do this for every node adjacent to the space we wish to analyze. Hence, the number we get is the control value. The higher the number, the more control that space has over its adjacent spaces. Therefore, using the integration and control value, we can identify how spaces in the Palace were used and how they may have changed over time.

Conclusion

RA and E values can be seen in Figure 10. These charts represent calculations done for the Palace around 621 AD with tunnels and without tunnels. Looking at the Tower Plaza, we can see the integration value decreases substantially from tunnel access to no tunnel access. Note that a high integration value indicates a space which integrates well within the system. Thus, the Tower Plaza seems to integrate better when there is no access to the tunnels. Also, the control value increases with no access to the tunnels, which means that the Tower Plaza seems to be more integrated and important when there is no access to the tunnels. Similarly, House E is better integrated into the system when there is no access to the tunnels but, as we would expect to see from this unique house, the control value increases dramatically once we have access

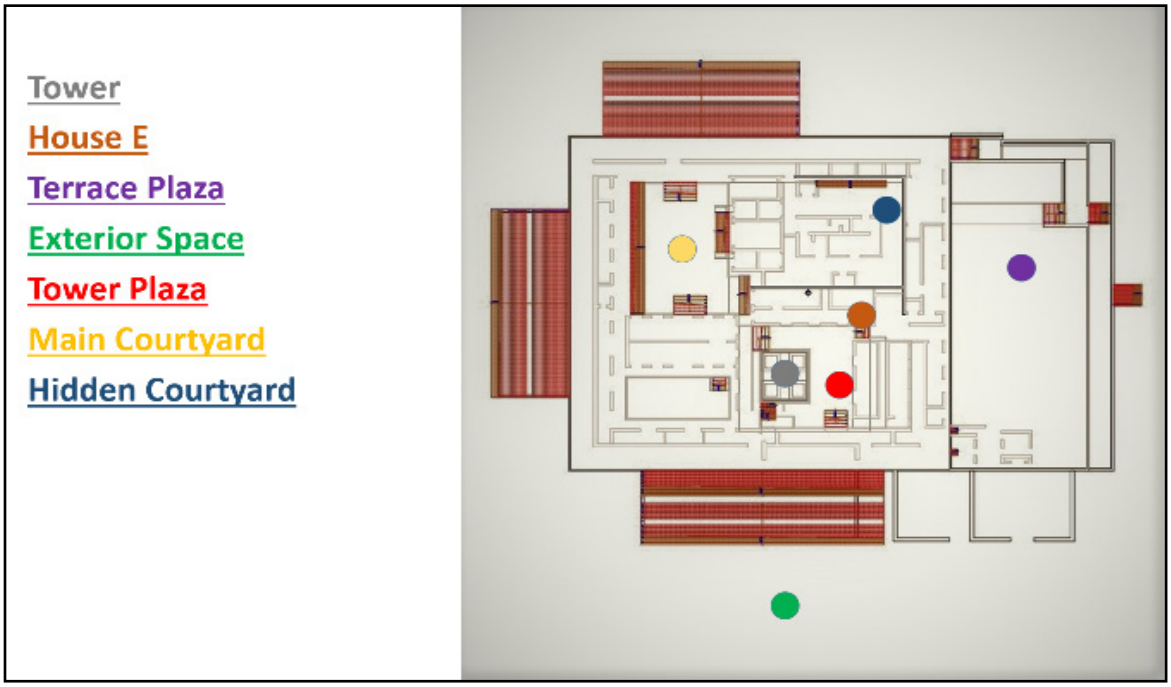

Figure 8. Areas of interest I have chosen to look at, color coded accordingly.

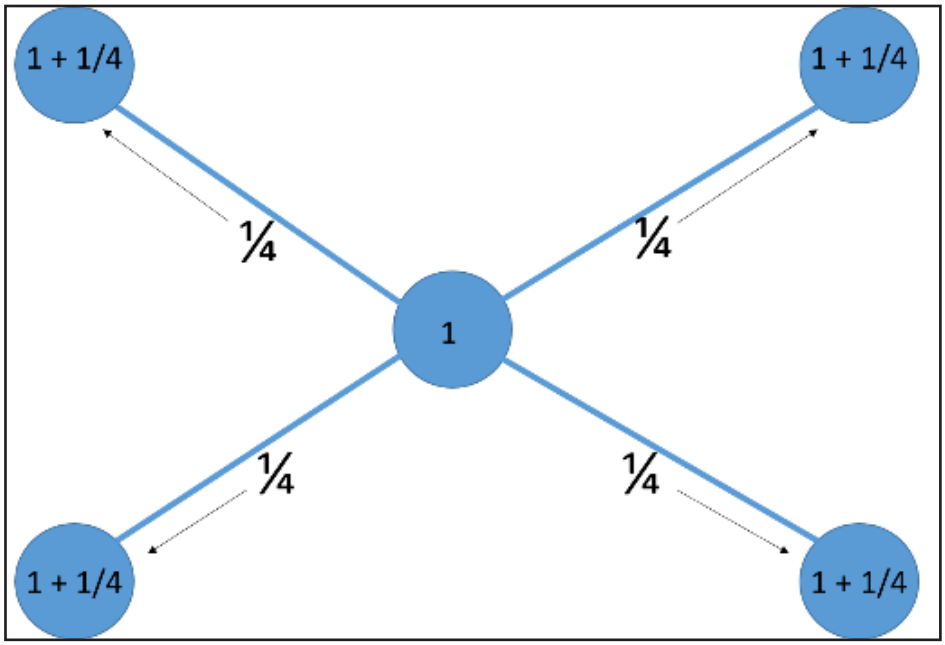

Figure 9. An example of how to calculate the control value for a central space is shown above.

to the tunnels system. Thus, House E is not as integrated with access to the tunnels, but it does have better control over adjacent spaces when access to the tunnels is given. The Terrace Plaza is like House E in that the integration falls when we have access to the tunnels, but the control value is increased. An important aspect to note about the exterior space is that, with no access to the tunnels, this space is more integrated and it has a higher control value. Hence, if guests were visiting this Palace, their entrance would provide them with control and integration with every space except the tunnels. This use of space could represent how guests may not have had access to the tunnels. The only difference with the Main Courtyard is a slight increase in integration. This could be because the Main Courtyard is not directly connected to the tunnel system.

Lastly, the area I refer to as the Hidden Courtyard has negligible changes within the control value but as a whole, this courtyard has the highest control values out of any other. These high control values may be directly linked to how tightly developed it is in the gamma maps. The Hidden Courtyard could represent an area of residence for inhabitants of the Palace. Interestingly, House E has the highest integration value of any other space within the Palace; this could further exemplify the importance and uniqueness of the House.

My findings regarding the values for the Palace layout after 721 AD are shown in Figure 11. Similar to the layout in 621 AD, the integration and control values in 721 AD act almost exactly as they were previously. The use of space in this way can tell us that, when modeling the rest of this Palace, the inhabitants here did not want to change any control or integration aspects between spaces. Therefore, the guest to inhabitant interaction within the Palace would have remained somewhat the same. The only space that changed from the previous layout was the Main Courtyard. In the Main Courtyard, the integration value lowers with access to the tunnels. This tells us that, if guests do not have access to the

tunnels, this space is more integrated for them. A more integrated public courtyard such as this one follows the integration of Palenque into the Mayan empire. As Palenque rose to power under Pakal's rule, it became more known to the Mayan world. Thus, Palenque may have had more visitors from neighboring cities. With more visitors, more public announcements and events would be held. Change in integration value within the Main Courtyard could represent that this was a place for increased visitation by guests. Lastly, this second set of calculations as a whole differ from the first set in the fact that House E is no longer the space with the best integration. For the justified gamma map excluding tunnels, the highest degree of integration is now found within the Terrace Plaza and the Hidden Courtyard. With the inclusion of tunnels, the Hidden courtyard is the most integrated out of all the spaces tested.

As mentioned above, there are minimal differences in terms of raising and lowering integration and control values in response to the tunnel accessibility. Looking at the control values throughout this time tells us a different story. Starting at the Tower Plaza, the control value has increased dramatically from 621 AD to 721 AD, representing more control to the adjacent spaces. Similarly, the Hidden Courtyard, Terrace Plaza, and Main Courtyard control values have increased through time, whereas the Exterior Space and House E both dropped in their control value. The higher control values found in the courtyards by 721 AD could represent higher amounts of guest visitations and more important guest-inhabitant interactions. Therefore, the layout of these spaces shows a potentially important cultural movement out of a disordered society and towards a great, important city in the Mayan empire.

In conclusion, a Spatial Syntax Theory analysis of the use of space within the Palace at Palenque, Mexico, revealed an important cultural change from 600 AD to 800 AD. The Palace layout at 621 AD highlights the significance of the integration of House E within the Palace. In addition, guests seem to be constricted to particular courtyards and houses

	No Tunnels			Tunnels	
Location	**i**	**E**		**i**	**E**
Tower Plaza	0.1	1.53		0.076923077	1.26
House E	0.125	1.2		0.1	1.7
Terrace Plaza	0.071428571	2.04		0.0625	2.26
Exterior Space	0.111111111	3.83		0.090909091	3.57
Main Courtyard	0.076923077	4.09		0.083333333	4.09
Hidden Courtyard	0.071428571	8.31		0.071428571	8.29

Figure 10. Results from calculating the integration (i) and control (E) values for the Palace at 621AD.

	No Tunnels			Tunnels	
Location	**i**	**E**		**I**	**E**
Tower Plaza	0.090909091	3.833333		0.076923	3.583333
House E	0.090909091	1.142857		0.083333	1.642857
Terrace Plaza	0.166666667	2.166667		0.1	2.333333
Exterior Space	0.125	3.666667		0.1	3.116667
Main Courtyard	0.1	6.083333		0.090909	6.083333
Hidden Courtyard	0.166666667	9.7		0.142857	9.7

Figure 11. Integration (i) and control (E) values for the Palace at 721AD.

with no access to the tunnel system. As the courtyard control values increase through time, guest access to the courtyards appears to increase through time, but they would not have access to the tunnel system. This increase in accessibility seems to be directly related to the cities' increase in size and importance in the Mayan empire between 600 AD and 800AD. Therefore, the use of space in the Palace resembles how Palenque moved from a small village into a city with great influence over the Mayan empire.

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About the Author

Alex Gregory is a senior archaeology and mathematics double major with interests in GIS, spatial theory, geomorphology, and landscape archaeology. After graduation he will be assisting Dr. Tim Messner at the archaeology field school this summer, take a year off to gather field experience and to look into graduate programs.

The Hidden Costs of Longevity: Alzheimer's Disease and Human Evolution

Lucy Condon

Chronological Framework

The Paleolithic period began about 2.5 to 2 million years ago and was distinguished by the first use of technology by humans. Many environmental changes occurred during this period that eventually led over time to the Agricultural Revolution and the domestication of certain animals, which allowed people to settle in larger communities. The human lifespan averaged about 25 years during the Paleolithic time period. Since then, the average lifespan has grown exponentially, as has the occurrence of degenerative diseases. In the United States today, 15.25% of the population is aged 65 or older. With such an aged population comes an increased likelihood of age-related disease, such as dementia and Alzheimer's.

The first documented case of early-onset dementia, eventually recognized as Alzheimer's Disease (AD), was described in 1906. A woman showed many signs of dementia and age-related brain deterioration, such as loss of memory, confusion, and eventually, an inability to function in her home. She was admitted to a hospital and died four years later, even more severely disoriented. Studies done by Alois Alzheimer showed her brain was severely affected by plaques and neuronal degeneration, indications of what is now known to be Alzheimer's Disease.

"Alzheimer's is not the result of a single genetic disorder but the combination of multiple possible abnormalities that may result in pathways to Alzheimer's disease."

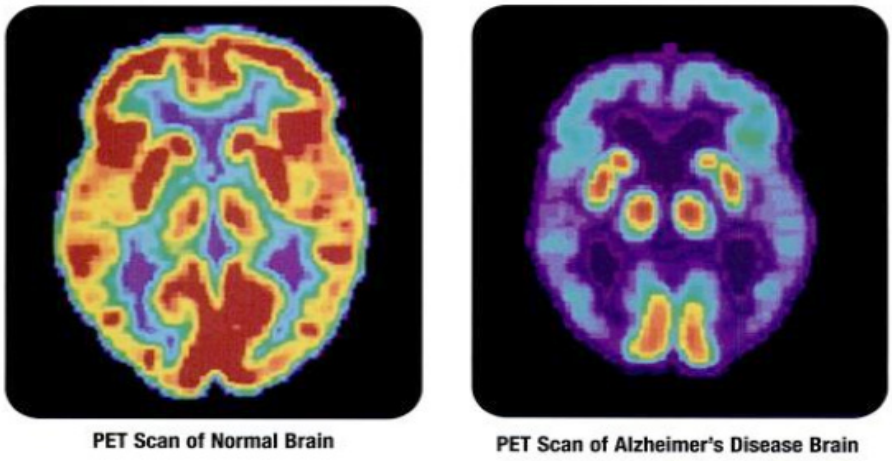
Signs and Symptoms

Clinical diagnoses for Alzheimer's Disease can be made based on behavioral and cognitive symptoms. Deficits in memory, attention and language are all parts of the natural aging process, but are magnified in Alzheimer's Disease. Specific cognitive and behavioral symptoms of Alzheimer's include confusion about the past versus the present, trouble expressing oneself, an inability to process information, mood swings, hallucinations, and trouble moving easily without aid. A study done by neuroscientist Catharine Joachim involved 150 cases of clinically diagnosed Alzheimer's (diagnosed based on cognitive and behavioral changes), submitted by 100 different physicians, and included a diverse range of patients. She compared the clinical diagnoses with neuropathological diagnoses (based on specific changes in the brain that define true Alzheimer's), and found an 87% agreement. In order for someone to receive a true neuropathological diagnosis of AD, their brain must show signs of amyloid plaques and neurofibrillary tangles—the two defining features of AD (Jorm, 1990). One can display cognitive and behavioral changes due to the natural aging process that are not related to Alzheimer's or dementia.

Criteria for a neuropathological diagnosis of Alzheimer's Disease is applied using a sliding age scale. A patient at age 45 would need to display fewer neuronal changes to signify Alzheimer's Disease than somebody aged 75. That is, symptoms which may be part of a normal aging process in the elderly could constitute Alzheimer's Disease in someone much younger. This scale may be modified based on clinical history.

Etiology and Transmission

Alzheimer's and dementia are characterized by loss of brain cells. There are a few theorized causes for this loss of brain cells; these include genetic predispositions and environmental influences. The first genetic hypothesis is the Normal Aging Hypothesis, which holds that Alzheimer's is a degenerative disease occuring naturally with brain aging. If this were true, then if every human lived long enough, they would develop Alzheimer's, as the predicted risk for Alzheimer's Disease would asymptote at nearly 100%. The increase in occurrence shows an age-dependent genetic mechanism,



Left. Scan of a healthy adult's brain. Right: Scan of an adult's brain affected by Alzheimer's Disease (Photo courtesy of Health and Human Services Department, National Institutes of Health, National Institute on Aging)

however, which would mean Alzheimer's could only be considered a disease if it occurred in its early-onset form. This pattern is hard to discern though because people rarely live much past 90 years of age. The second genetic hypothesis for the cause of Alzheimer's Disease in humans is the Autosomal Dominant Hypothesis, which holds that Alzheimer's Disease is passed down genetically from parents to child. If this were the case, then by age 90, risk of occurrence would asymptote at 50% of the population developing Alzheimer's Disease. Again, because a vast majority of the human population does not live to see 90, this pattern is difficult to confirm.

Familial early-onset Alzheimer's due to genetic causes shows involvement of three different genes. These genes include the amyloid precursor protein, presenilin 1, and presenilin 2. Because of the inclusion of three genes, there could be hundreds of possible abnormalities. This reflects the reality of Alzheimer's, which is not the result of a single genetic disorder but the combination of multiple possible abnormalities to varying extents that may result in pathways to Alzheimer's Disease. Brain aging affects many of these pathways and contributes in critical ways to late-onset forms of the disease, with some premature elements contributing to the triggering of early-onset forms of Alzheimer's Disease. Genetics is a major contributor to the development of Alzheimer's Disease, but does not offer a full account of the onset of the disease. For example, in monozygotic twins, who develop from the same zygote fertilized by the same sperm, one twin may develop Alzheimer's while the other may not, proving some contribution of environmental factors in the cause of AD.

Environmental involvement in Alzheimer's Disease is explained by the Aging and Environmental Interaction Theory. This theory holds that trauma, stress from life experiences, toxins and even infectious agents can all contribute to the loss of neurons in the brain resulting in abnormal long-term health outcomes. Environmental factors may not directly cause neuropathological symptoms of AD, but can magnify the involvement of these symptoms in old age. For example, the Parkinsonian Dementia Complex of Guam is a degenerative disease specific to isolated Pacific populations. In normal Parkinsons, the toxic chemical MPTP selectively destroys brain cells. In Guam, consumption of the Cycad Seed is thought to cause similar effects on the brain as this seed is thought to contain several neurotoxins that produce similar results. Similar to environmental theories of other degenerative diseases, the Parkinsonian Dementia Complex of Guam is patterned by a sudden appearance of symptoms following an extensive

interval in which no signs of the disease are manifest. The loss of neurons in the brain due to environmental factors would not necessarily have any immediate effect, but as natural cell death occurs with age, the accumulation of the loss of neurons may produce degenerative neurological disorders that accompany aging, such as Alzheimer's and Parkinson's.

The human central nervous system loses cells naturally with age and additionally with environmental experiences. The brain has the capability to rewire those lost connections so other cells can compensate for the functions that may have otherwise been lost. This process is called regenerative neurology and is linked to synaptic plasticity, which "can be achieved in three ways: physical exercise, environmental enrichment, and chronic antidepressant treatment. [It] is increased by stimulating the growth of new synapses and (more rarely) new neurons" (Whalley 2015: 345). However, with the natural loss of synapses and neurons that attend aging, it becomes harder for neurons to satisfy the functions necessary to maintain normal cognition. Alzheimer's Disease works with very similar mechanisms. In AD, loss of cells in the basal forebrain puts stress on other parts of the brain to make up for the lost ability to function. This process is the same in natural aging, but the exhaustion of the compensatory process brings on more than just natural aging deficits in cognition; it magnifies those to the point of Alzheimer's Disease. Experiences early in life causing stress and loss of neurons may be a catalyst to bring on compensatory exhaustion earlier in the aging process.

Developmental biology helps explain the combination of genetics and environmental factors contributing to the development of degenerative diseases. Developmental biology holds that specific genes are coded for or programmed by DNA, but can be triggered to act in certain ways based on environmental influence. In biology, the instructions of the program are coded internally (as DNA), and gene expression is controlled internally with opportunities for the environment to influence (or better, as in the terminology of Eva Jablonka and Marion Lamb, to make an educated guess about the future environment) a set of innate instructions that will determine when each developmental gene is switched on or repressed (Whalley 2015).In Alzheimer's, certain genes may predispose patients to the development of degenerative symptoms that may not be triggered unless acted upon by certain environmental stressors. These stressors could include trauma from head injury causing neuronal damage, stresses associated with poverty or poor parenting, and neurotoxins from the environment similar to the Cycad Seeds that cause Parkinsonian Dementia Complex of Guam.

"Developmental biology holds that specific genes are coded for or programmed by DNA, but can be triggereed to act in certain ways based on environmental influence."

Pathogenesis and Mechanisms

Alzheimer's is distinguished by both amyloid plaques and neurofibrillary tangles, in addition to the natural loss of synapses through aging. Amyloid are protein fragments occurring naturally in the brain and are normally broken down. The Amyloid hypothesis explains that early-onset Alzheimer's is distinguished by mutations in the APP gene, which cause sheets of fibrils, called beta amyloid fragments, to form and accumulate. Aggregates of these abnormal protein fragments come from a mutation on chromosome 21 in the APP gene, which is the amyloid precursor protein. Because of the mutation in the gene, the amyloid becomes toxic such that the brain is unable to break these fragments down. The brain's inability to decompose amyloid fragments causes plaques: a "sticky buildup which accumulates outside nerve cells or neurons" (Myers 2006: n.p.). Amyloid fragments occur naturally in the human aging process, but are distributed more widely in Alzheimer's Disease. Similarly, in Alzheimer's the natural occurrence of loss of synapses is heightened. Of the many pathways to Alzheimer's, many share processes that increase amyloid formation or impair

its clearance from the brain.

The other hallmark of Alzheimer's Disease is the presence of neurofibrillary tangles in the frontal and temporal association regions of the brain. These are twisted fibers found in brain cells and are predominantly made up of the protein tau. Tau forms small structures called microtubules that are necessary in the brain for the transportation of nutrients. Alzheimer's causes certain microtubules to form abnormally, causing the structure to collapse and lose its function.

Lastly, Alzheimer's is marked by a magnification of the natural loss of brain cells that comes with aging. Loss of neurons in the brain cause a decrease in brain size. By the end of the aging process, about 30-40% of white matter and 10% of grey matter in the brain has been lost. This loss is thought to be caused by the death of myelin sheaths, which are what gives white matter its particular color. The loss of brain cells and myelin sheaths in aging and in the developmental process accounts for impaired brain function and, therefore, decreasing cognitive and behavioral abilities.

Genes are programmed in ways that allow us higher cognitive abilities and incredible mental function. One mutant gene does not necessarily cause a brain disease; rather, the combination of mutations amongst genes can lead to abnormalities causing pathways to Alzheimer's disease. In other words, "a mutant gene codes for an abnormal protein that leads to a sequence of molecular events that lead eventually to a disease" (Whalley 2015:14). The idea of Alzheimer's as a single entity, rather than a combination of pathways is confuted by this because in order for Alzheimer's Disease to occur, many different mutations may occur.

Darwinian Evolutionary Perspectives: Why?

Alzheimer's Disease is unique to humans. Although its treatment and prevention are not yet medically possible, we can trace with some degree of accuracy the evolutionary origins of the disease. Learning and memory in both humans and in animals occurs by strengthening connections between neurons in the brain; this is the biological basis of memory. There are many theories that explain how this strengthening occurs. Such theories include the "sprouting [of] new nerve endings, increasing connectivity between nerve cells, and increasing sensitivity of nerve cells to 'read' the messages from the connecting cells" (Whalley 2015:27). Naturally, with the loss of brain cells through aging, connections between neurons are lost or weakened, drastically decreasing learning and memorization cognitive abilities. So why, if cognitive aging is universal, is Alzheimer's specific to humans?

The brain cortex is extremely developed in humans and has complex structures and connections. "Human cortical cells are much more diverse and make more intricate local networks of connections" (Whalley 2015:15). The development of human brain complexity is a result of a longer gestation period than other animals. For example, in rats it takes six days for the basic structure of the cranial cortex to form. In comparison, the human cortex takes roughly seventy days in the womb to develop properly. Cortical regions of the brain in which these connections occur are, indeed, present in animals such as non-human primates, but the evolution of specific regions of the brain has created a distinctly human ability to reason abstractly.

The human brain has evolved rapidly since the Paleolithic time period and has made us cognitively superior to other animals. The neurofibrillary tangles that are a distinct marker of Alzheimer's disease appear only in the frontal and temporal association areas of the brain. The frontal and temporal lobes are two areas which have evolved quickly. The frontal lobe is closely linked with higher cognitive abilities, such as completion of tasks involving connecting different types of data, whereas the temporal lobe is linked to hearing, listening, and comprehension. The frontal lobe and prefrontal cortex are both related to abstract reasoning—the type of thinking that sets us apart from animals. The ability to use both the evolved temporal and frontal lobes is unique to humans. Distinguished cognitivity allows humans to reason by using data from the external world and from an ability to think abstractly. The ability to combine several types of data enables humans to make moral judgments and to forecast the behavior of others. Occurrence of neurofibrillary tangles is extremely rare in animals, and in the very rare occurrence, these are structured significantly

differently than human tangles. And although brain aging does occur in animals, even primates do not show signs of dementia or Alzheimer's Disease. This is because the genes that cause abnormalities in pathways leading to Alzheimer's Disease and dementia occur predominantly in regions of the brain that have evolved specifically in humans —regions accounting for higher cognitive ability.

A study done by Chet Sherwood, at the George Washington University, took the MRI results of the aging cortices of 87 humans and 69 chimpanzees. The maximum age of the chimps in this study was 45. None of the 69 chimps showed signs of age-related decrease in brain volume anywhere near similar to age-related decline in brain volume in humans. Other studies, using chimps up to age 59, show eventually chimps do display age-related brain volume decline, but not enough to support any argument that chimps undergo brain changes similar in nature to humans. Brain volume decline is distinguished by intensive loss of connection between nerve cells, followed by neuronal loss and destruction of neuronal circuits. There is no evidence that synaptic loss in animals could lead to such neuronal death and progression to Alzheimer's Disease. Evolutionary changes in brain structure and function have led to one pathway toward Alzheimer's Disease in humans. Human brain evolution is just one of the ways humans are programmed to adapt to changing environments. This ability to adapt has provided the means for humans to prosper and reproduce more efficiently. Although, historically it has taken generations for humans to adapt, the species has done so successfully.

> *"Many benefits of breastfeeding were lost as a result of socioeconomic and cultural shifts, including the fact that the fatty acids the baby receives are associated with better retention of mental ability and, possibly, lower rates of dementia."*

The Paleolithic lifespan lasted an average of 25 years. The prehistoric diet included 3,000+ plants and fruits, lean game, and many different types of fish (Whalley 2015). The beginning of agriculture marked the beginning of the rapid change of diet and increased lifespan in humans. Before the advent of sustained agriculture, humans were nomadic foragers. With the invention of agriculture came the ability to stay in one place, and thus the formation of larger communities. Urbanization facilitated industrialization and, within centuries, human diets shifted from plants, fruits and lean game turned to the factory worker's diet of grains and sugars high in energy but low in nutrients. The human diet evolved so rapidly there was insufficient time for the body to adapt. Radical transformation of diet has led to increased heart disease, cancer, and other chronic diseases.

The mid-1800s were characterized by war and industrialization. Families were larger than they are today. In 1800, for example, the average working class family produced seven children. During this period, when the men went away to war, it was up to women and children to go to work in order to provide for the family. The need for additional providers may explain why the number of children in a family was much greater in the 1800s than it is today. Children were seen as property and as sources of income. If a child could work to make money, they would be sent to do so in a factory. Wages were low and working conditions onerous. Families laboring under these conditions were poorly nourished. With unionization, child labor laws came into place, and the advent of universal public education as well as with advances in medical knowledge, helped to increase life expectancy, which by the close of the 19th century in the United States was 39.4 years old (Roser 2018).

Additional changes occurred in the human diet as a result of widespread human conflict during the early 20th century. When men went away to war and women took their places in factories, they

were not given the opportunity to breastfeed their children. Even prior to this shift in labor, breastfeeding had begun to be seen in a negative light, particularly among the middle and upper classes. Many benefits of breastfeeding were lost as a result of the socioeconomic and cultural shifts, including the fact that the fatty acids the baby receives are associated with better retention of mental ability and, possibly, lower rates of dementia. Life expectancy in the United States and other industrialized countries, however, continued to skyrocket throughout the 20th century. Changes impacting increasing longevity included "breakthroughs like germ theory, antibiotics, and widespread vaccination, as well as major public-health advances in sanitation and regulation, neutralized many long-leading causes of death" (Pinsker 2015: n.p.). By 2011, the average life expectancy in the United States was 78.7 years old.

"Maybe we find ourselves at an evolutionary moment where human biology is not yet apace with evolutionary necessity."

Biological and cultural adaptability in humans are inextricably linked. As humans have adapted both to environmental and cultural changes we have benefitted biologically, but also experienced increasing negative effects. Senescence is defined as "a biological process (or processes) in which, following a phase of development and attainment of maximal reproductive potential, there is an age-associated physiological degeneration which adversely affects vitality and function and leads to an increased risk of death" (Gluckman 2016:105). In other words, senescence describes an evolutionary trade-off. Population biologist Robert Sokal conducted an experiment on flour beetles that lasted 40 generations. The results of the studies showed when the beetles were bred to reproduce earlier and more often in life, they also aged much more quickly. This proves that some genes are coded for early benefits despite the costs appearing later in life. Similarly, biologists Michael Rose and Brian Charlesworth conducted an experiment on fruit flies. In this study, however, the fruit flies were bred to reproduce later in life. The results showed they lived longer but produced less offspring. This study proves that some genes are coded for later benefits with their own compromises —this time in the amount of offspring produced. Genes that predispose people to Alzheimer's Disease may have been selected for the benefits they provide earlier in the human-lifespan. In evolutionary terms, those benefits may have been of greater value at a time when human lifespans were shorter. Maybe we find ourselves at an evolutionary moment where human biology is not yet apace with evolutionary necessity. Until we find means of preventing and/or curing Alzheimer's Disease, human brain adaptability may seem to us to have come at a very high price.

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About the Author

Lucy Condon is a sophomore majoring in anthropology from Waterloo, Ontario. In addition to her studies, Lucy plays both hockey and softball for SUNY Potsdam. After graduation she will be attending graduate school in Ontario with a focus in cultural anthropology. This is her first published work.

A Year Abroad: Europe Through the Eyes of an Anthropologist

Rebecca Barrett with photographs by the author

I was lucky enough to spend my junior year of college abroad in Paris, France, as well as traveling throughout Europe. I had only traveled abroad a couple of times before this, but I never stayed anywhere long enough to be able to really immerse myself in the culture and try to live like the locals do. As a budding anthropologist, I was excited to start conducting my own "fieldwork." However, the first thing that I experienced when arriving in Paris was not the food or the better way of life I assumed I would find; it was culture shock. Culture shock is talked about in Anthropology classes as being a good first tool to use when in an unfamiliar situation or culture, but I was not prepared for the real thing. During the first couple of weeks of being abroad, I found myself sinking quickly into culture shock and homesickness. I would get frustrated easily when things did not work out the way I thought they would, and I would get annoyed at myself when I could not order food at the patisserie without resorting to English. During these few weeks, I noticed different intricacies that make Parisians unique. Some were broad and fairly well-known – like how they are carefree and will spend hours at a café – and some that were much smaller – like how Parisians do not smile with their teeth, and that there is always someone there to help you if you need it. Soon, I got into the swing of things and the feeling of culture shock faded. I met new friends, improved my French dramatically, and was fortunate enough to visit other places in Europe. I was able to witness the cultural differences in Western European and Eastern European countries firsthand, as well as in Western and Islamic society, while also eating the delicious local food. My time abroad not only highlighted the beautiful differences in customs and culture all over the world, but also showed me how to handle culture shock and be alone in different foreign environments where nothing is familiar.

ABOVE RIGHT:
View of the Eiffel Tower from the Musee de L'homme, a museum dedicated to the study of humans.

ABOVE LEFT:
Breathtaking view on top of the Aiguille du Midi located in the French Alps.

RIGHT:
The ruins of the temple of Athena Pronaia in Delphi. Excavations have show that before the temple was erected, this used to be a cult site likely dedicated to Gaia.

LEFT: My friend Devon and I enjoying the view in Egypt while wearing the traditional male headwear.

FAR LEFT: Trying the local cuisine of bread dumplings, pork, and sauerkraut in Prague. Eating local food is one of the eentral experiences for any anthropologist.

CENTER: Eating the traditional food kushari in Cairo Egypt. It's made with rice, noodles, and lentils topped with spicy tomato sauce.

RIGHT: Delicious kadaifi pastry in Crete. It's made with shredded pastry, ice cream, caramel, and almonds

ABOVE LEFT: Pena Palace located on top of a giant hill in Sintra Portugal.

ABOVE RIGHT: The beautiful Peles castle in Transylvania, Romania

LEFT: The tower bridge in London. While this bridge has become a cultural landmark in London, when it was first constructed many people were critical about it including artist Frank Brangwyn who stated, "A more absurd structure than the Tower Bridge was never thrown across a strategic river."

A Comparative Analysis of Canine Dimorphism and Social Groups

Taleea Tomlinson

Introduction

According to biological anthropology, culture and biology interplay with one another, and both affect the individual body. This concept is known as biocultural evolution and can be seen in both human and non-human primates (Larson 2010). Amongst primates, social group dynamics speak to the complexity of primate cultures. Previous research shows there is a direct correlation between these social group dynamics and the presence of canine dimorphism in primate groups. Canine dimorphism is a type of sexual dimorphism that refers specifically to the size difference in canines amongst males and females. Males and females tend to have different canine sizes due to sexual selection—the way animals select their sexual partners.

When primates choose partners, they employ different reproductive strategies. Males tend to use aggression and fighting as a way of earning access to females (Larson 2010). Large canines can be a way of showing intimidation and can aid in fighting and competitions. These reproductive strategies amongst primate groups have resulted in differences in canine sizes between the sexes, as has been noted by biological anthropologists. The trend often observed is that males have larger canines and females have smaller canines. The smaller size of female canines is due to the lack of a need for physical competition to gain access to males. Sexual dimorphism and sexual selection also relate to social grouping; if a social group has a high number of individuals, there is typically more competition among males for access to females. However, in primate groups practicing pair bonding or monogamy, we see little competition for different mates as they mate with one partner at a time or with one partner for life.

In analyzing these different social and reproductive patterns, it becomes apparent that primate social groupings could directly affect the presence and intensity of canine

Taxon	Common Names	Social Group	Accession #
Prosimians			
Nycticebus cuacang	slow loris	Monogamous/Solitary	24-8427
New World Monkeys			
Cebus apella	tufted capuchin	One male- multifemale	24-8629
Alouatta palliata	mantled howler	Multimale-multifemale	24-8611
Old World Monkeys			
Rhesus macaque	rhesus macaque	Multimale-multifemale	24-8696
Papio hamadryas	hamadryas baboon	One male- multifemale	24-8744
Apes			
Hylobates klossii	white handed gibbon	Monogamy	24-8778
Pongo pygmaeus	Bornean orangutan	Solitary	
Pan troglodytes	common chimpanzee	Multimale-multifemale	
Gorilla Gorilla	western lowland gorilla	One male- multifemale	
Homo sapiens	human	Monogamy	

Table 1. Primate species used in the study. Social group types are from Redmond (2011).

Common name	UpperM	UpperF	LowerM	LowerF
Slow Loris	6.8	6.2	6	5
Gibbon	17.5	15.2	8	9.1
Capuchin	11.4	8.1	11.5	8.1
Macaque	20.1	9.5	14.5	9.1
Howler	12	8.9	8.1	6.4
Baboon	32.4	13.7	27.5	12.6
Orang-utan	33.1	18.3	33.1	18.1
Chimpanzee	20.6	17	18.3	14.5
Gorilla	37.3	17	27.4	19.9
Human	14	10.6	12.6	9.7
Min	6.8	6.2	6	5
Mean	20.5	12.5	16.7	11.3
Max	37.3	18.3	27.5	19.9

Table 2. Upper and lower canine measurements.

dimorphism (Nystrom and Ashmore 2008; Larson 2010). One of the research questions in this project is whether there is in fact a correlation between social groups and canine dimorphism amongst non-human and human primates. This project also seeks to provide a better understanding of what trends can be analyzed by looking at the lower and upper canines of both males and females of different primate groups. The current literature on canine dimorphism in primate species lacks indications of whether the upper or lower canine have been measured; there are a few published findings on the upper canine or lower canine measurements, but not both. This study compares the upper and lower canines in primates and aims to infer their social grouping based on those results.

Materials and Methods

This study analyzed ten primate species which included a prosimian, New World Monkeys, Old World Monkeys, Apes, and Humans (Table 1). The species analyzed were Nycticebus cuacang, Hylobates klossii, Cebus apella, Rhesus macaque, Alouatta palliata, Papio hamadryas, Pongo pygmaeus, Pan troglodytes, Gorilla gorilla, and Homo sapiens. Their common names are also provided.

A digital caliber was used to measure the upper and lower canines of males and females to the nearest millimeter (mm). Only the left canines were measured as the left side of the mouth is typically more sexually dimorphic than the right. The canines were measured from the alveolar bone to the apex, or tip, of the crown. The measurements were then recorded in an Excel Spreadsheet. The formula used for the calculations of canine indices was CI = M/Fx100, whereby the length of the male canine was divided by that of the female canine, then multiplied by 100. The means, minimum, and maximum ranges were calculated for the sample and for each primate group.

Results of the Sexual Dimorphism Analysis

The canine measurements taken from the upper and lower jaws of both males and females, including ranges and the sample means, are provided in Table 2. Canine dimorphism indices (CI), sample ranges, and means are provided in Table 3. The overall pattern of canine dimorphism amongst the primates studied and their mean canine dimorphism indices show that there is a tendency for males to have larger canines than females (Figure 1). The primates with the highest ratio of canine dimorphism are Rhesus

macaque, Papio hamadryas, Pongo pygmaeus and Gorilla gorilla. For instance, the male gorilla shows an upper canine length of 37mm and the female shows an upper canine length of 27mm.

The primates with the lowest ratio of canine dimorphism were Nycticebus cuacang, Hylobates klossii, Cebus apella, Pan troglodytes, and Homo sapiens. For example, Gibbons have the lowest index for canine dimorphism at 88 mm, compared to the average index of 148 mm.

Upper and Lower Canine Analysis

Analysis of the upper and lower canine lengths showed an interesting trend. The upper canines tended to have a longer length than lower canines with some exceptions. The mean figures for upper and lower canine sizes show that the upper canines are larger than their lower canine counterparts across almost all species (Figure 1). This trend is particularly visible in the male Lowland Gorilla, Slow Loris, White Handed Gibbon, Macaque, Howler, Hamadryas Baboon, Common Chimpanzee, and Humans. For example, the Gibbons' (H. Klossi) upper canines are nearly twice the size of the lower canines (Table 2). In other primates, such as the Orangutan and the Capuchins, there is no size difference between the upper and lower canines. In the Capuchins, both the male's and female's upper and lower canines had nearly the same measurements. For example, the male Capuchin's upper and lower canines were measured at 11 mm and 12 mm. The female Capuchin's upper and lower canines both measured at 8 mm. In the Bornean Orangutan (P. Pygmaeus), the male's upper and lower canines were measured at 33.1 mm, and the female's upper and lower canines were measured at 18.3 mm and 18.1 mm respectively. Interestingly, only the female Lowland Gorilla's (G. gorilla) lower canine was longer in length than her upper canine. The female's upper canine measures at 17 mm, and the lower canine measures at 19.9mm. This is not seen in the male gorilla.

Social Group and Canine Sexual Dimorphism

The species of primates whose canines were measured fell into three different categories of social groups. These social groups were monogamous/solitary, one-male multifemale, and multimale-multifemale. The primate species that fell into the monogamy/solitary groups include the Slow Loris, Bornean Orangutan, White Handed Gibbon, and the Humans. The primate species that belong to the one-male multifemale are the Tufted Capuchin, Hamadryas Baboon, and Western Lowland Gorilla. The primate species belonging to the multimale-

#	UpperM	UpperF	Upper CI	LowerM	LowerF	Lower CI
Slow Loris	7	6	110	6	5	120
Capuchin	11	8	141	12	8	142
Howler	12	9	135	8	6	127
Macaque	20	10	212	15	9	159
Baboon	32	14	236	28	13	218
Gibbon	18	15	115	8	9	88
Orang-utan	33	18	181	33	18	183
Chimpanzee	21	17	121	18	15	126
Gorilla	37	17	219	27	20	138
Human	14	11	132	13	10	130
Min	7	6	110	6	5	120
Mean	**21**	**13**	**164**	**17**	**11**	**148**
Max	37	18	204	28	20	138

Table 3. Measurements of the canines and indices.

multifemale group are the Mantled Howler, Common Chimpanzee, and Rhesus Macaque. When social groups and canine dimorphism are considered, an interesting trend can be observed. The primates belonging to monogamous/solitary social groups tended to have a smaller degree of canine dimorphism, with the exception of the Bornean Orangutan. For example, the Slow Loris male had an upper canine length of 7 mm and a lower canine length of 6 mm. The female Slow Loris had an upper canine length of 6 mm and a lower canine length of 5 mm (Figure 1).

Unlike the primate species who engaged in monogamous/solitary social groupings, the primate species in the one-male multifemale groups presented a high amount of canine dimorphism. For example, the male Hamadryas Baboon's canine length, for both the upper and lower canines, nearly doubles the length of the females' upper and lower canines. However, there seems to be an outlier. Despite the fact that Bornean Orangutans are solitary foragers, their canines follow the trends seen in primates belonging to one-male multifemale social group. The male's upper and lower canines are nearly twice the size of the female's upper and lower canines. As for the trend in the multimale-multifemale social groups, it seems the group has a lower degree of canine dimorphism, but not as low as the monogamous/solitary social groups (Figure 1).

Discussion

The differences in length in the lower and upper canines of various primate species can be seen in Figure 1. In monogamous groups of primates, canine dimorphism amongst males and females is low (Table 2). The Slow Loris, both male and female, presented a canine length of approximately 6 mm. For the Gibbons, their canine dimorphism shows a slight difference in degree between males and females by a few millimeters. Lastly, for Humans, the canine dimorphism index is at 130 mm, with the average canine measuring in at 148 mm. This could be related to the species' reproductive strategies. The upper canine tends to be larger and longer than the lower canine in most primate species included in this study, with the exception of Orangutan, female Gorilla, and Capuchin. For example, the female Gorilla's upper canine is shorter in length (17 mm) than her upper canine (19.9 mm). This could be the result of an incorrect measurement, or it could have been a particularity of the individual measured. More research is needed to determine whether this measurment is an abnormality, or whether it could represent a trend amongst other female Gorillas.

The Orangutan and the Capuchin canines

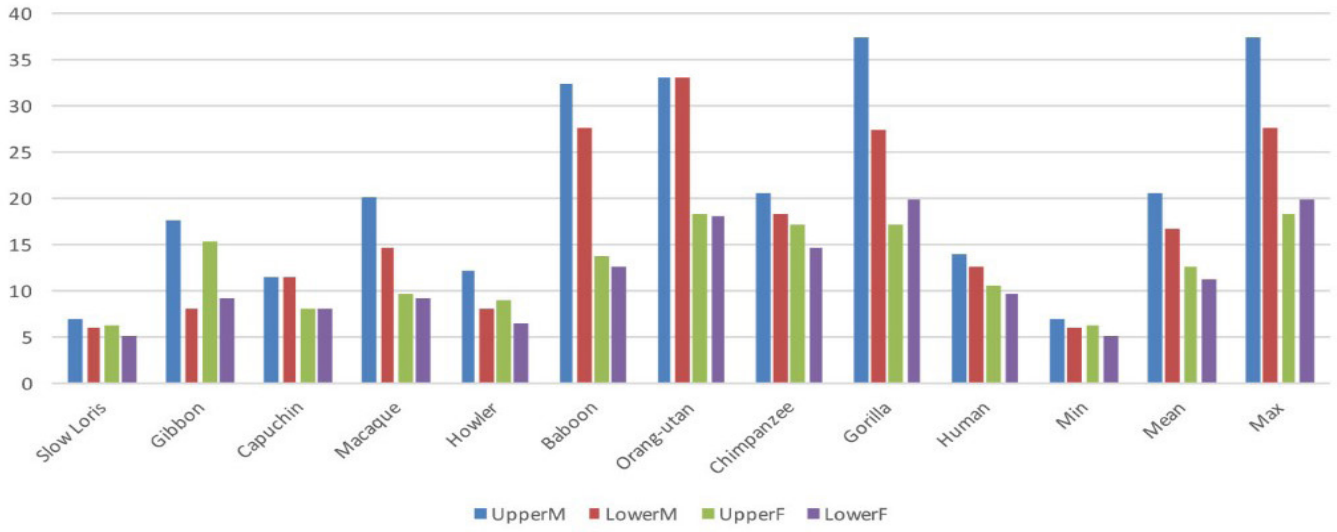

Figure 1: Comparison of upper and lower canine length between males and females of primate groups.

measured the same length. For instance, in the Orangutans, the upper and lower canines in males measure the same at 33.1 mm, and in the females, the upper and lower canines measured to 18.1 mm and 18.3 mm.

Further research needs to be conducted on Gorillas, Orangutans, and Capuchins. Orangutans, who are solitary foragers, follow a pattern of canine dimorphism typically found in one-male multifemale groups. The male Orangutan's canines in this study proved to be nearly twice the size of the female's canines (Figure 1). The Gorilla, who belongs to a harem group, exhibited male canine lengths of nearly 10 mm longer than the female's. This size difference suggests the Orangutan must have a reproductive strategy unique from the other monogamous groups of primates. Since it is known that reproductive strategy might not be the only factor affecting canine dimorphism, it may be suggestive of canine dimorphism's relation to territoriality instead. Orangutans only mate every seven years, possibly explaining why they have a canine index at 183 mm, 40 mm higher than the average index. This could further support the idea that their canine size might be more heavily impacted by territoriality rather than social grouping or reproductive strategy. Overall, Orangutans tend not to be very territorial, although male Orangutans display more territoriality than female orangutans. This behavior, while subtle, could directly impact canine dimorphism in the Orangutan, since males' canine length is twice as the females'. According to a study done by J. Michael Plavcan and Carl P. Van Schaik (1992) on intrasexual competition and canine dimorphism in anthropoid primates, "Predation also has a marked effect on canine dimorphism, in that savanna-dwelling species consistently show greater canine dimorphism than other species, all other factors being held equal." (Playcan and Schaik 1992:1).

"Unlike the primate species who engage in monogamous social groupings, the primate species in the one male-multifemale social groups present a high rate of canine dimorphism."

Conclusion

This preliminary analysis of ten different species showed that social groupings may not correlate with canine dimorphism as neatly as expected. It seems many different factors are working together to shape patterns of canine sexual dimorphism in different primate groups. A larger scale research project centered on this topic could possibly help us gain a better understanding of not only the different expressions of canine dimorphism, but also how nuances of biocultural evolution present themselves in subtle yet significant ways.

As illustrated above, further research needs to be done in the study of canine sexual dimorphism amongst different primate species. Such research would consist of using a larger sample group, including other primate families such as platyrrhine monkeys, catarrhine monkeys, catarrhine apes, and prosimians. Testing the upper and lower jaws of those groups alongside the baculum, or penis bone, of the primate would also prove to be beneficial in future studies.

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About the Author

Taleea Tomlinson is a sophmore anthropology and archaeological studies double major at SUNY Potsdam. Taleea's interests are primatology, human diversity, and African studies. Taleea would like to work in the field of paleoanthropology and pursue a Master's Degree in Biological Anthropology. This is her first publication.

Advice Column

Tips for Pursuing Undergraduate Research at SUNY Potsdam

Emma Williams

As a student at SUNY Potsdam I wanted to ensure I made the most of my undergraduate education. Unlike numerous undergraduate anthropology and archaeology programs in the United States, Potsdam offers undergraduates two funding opportunities for pursuing undergraduate research: the Kilmer grant and the Presidential Scholars program. The Kilmer grant program offers funding for which a student achieving a 2.5 GPA or greater may apply. Presidential Scholars is a program students are invited to apply to if they have a 3.5 GPA or higher.

At the end of my sophomore year at Potsdam, I was invited to apply for the Presidential Scholars program. This provided me an opportunity to pursue my interests and design a project in which I mummified rats to compare natural mummification to artificial/anthropogenic mummification techniques. The artificial mummifications I performed were Egyptian and Incan. Over the course of my project I have experienced what it entails to conduct undergraduate research. I have three pieces of advice to share with students who are planning to pursue, or are currently conducting, undergraduate research:

Do not worry if parts of your project change! The process of research is flexible and malleable. The exact plan and outline you create for your project will likely change over time. Do not let the changes scare you, embrace them and let them guide you. Adapt your project to meet the challenges you face. My initial project plan was to mummify multiple rats using the mummification technique protocols I developed. For various reasons, I ended up only mummifying one rat using each technique. Additionally, the project I designed was limited by lack of space and equipment. Due to this, I decided to focus on the anthropological and cultural aspects of my research. You may find, as I did, that there are limits to what you can achieve in an undergraduate research project. Despite the twists and turns your research may take, by the end of your project you will be proud of what you have accomplished!

Believe in your project! There will be times during your research when you come across an incredible and poignantly written dissertation or published, graduate level research. You will likely find these either while reading for interest or finding sources for your project. I often found myself comparing my undergraduate research to the graduate level research and consequently, becoming overwhelmed by how 'little' and 'insignificant' my project seemed.

At those times, remind yourself that your project is important to your growth as a student and will benefit your future. Do not become overly intimidated by the professional writings you encounter. Instead, let them inspire you. For those of you who plan to attend graduate school, let them provide a look into what your future may hold. I also suggest using them as a model when writing the final report of your research!

Push yourself out of your comfort zone! Undergraduate research will challenge you to pop your personal bubble. There may be times when you need to ask for guidance or advice from a professor or person outside of the Anthropology Department or the College. This can be uncomfortable, even scary, but allow yourself to seek help. It takes strength to ask for help in life, and when it comes to research, seeking guidance and other's opinions or ideas can open your mind to things you never thought of.

I highly recommend attending and presenting your research at conferences as a way to push yourself out of your comfort zone and into the world of sharing your work with others. It allows you to learn, grow, and share your passions with other people who have similar interests. Presenting at conferences allows peers, colleagues and others in the field, to provide support and constructive criticism in a professional setting. For example, I presented my research at the Bioarchaeologists' North Eastern Regional Dialogue and the Experimental Archaeology conference in Colonial Williamsburg, Virginia. Despite the anxiety I experienced while preparing my presentations, the conferences provided me invaluable opportunities. Both conferences were fun, educational and inspiring. They gave me a taste of what it is like to contribute to anthropological and archaeological knowledge. Each conference allowed me to become more accustomed to presenting research in front of an audience. The knowledge gained from these experiences will certainly benefit me in the future when attending graduate school and presenting at conferences.

Undergraduate research is a fantastic opportunity and a unique experience. I hope these tips lead anyone uncertain about applying for the Kilmer grant or developing a Presidential Scholars project to do so. I wish all students who pursue research the best of luck with their projects!

About the Author

Emma Williams is a senior with a double major in Archaeology and Anthropology. She is a SUNY Potsdam Presidential Scholar and she holds several awards from the Anthropology Department, including the prestigious I. Thomas Stone award, which is presented to the anthropology major who has produced the most professional example of anthropological original research or writing.

The *Collegiate* Profile: Dr. Susan Stebbins, Sociocultural Anthropologist

Samuel Conti and Amber Rounds

Dr. Susan Stebbins is a professor of cultural anthropology here in SUNY Potsdam's Department of Anthropology, and we are sad to say that she will be leaving us this semester. However, we are happy to say she made it to retirement! Congratulations Dr. Stebbins!

Dr. Stebbins began her career teaching public school in Richmond, Virginia. After ten years in Virginia she decided it was time for something new. Having always had a fascination with mythology, she began working with an archaeological society in Virginia as she made plans to go to graduate school. "Originally, I was going to go to graduate school to study Archaeology," she explained. "But, I ended up going into Anthropology instead." While getting her Master's in Education at Virginia Commonwealth University, she took a class on Mesoamerican Archaeology where she was shown little figurines resembling children turning into jaguars. "I'm asking questions like, 'well, what do they mean?' 'Why are they called jaguar babies?' " she told us, "and [the professor] says, 'those aren't the kinds of questions Archaeologists ask; those are the questions anthropologists ask.' So, when I actually went to graduate school at SUNY Albany, I decided to focus on anthropology instead of archaeology."

Dr. Susan Stebbins (Photograph courtesy of Dr. Stebbins).

Her choice was confirmed during graduate school at SUNY Albany. About one of her Archaeology classes at Albany, she says with a chuckle, "I like the field work; I don't like the lab work." So, she chose to continue pursuing Anthropology.

While still a student at the University at Albany, Dr. Stebbins began teaching classes in Anthropology and Women's Studies as well as working a full-time job teaching for the Girls' Club of America. "I was a graduate student who was basically adjuncting. I wasn't making a whole lot of money and human services with kids can be a real burnout job when working with a lot of at risk kids," she explained, "so, after five years, that got a bit old." As she finished up her degree, she began looking for work elsewhere.

"I really didn't think I'd be a college professor," she explained. "I really thought I'd be going into some applied field. But, I applied for a job here [at Potsdam] and I came and got the job and I really liked the area, so I came and I moved." She began working for SUNY Potsdam immediately after finishing her degree, and turned in her dissertation "two weeks before classes started."

While working at Potsdam, Stebbins has taught classes focusing mainly on Native American topics. Some classes include Native America, Magic, Religion and Witchcraft, as well as Anthropological Theory, Senior Seminar, and Professionalism. She also has a book published through SUNY called, *Native Peoples of North America*, as well as several articles about representations of Native Americans in popular culture and movies, such as Cowboys and Aliens and The Searchers. She also has a book in the works about Native American women directed towards young middle school aged children. "This book is not about Pocahontas or Sacagawea," she told us. "I teach classes about Native American women, and so I'm familiar with a lot of other women and women from the 20th and 21st centuries who have had a huge impact on their communities. So, that's what the book is going to be about."

In addition to this, Dr. Stebbins has begun research on missing and murdered Native American women —a topic getting attention in Canada but not in the United States. She also plans on volunteering some of her time towards media consulting about Native American issues as well as issues concerning health, age and ageism, and gender.

The aspects of her career Professor Stebbins is most proud are all of the ways she has influenced her students. "There [are things] I've done with students that I still remember and I've had them tell me that they will remember. For instance, ... I took a group of students to the southwest and we visited many native communities and we went to archaeological sites ... in Chaco Canyon in New Mexico. We were camping out and I wasn't even in the tent, and we got like five or six inches of snow. And so, the story is that Mike Whiting who did a lot of the preliminary stuff and got the equipment together had to go dig me out of the snow! And over the years, the [story of how much snow] that we got grew. I was just covered in snow. By the time everybody graduated in was like six inches."

Her adventures with her students are best summed up by what one of her students told her about a trip to an old civil war fort in Oswego. She told us, "after he graduated he came and found me and he said, 'I just want you to know, that I don't think I'll remember anything that I learned in college, but I'll remember that trip.' "

To the aspiring anthropologist, Dr. Stebbins has these words of encouragement, "I'm going to quote one of my heroes …, Joseph Campbell. He was not an anthropologist; he studied mythology. He taught at San Francisco State University. What Dr. Campbell used to tell his students was "Follow your bliss" If you don't like what you're doing, change. [Don't just do] what makes you happy but [do]what gives you some sense of fulfillment. When I was younger ... when I was in a good place, I would have these dreams about these beautiful houses where one room led to another and it was just beautiful, with lots of light and gardens and that kind of thing. And, when I wasn't in a good place, I would wake up in the middle of the night in a cold sweat... So, if you start having those dreams where you're waking up in the middle of the night in a cold sweat, you're not in a good place. You need to be thinking about what it is you could be doing; [how can] you get to the place where you're having the good dreams? For me the big houses with lots of light means this is where you're going to find more things to learn, more things to do, and new experiences."

Speaking with Dr. Stebbins was such a joy. Her energy and passion for her students was obvious. Congratulations, Dr. Stebbins, on your retirement. You will be missed.

About the Authors

Samuel Conti is an Anthropology major with a minor in Museum Studies. This is his first year on the *Collegiate Anthropologist*'s editorial staff and he is thrilled to be a part of it.

Amber Rounds is a junior anthropology and archaeological studies major with a minor in Native American Studies. She attended this past summers' field school at the John Brown Farm State Historic Site in Lake Placid, New York. She was recently accepted into the Presidential Scholars Program at SUNY Potsdam where she will be experimenting with the progenitors of crops associated with the Eastern Agricultural Complex. This is her second year editing for the *Collegiate Anthropologist*.

How-to column

Building a Day of the Dead Altar

Logan Kneaksern

In the fall 2017 Language, Magic, and the Supernatural course with Dr. Lydia Rodriguez, students learned about Día de los Muertos, the Day of the Dead, a well-known Mexican holiday that celebrates and facilitates the moving on of the dead to the next life. Playing a pivotal role in this process is the altar, created uniquely by those close to the deceased for the individual they hope to help pass on. To build such an altar, however, it is important to understand the cultural and religious significance of the surrounding holiday and the altar itself.

The tradition of Día de los Muertos has its roots in pagan Mesoamerican and European Christian beliefs. When Christian missionaries arrived from Europe with Hernan Cortes in February of 1519, they set about Christianizing the native Mexicans, who were primarily ruled by the Aztecs (Dovas 2007). Their efforts only began to take effect after the Spaniards defeated the Aztecs in war in 1521 (Dovas 2007). To expedite this process, they made Mexican holidays seem the same as Christian holidays. Christians related Día de los Muertos to the Christian holiday known as, All Saints' Day, a celebration of all Christians who died and went to heaven. Missionaries were eventually successful in Christianizing Central America, resulting in the creation of the syncretic holiday known as Día de los Muertos. A syncretic holiday is one being characterized by the combination of different beliefs or practices (Merriam-Webster 2018). Following this change, when the altars for Día de los Muertos were created, symbolism from both Christianity and the older pagan religions of Mesoamerica were used.

Día de los Muertos' altars serve a special purpose on this holiday. On Día de los Muertos, it is thought the spirits of those who died in the past year pass on to their next life (Stein 2016). The altar helps them in this process. Everything on the altar is thought to either help the spirit find the altar, energize or protect the spirit for its journey, or help purify the soul so it may spend as little time in purgatory as possible before passing into heaven (Stein 2016).

The significance of a Día de los Muertos altar is its uniqueness. Each altar is made for a specific individual, and what is placed on the altar is meant to reflect upon and draw in the spirit of that individual. Altars typically have three levels representing heaven, purgatory, and Earth. Sometimes only two levels are used, with the third being the ground. The table of the altar is often covered in brightly colored cloth, typically yellow, which was considered the color of death by many Aztec religious traditions (Robelo 1951).

Two key elements that can be found in most altars are water and candles. Both are purifying. Water would be placed on the altar in an open bowl, seen as an agent to wash away the impurities of the soul. Similarly, a lit candle is thought to burn away the soul's impurities, while also serving as a beacon to the spirits of the dead, beckoning them to the altar (Brandes 2006).

Pictures of saints, as well as the deceased — if available — are ubiquitous on altars for Día de los Muertos. The pictures of saints help guard the spirit on its journey to the afterlife. Similarly, marigolds and skeletal imagery adorn most altars, helping to guide the spirit. The marigold is a symbol of death in Mesoamerica, and their pungent smell is thought to help the spirits find the altar. They also help reflect the lingering concept of death, staying bright and beautiful for several days after being cut before finally withering away (Robelo 1951). Skeletal imagery known as *calaveras* or *calacas* helps to identify an altar for what it is. Skeletons are symbols of death in numerous cultures, though in Mesoamerica they are seen as raucous, jovial figures rather than the grim harbingers of doom they are often considered to be in European traditions (Robelo 1951).

The final piece of an altar is also one of the most important, as it is in all aspects of life: food. Food is thought to give the spirit energy and is abundantly placed on the altar by family and loved ones. The spirit consumes the essence of the food on their altar and becomes invigorated for the coming journey (Stein 2016). Common foods found on altars are often sweet and energizing. Liquor is almost universal, as are a variety of fruits and sweets. Pan del muertos, or the bread of the dead, and sugar skulls are also highly pervasive food items found on Day of the Dead altars (Stein 2016).

The absolute, single most important aspect to

LEFT: Hand-made sugar schools.

CENTER: Day of the Dead Altar created by students in Language, Magic, and the Supernatural, featuring photopraps of loved ones, their favorite beverages, food, candles.

RIGHT: Yellow marigolds and hand-made Pan de Muertos.
(Photographs by Dr. Lydia Rodriguez)

remember if one wishes to create a Day of the Dead altar however, is not any of this. While all the elements above are traditional and ritually required for the altar, what is by far more important is the individual to whom the altar is dedicated. Everything about the altar is built to reflect this person. Every detail is built to the subject's tastes. This is particularly relevant when it comes to the choice of food upon the altar. To properly draw in the spirit of the one who is dead, and to cleanse it and help it along its way into the next life where it may spend eternity in bliss, the altar must be built for them with the care and attention of those who loved them. This aspect of preserving and symbolizing individuality is what is truly behind the tradition of creating Día de los Muertos altars.

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About the Author

Logan Kneaskern is a sophomore archaeological studies and geology major with a minor in anthropology. His interests lie in medieval archaeology. This is his first year editing for the *Collegiate Anthropologist*.

Collegiate Anthropologist Timeline

Emily Cox

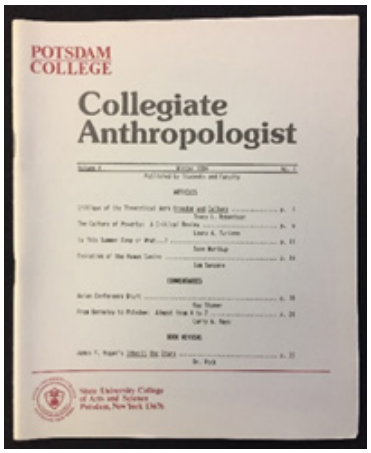
1979


The Collegiate Anthropologist

Contents

The first Collegiate Anthropology was published in the fall of 1979. The original issue was more faculty based, but by the 3rd issue it became a venue for featuring of faculty and student's work.

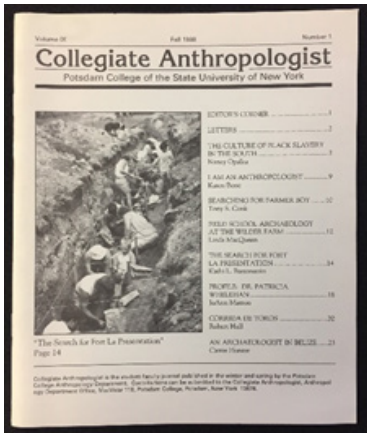
The journal was originally produced twice annually, one journal published every semester.


POTSDAM COLLEGE

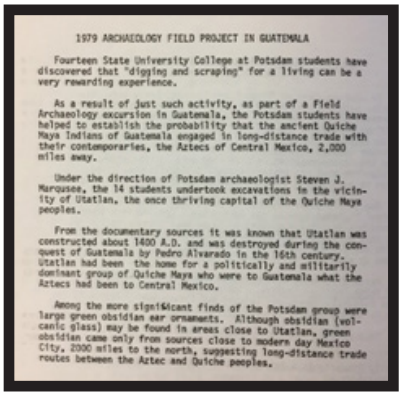
Collegiate Anthropologist

1984

They did not have page making computer programs or zerox machines until the early 90's.


Collegiate Anthropologist

Potsdam College of the State University of New York


1979 ARCHAEOLOGY FIELD PROJECT IN GUATEMALA

Fourteen State University College at Potsdam students have discovered that "digging and scraping" for a living can be a very rewarding experience.

As a result of just such activity, as part of a Field Archaeology excursion in Guatemala, the Potsdam students have helped to establish the probability that the ancient Quiche Maya Indians of Guatemala engaged in long-distance trade with their contemporaries, the Aztecs of Central Mexico, 2,000 miles away.

Under the direction of Potsdam archaeologist Steven J. Marquese, the 14 students undertook excavations in the vicinity of Utatlan, the once thriving capital of the Quiche Maya peoples.

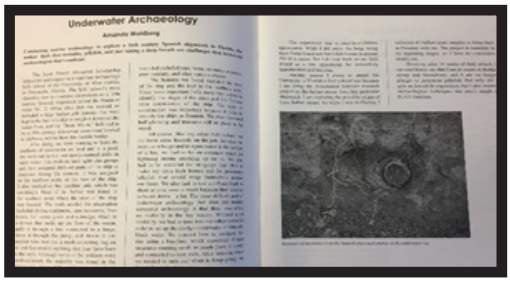
From the documentary sources it was known that Utatlan was constructed about 1400 A.D. and was destroyed during the conquest of Guatemala by Pedro Alvarado in the 16th century. Utatlan had been the home for a politically and militarily dominant group of Quiche Maya who were to Guatemala what the Aztecs had been to Central Mexico.

Among the more significant finds of the Potsdam group were large green obsidian ear ornaments. Although obsidian (volcanic glass) may be found in areas close to Utatlan, green obsidian came only from sources close to modern day Mexico City, 2000 miles to the north, suggesting long-distance trade routes between the Aztec and Quiche peoples.

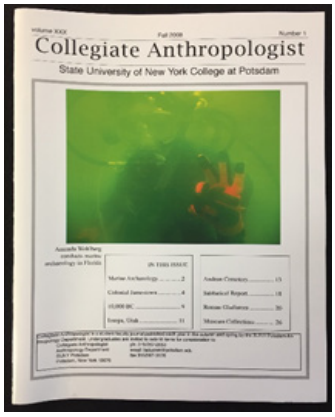
The original copies were written on typewriters for 20 years.

1988

With Dr. Kruczek-Aaron came numerous changes to the journal in terms of formatting and appearance. She wanted to change the overall look of the journal with the addition of a glossy binding and colored pictures. In order to do this, the editors used their budget to publish one issue

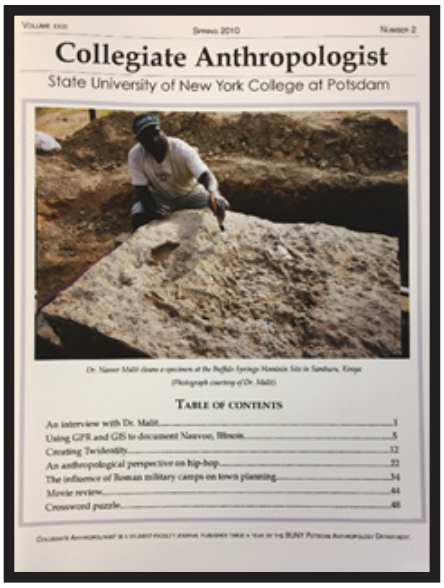

Underwater Archaeology

2008

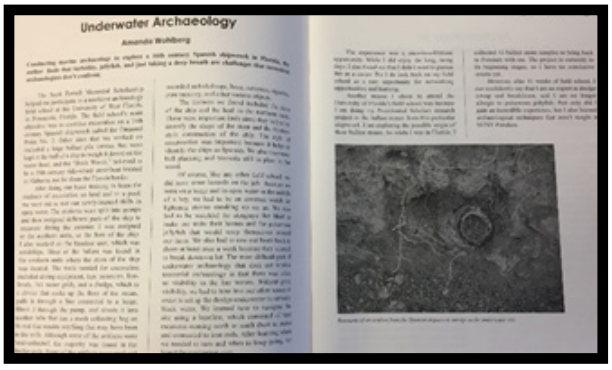

Collegiate Anthropologist

State University of New York College at Potsdam

Dr. Omohundro was the original founder of the magazine and ran it until Dr. Kruczek-Aaron took over in fall of 2008. The journal was always student run and most features have remained the same with a few changes yearly. Some features not present today include crossword puzzles and cartoons.



2010



Transition to an annual journal was officially made in 2013-2014. The journal had a glossy binding and color for the title page. Eventually, there was enough money annually to have colored pictures featured in the journal.

2014

Dr. Kruczek-Aaron, "The Collegiate Anthropologist has always reflected the goals of the department and showcased what the department offers to undergraduate students in the department."

Dr. Omohundro, "The articles and pieces in the journal have always been examples of how students at Potsdam went above and beyond the expected class work into the realm of sharing and collaborating research to answer questions."

2017

Collegiate Anthropologist Editorial Team

SUBMISSION INSTRUCTIONS

Anthropological research papers, personal reflections or journals on internships and study abroad programs, photo essays, and generally anything pertinent to the study and experience of anthropology is welcomed for submission. Papers should be submitted in electronic form (.doc or .docx please) to collegiateanthropologist@yahoo.com. Electronic submissions on cd-rom are also welcomed via mail to the following address: *Collegiate Anthropologist*, Anthropology Department, SUNY Potsdam, Potsdam, NY 13676.

630007
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Palace complex and Temple of Inscriptions, Palenque, Mexico (Photograph by Dennis Jarvis).