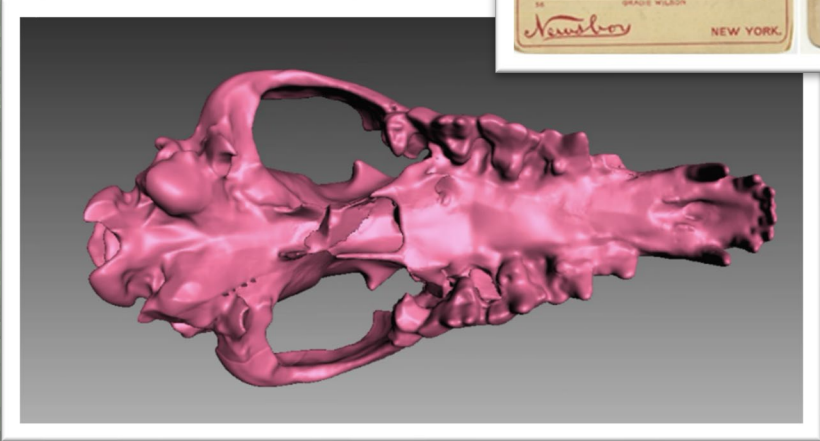


# Furthering Perspectives

Volume 11, 2022





## Editor's Note

Anthropology is the study of Humanity; of us. How we behave, what we think, what we were like in the past, and why we look like we do. The human experience is varied and incredibly complicated. As such Anthropological research reflects a plethora of topics and perspectives. This issue of *Furthering Perspectives* pays homage to the dynamic study of humanity by presenting a diverse group of articles written by undergraduates, alumni, and graduate students from Colorado State University. Displaying a mixture of original research and literature review, *Furthering Perspectives 2022* will explore geopolitical issues, and themes of trauma and healing. It will analyze primate bone structure, and the effects of mass media in the digital age.

## Acknowledgments

Myself and the rest of the Anthropology Graduate Student Society thank every student, reviewer, and faculty member that supported the authors in their writing endeavors. Without these valuable efforts, this volume would not be possible.

*We acknowledge, with respect, that the land we are on today is the traditional and ancestral homelands of the Arapaho, Cheyenne, and Ute Nations and peoples. This was also a site of trade, gathering, and healing for numerous other Native tribes. We recognize the Indigenous peoples as original stewards of this land and all the relatives within it. As these words of acknowledgment are spoken and heard, the ties Nations have to their traditional homelands are renewed and reaffirmed.*

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### Background

From "Eating Disorders" by Natalie Freeman

### Upper

From "Eating Disorders" by Natalie Freeman

### Lower

From "Palaeonictis occidentalis Reconstruction" by Jenny Lee



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## Eating Disorders: The Evolutionary Disparity Between the Human Body and Society

Natalie Freeman

### Abstract

Medical experts and researchers work tirelessly to treat medical conditions as they manifest within individuals, but these solutions often only manage symptoms. We have identified proximate causes of disease but have failed to acknowledge their root causes. Evolutionary medicine looks past individual diagnoses, delving deeper than the proximate causes to unearth the biological bedrock, or the ultimate causes, of modern human diseases through the analysis of human evolutionary adaptations. This paper investigates the prevalence of eating disorders, specifically anorexia nervosa, and bulimia nervosa, as an evolutionary disparity between human physiology/psychology and our contemporary behaviors within our social environment. This paper proposes a shift in existing perspectives on these diseases. Internalized beliefs surrounding desirability result in disordered eating behaviors, that have negative mental and physical health consequences. The Intrasexual Competition Hypothesis is accurate in the sense that there is a competition to be viewed as a desirable person. However, what is deemed desirable at this moment is heavily spurred on by western cultural beliefs that thinness for women in particular increases desirability. This paper attempts to identify and address the ultimate cultural and biological causes of eating disorders, while providing potential solutions both on the individual and societal scale to effectively treat this mismatched disease through the application of medical anthropology

### Introduction

Humanity is experiencing an unparalleled era of healthcare. Within the United States, healthcare developments include technological innovations, medicine manufacture, and increased availability.<sup>1</sup> Despite these life-saving advancements, humans are also experiencing excessive amounts of chronic health conditions.<sup>2</sup> These conditions negatively affect the lives of millions globally but may have been entirely nonexistent in ancestral hominin populations. They only became a prominent concern in communities in recent generations, when increased rates of these health conditions caught the attention of medical experts.<sup>3</sup> Lower mortality rates are being replaced with higher rates of morbidity.<sup>4</sup> For example, less people are dying from starvation compared to a hundred years ago.<sup>5</sup> However, people experience disordered eating patterns more

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<sup>1</sup> Lieberman, Daniel E., *The Story of the Human Body*. New York: Pantheon, 2013, 26.

<sup>2</sup> Lieberman, *The Story of the Human Body*. 5.

<sup>3</sup> Lieberman, *The Story of the Human Body*. 7.

<sup>4</sup> Lieberman, *The Story of the Human Body*. 8.

<sup>5</sup> Joe Hasell and Max Roser (2017). Our World in Data. "Famines." *Online: OurWorldInData.org*.



frequently than they did in the past.<sup>6</sup> Although researchers seek to treat the symptoms of these medical conditions, professionals have failed to acknowledge their root causes. Through the analysis of human evolutionary adaptations, evolutionary medicine looks past proximate causes to determine the ultimate cause of modern human health conditions. This paper investigates the prevalence of eating disorders in relation to the Western social environment: how contemporary human behaviors within this setting are misaligned with evolved human physiology.

## Eating Disorders

Before delving into this evolutionary perspective, the elements that define and differentiate eating disorders must be outlined. Eating disorders share the defining characteristic of abnormal and disordered eating behaviors. Three categories described in this paper, anorexia nervosa, bulimia nervosa, and binge-eating disorder, are characterized by unique behavioral patterns. Anorexia nervosa manifests as the obsessive preoccupation with preventing weight gain and losing weight through extreme dieting, food restriction, excessive exercising, and the abuse of diuretics or appetite suppression medication.<sup>7</sup> Those suffering from bulimia nervosa also exhibit a preoccupation with weight and obsession with weight loss but will overeat and self-induce vomiting frequently in addition to restricting food intake and abusing diuretics and appetite suppressants.<sup>8</sup> Binge-eating disorder contrasts anorexic and bulimic behaviors. Individuals suffering from binge-eating disorder tend to overeat in an uncontrolled manner, consuming large amounts of food within a brief period regardless of if the individual is hungry or not.<sup>9</sup>

Anorexia nervosa and bulimia nervosa are the focus of this paper. The motivation behind these disorders is the same: a preoccupation with losing weight and maintaining an extremely low body mass. Shared psychological symptoms include an obsession with weight, compulsive behavior, social isolation, poor self-esteem, hyperactivity, anxiety, depression, and an aversion to food.<sup>10</sup> Physical effects of these disorders include extreme weight loss, low weight, dehydration, fatigue, dizziness, slow heart rate, brittle hair and nails, bruising, irregular or absent menstruation, low body temperature, and low blood pressure.<sup>11</sup> Extreme cases often cause irreparable mental and physical damage and even result in death. Due to the similarities between the motivations and symptoms of anorexia and bulimia, this paper argues that these two patterns of disordered eating stem from the same evolutionary adaptation.

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<sup>6</sup> Saloni Dattani, Hannah Ritchie, & Max Roser. (2021). Our World in Data. "Share of population with an eating disorder, 2017." Seattle, United States: Institute for Health Metrics and Evaluation.

<sup>7</sup> "Eating Disorders." Mayo Clinic. February 22, 2018. <https://www.mayoclinic.org/diseases-conditions/eating-disorders/symptoms-causes/syc-20353603>.

<sup>8</sup> "Eating Disorders."

<sup>9</sup> "Eating Disorders."

<sup>10</sup> "Eating Disorders."

<sup>11</sup> "Eating Disorders."

Anorexia nervosa has one of the highest mortality rates of all psychiatric disorders.<sup>12</sup> A study conducted in 2019 found only 46% of anorexia nervosa patients recover completely, while the average duration of the illness is six years.<sup>13</sup> Whereas, in ten years, only 50% of patients recover from bulimia nervosa.<sup>14</sup> Due to the variety of disordered eating behaviors, coupled with the stringent guidelines used to clinically diagnose anorexia and bulimia nervosa, it is estimated that at least 60% of eating disorders do not meet the standard criteria for a formal diagnosis.<sup>15</sup> At the moment, the only methods of treatment available include counseling, cognitive behavioral therapy, and nutritional education. Medications such as selective serotonin reuptake inhibitors (SSRIs) are often ineffective, so cognitive behavioral therapies focus on changing the negative thought patterns that lead to disordered eating habits.<sup>16</sup> Not only are rates of anorexia and bulimia nervosa underreported, but treatments currently available are ineffective. More than half of the individuals suffering from eating disorders do not find relief and resolution, and those who do recover only do so after years of struggle. Rather than addressing the disorder's underlying cause, the primary method of treating an eating disorder consists of symptom reduction. Since the source of the disorder is not treated, these conditions persist.<sup>17</sup>

### Intrasexual Competition Hypothesis

One of the leading hypotheses in evolutionary medicine to explain the incidence of eating disorders, as it relates to human adaptive behavior, is the Intrasexual Competition Hypothesis. Hypothesized by Riadh Abed in 1998, he states that to appear more attractive and desirable for a mate, maintaining a lower weight would highlight the waist-to-hip ratio in women, both to emphasize they are not currently pregnant, as well as to retain a “nubile shape” to accentuate their reproductive potential.<sup>18</sup> Therefore, the increased prevalence of eating disorders is viewed as a byproduct of heightened intrasexual competition among women.<sup>19</sup> This hypothesis is specific to areas of the world with high socioeconomic status and widespread media exposure, which explains the influence on “certain vulnerable females” that causes them to develop eating disorders.<sup>20</sup>

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<sup>12</sup> Markus Rantala et al., “Eating Disorders: An Evolutionary Psychoneuroimmunological Approach.” *Frontiers in Psychology* 10, no. 2200 (2019): 1.

<sup>13</sup> Rantala et al., “Eating Disorders.” 12.

<sup>14</sup> Ibid.

<sup>15</sup> Saloni Dattani, Hannah Ritchie, & Max Roser. (2021). Our World in Data. “Share of population with an eating disorder, 2017.” Seattle, United States: Institute for Health Metrics and Evaluation.

<sup>16</sup> Rantala et al., “Eating Disorders.” 12.

<sup>17</sup> Rantala et al., “Eating Disorders.” 2,12.

<sup>18</sup> Riadh Abed, “The sexual competition hypothesis for eating disorders.” *British Journal of Medical Psychology*, (1998) 71: 526.

<sup>19</sup> Rantala et al., “Eating Disorders.” 3.

<sup>20</sup> Abed et al., “Eating Disorders and Intrasexual Competition: Testing an Evolutionary Hypothesis among Young Women.” *The Scientific World Journal*, (2011): 6.

## Intrasexual Competition Hypothesis Critiques

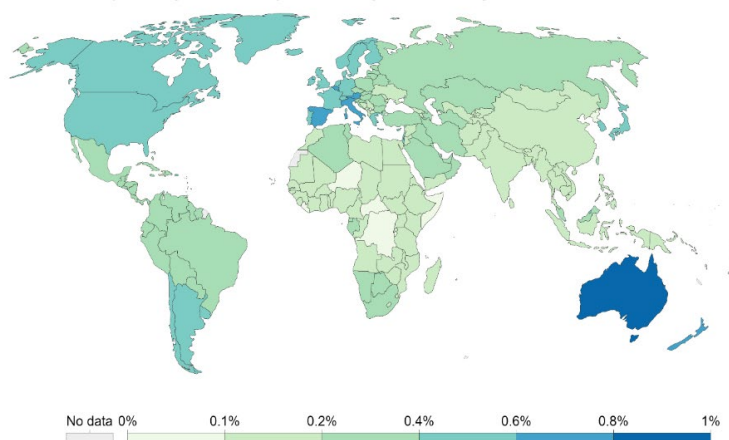
This hypothesis raised questions. If the intrasexual competition was indeed the cause, what is this link between a preference toward a thinner female form, media exposure, and high socioeconomic status?<sup>21</sup> A study with 7,000 participants spanning 26 countries worldwide found that women perceive a thin female form as attractive more frequently than their male counterparts.<sup>22</sup> Swami et al. determined that a key factor to predicting body dissatisfaction among women was not their amount of general media exposure, but their exposure to Western media specifically.<sup>23</sup>

Who is a “vulnerable female” to these disorders? The most recent global statistics on eating disorders (Fig. 1) reveal a global eating disorder prevalence correlative to areas of the world strongly influenced by Western cultural beliefs. Therefore, those who are particularly entrenched within media experience increased pressure from Western cultural beliefs, as well as individuals within social groups that hyper-focus on Western cultural beliefs.<sup>24</sup> These beliefs do not pertain to body weight or shape specifically, but is rather an element of beauty standards in which ideas surrounding body size, shape, and weight all factor into determining individual attractiveness.

As mentioned previously, socioeconomic status also plays an important role. Beauty standards are directly linked to wealth: attractiveness increases social standing, or one can become more attractive through resources available to the wealthy. Beauty standards, especially those of women, vary across time and place. Women perceived as attractive in Europe during the

### Share of population with an eating disorder, 2017

Share of the population suffering from the eating disorders anorexia nervosa or bulimia nervosa. This share has been age-standardized assuming a constant age structure to compare prevalence between countries and through time. Figures attempt to provide a true estimate (going beyond reported diagnosis) of eating disorder prevalence based on medical, epidemiological data, surveys and meta-regression modelling.



Source: IHME, Global Burden of Disease

CC BY

Figure 1: Recent global statistics on eating disorder prevalence

<sup>21</sup> Swami, Viren, David A. Frederick, Toivo Aavik, Lidia Alcalay, Jüri Allik, Donna Anderson, Sonny Andrianto, et al. “The Attractive Female Body Weight and Female Body Dissatisfaction in 26 Countries Across 10 World Regions: Results of the International Body Project I.” *Personality and Social Psychology Bulletin* 36, no. 3 (March 2010): 320

<sup>22</sup> swami et al. “The Attractive Female Body Weight and Female Body Dissatisfaction.” 321.

<sup>23</sup> Ibid.

<sup>24</sup> “Advertising's Toxic Effect on Eating and Body Image.” News, March 28, 2020.

<https://www.hsph.harvard.edu/news/features/advertisings-toxic-effect-on-eating-and-body-image/>.

Victorian era, for example, were especially pale and voluptuous.<sup>25</sup> Social status influences desirability, and paleness and voluptuousness at that time conferred social status.<sup>26</sup> Women that exemplified this perceived beauty had the luxury of staying indoors, rather than working outside under the sun, giving them a pallor. A higher body weight also indicated a relaxed and sedentary lifestyle with ample food resources, which were daily habits possessed by the rich and powerful. Beauty standards of the twentieth century contrast this, since there was a cultural shift that instead found a thinner figure attractive.<sup>27</sup> Those of a higher social status have the time, resources, and privilege to go on vacation, participate in outdoor activities, and maintain a more active lifestyle. This pattern of socioeconomic status and its influence on beauty standards continues today, seen when comparing areas of high socioeconomic status globally (Figure 2) with global eating disorder prevalence (Figure 1). Thin women are deemed the most attractive today within Western culture, Western media, and other areas of the world influenced by this

Total wealth per capita, 2014

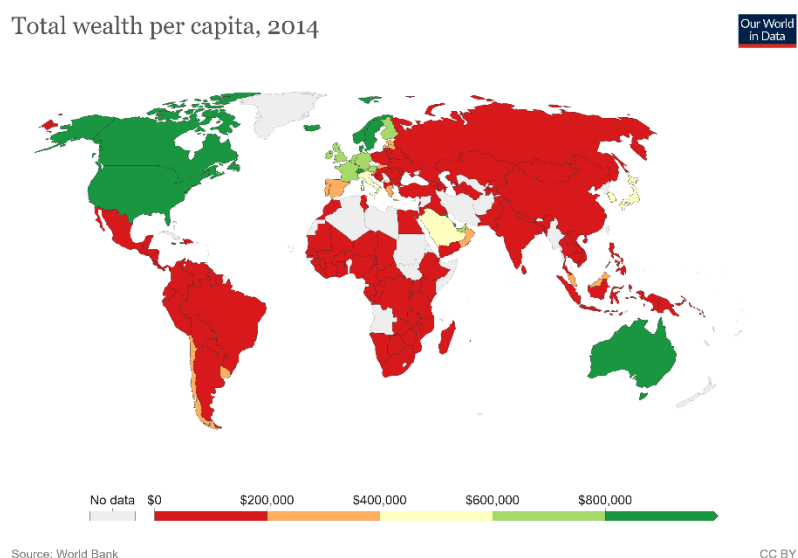


Figure 2: Recent global statistics on total wealth per capita

media.<sup>28</sup> Those who are less financial privileged often work more, work multiple jobs, and may only have the time and money for calorically dense, but nutrient deficient, fast foods.<sup>29</sup> Whereas those of higher socioeconomic status are more likely to have time to exercise, resources to afford nutritious, high-quality foods, and the ability to maintain a balanced lifestyle.<sup>30</sup> Although there is a clear relationship between socioeconomic status and beauty standards, it is one of the many factors influencing the prevalence

<sup>25</sup> Christine McPherson Morris. "Victorian Legacies of Beauty: Feminine Beauty Ideals in the Fiction of Lady Blessington, Charlotte Bronte, Mary Elizabeth Braddon, and George Eliot." Order No. 9708160, The University of North Carolina at Chapel Hill, 1996, 149.

<sup>26</sup> "Advertising's Toxic Effect on Eating and Body Image."

<sup>27</sup> "Advertising's Toxic Effect on Eating and Body Image."

<sup>28</sup> Dell'Osso, et al. (2016). Historical evolution of the concept of anorexia nervosa and relationships with orthorexia nervosa, autism, and obsessive-compulsive spectrum. *Neuropsychiatric disease and treatment*, 12, 1654.

<sup>29</sup> Ragna Stalsberg & Arve Pedersen. "Are Differences in Physical Activity across Socioeconomic Groups Associated with Choice of Physical Activity Variables to Report?" *International journal of environmental research and public health*. U.S. National Library of Medicine, 2018.

<sup>30</sup> Stalsberg & Pedersen. "Are Differences in Physical Activity across Socioeconomic Groups Associated with Choice Physical Activity Variables to Report?"

of eating disorders.<sup>31</sup> Affluent people have the time and resources to make themselves into the epitome of beauty while influencing the beauty ideal itself.

Human biology alone does not dictate desirability in contemporary society, as it may have determined who was adapted to survive and pass on their genes to offspring in ancestral human populations. Intragroup competition for a mating partner today is influenced by physical appearance, socioeconomic status, sexual orientation, personality attributes, and more. Cultural

beliefs heavily influence what humans perceive as “desirable” or “not desirable” characteristics. This subsequently impacts, consciously or not, both how an individual makes themselves appear more desirable to others and who that individual may find attractive.

Beauty standards are constantly in flux and have varied widely. Global data analyzed in relation to beauty standards reveals cultural variation. This inconsistency is also evident in the historical record. European artists like Peter Paul Rubens depicted the “ideal” woman as soft, voluptuous, and pale in the seventeenth century (Figure 3).<sup>32</sup> Body size standards fluctuated further in the following centuries. Burlesque dancers from the nineteenth century (Figure 4) also retained a more curvaceous body type

to satisfy male audiences.<sup>33</sup> Beauty standards of the twentieth gravitated towards an emphasis on women having curves to attain attractiveness (Figure 5). The twenty-first century has become hyper-focused on attaining thinness, at first as a sign of health and activeness. However, competition in the modeling industry and this obsession with thinness have



Figure 5: Advertisement reinforcing beauty standards of the twentieth



Figure 3: *The Three Graces* by Peter Paul Rubens



Figure 4: Burlesque dancers of the late nineteenth century

<sup>31</sup> Rantala et al., “Eating Disorders.” 3.

<sup>32</sup> Peter Paul Rubens. *The Three Graces*. 1630-5. Oil painting, 87 x 71 in. Museo del Prado, Madrid.

<sup>33</sup> “Burlesque Dancers.” Charles McClaghy Collection, Ohio State University. <https://library.osu.edu/tri/explore>.

become largely unsustainable and unrealistic (Figure 6). Since these body types became the most represented within mass media, this dominating beauty standard coincided with an epidemic of eating disorders in the Western world.<sup>34</sup> Many societies worldwide have preferred larger body types historically, but are also being influenced by a thinner ideal in recent decades, which may be a result of globalization and the spread of Western media, and the ideals conveyed within them.<sup>35</sup>

## Causes

The proximate causes of anorexia and bulimia nervosa involve stressors, obsessive tendencies, and unhealthy ideation around food intake. Internalized beliefs surrounding desirability result in disordered eating behaviors, that have negative mental and physical health consequences. The Intrasexual Competition Hypothesis is accurate in the sense that there is a competition to be viewed as a desirable person. However, what is deemed desirable at this moment is heavily spurred on by cultural beliefs, supported and dispersed through media, that thinness for women increases desirability.<sup>36</sup> Silverstein et al. found that the current standard for attractiveness holds women to a slimmer weight standard than men and pressure women more so than men to maintain low body weight.<sup>37</sup> Eating disorders are more common among women than men and occur at higher frequencies than they did in past decades.<sup>38</sup> When these ideas are given space within mass media, they dominate the hearts, minds, and bodies of media consumers. Media does not just affect adults: it influences parents that raise children and pressures teenagers to adopt these standards. Little girls are often praised for being “so pretty” while little boys are



Figure 6: Ukrainian fashion model Natalia Gotsii in a 2007 runway show

told they are “so strong” or “so fast.” Not only does this enforce a gender binary, but it also causes children to internalize what is expected from them or gives them self-worth.<sup>39</sup> As a woman myself, I remember being bullied in elementary and middle school over the shape of my body and weight, which caused me to self-restrict food intake and obsess over my weight at the age of twelve. My disordered eating patterns continued throughout high school, as did the judgments and bullying; and, although I have

<sup>34</sup> Brett Silverstein, Lauren Perdue, Barbara Peterson, and Eileen Kelly. “The Role of the Mass Media in Promoting a Thin Standard of Bodily Attractiveness for Women.” *Sex Roles* 14, no. 9 (1986): 532.

<sup>35</sup> “Cross-Cultural Perspectives.” Bradley University. 2022.  
<https://www.bradley.edu/sites/bodyproject/perspectives/>.

<sup>36</sup> Dell'Osso, et al. (2016). Historical evolution of the concept of anorexia nervosa and relationships with orthorexia nervosa, autism, and obsessive-compulsive spectrum. *Neuropsychiatric disease and treatment*, 12, 1653.

<sup>37</sup> Brett Silverstein, et al. “The Role of the Mass Media.” 519.

<sup>38</sup> *ibid.*

<sup>39</sup> Engeln, *Beauty Sick*, 334.

broken those habits and eat regularly, I still grapple with body dysmorphia and body image issues. Returning back to this feedback loop of unrealistic beauty standards represented in media and perpetuated by society, it sends the message, whether directly or indirectly, that beautiful, thin women are desirable women. Consequently, desirable individuals have a higher chance of finding a partner/mate and passing their genes on to subsequent generations.

The ultimate cause of eating disorders such as anorexia and bulimia, then, develop when these social standards surrounding body shape and body weight become internalized. These trends present the standard of desirability for everyone, but especially young women, who are consistently exposed to targeted media and exist within a culture that upholds and reinforces these beauty standards. The compounding factors of beauty standards, targeted media, and social pressures increase the chance of developing disordered eating patterns.

## Treatment

For those currently struggling with an eating disorder, a treatment that couples psychological counseling with repairing digestive systems may prove to be successful at helping patients recover fully while minimizing the risk of relapse. This may be accomplished by repairing gut dysbiosis and neuroinflammation, paired with cognitive behavioral therapy.<sup>40</sup> The central nervous system interacts with the digestive tract, but the mechanisms behind this phenomenon and the amount of influence intestinal microbes have on neurological functions are not fully understood.<sup>41</sup> The risk of celiac disease, Crohn's disease, and ulcerative colitis was much more common in groups with anorexia nervosa, and researchers attribute these conditions to gut dysbiosis.<sup>42</sup>

Repairing one's microbiome has been shown to reduce neuroinflammation, which can ameliorate elements of this disorder, such as obsessive thoughts and compulsive behavior.<sup>43</sup> Gut dysbiosis is not the cause of an eating disorder, but is rather the result of restrictive eating. Subsequently reintroducing foods that cannot be processed due to a lack of these specific bacterial strains manifests as diseases caused by gut dysbiosis. The microbiome has profound impacts on the ability to harvest energy from food: the microbiome of overweight individuals differs from the microbiome of malnourished individuals, with the bacterial flora of overweight individuals exhibiting more energy efficiency, while the bacterial flora of the underweight individual is less efficient at harvesting and storing that metabolic energy.<sup>44</sup>

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<sup>40</sup> Rantala et al., "Eating Disorders." 12.

<sup>41</sup> Elaine Glenn, Emily Bulik-Sullivan, Quyen Tang, Cynthia Bulik, and Ian Carroll. "Eating disorders and the intestinal microbiota: Mechanisms of energy homeostasis and behavioral influence." *National Center for Biotechnology Information* 19, no. 8 (2017): 51.

<sup>42</sup> Rantala et al., "Eating Disorders." 8, 13.

<sup>43</sup> Glenn. "Eating disorder and the intestinal microbiota."

<sup>44</sup> Jochen Seitz, Meriem Belheouane, Nina Shulz, Astrid Dempfle, John Baines, and Beate Herpertz-Dahlmann. "The Impact of Starvation on the Microbiome and Gut-Brain Interaction in Anorexia Nervosa." *Frontiers in Endocrinology* 10, no. 41.

## Body Image: A Holistic View

In patriarchal societies, a woman's body has, historically, been "her best survival tool," since she could use it to influence male desire and her marriageability, which could determine her place in society and opportunities that were dependent on the man she chose or was forced to marry.<sup>45</sup> This may explain why a woman's body continues to be heavily influenced by social and cultural ideologies.<sup>46</sup> Humans still live in a patriarchal social system that continues to pressure women into these behaviors and drive them to make themselves appear desirable. These social factors, coupled with biological motivations to find and mate with a partner, and passing genes onto the next generation, results in the self-objectification and internalization of beauty standards that can result in disordered eating patterns. The ultimate, or evolutionary mechanism that forms the bedrock for this disorder is sexual selection, but competition for mates is determined by constantly shifting cultural beliefs upheld by society.

Studies on the potential treatments for eating disorders are exciting and hold promise. Future treatment methods will undoubtedly help those suffering from eating disorders, but a larger issue needs to be addressed to prevent individuals from developing the disorders. The positive results from these treatments should not distract from addressing and treating the cultural roots of eating disorders, rather than merely treating the individuals. Contemporary society, especially western society, is suffering from what Dr. Renee Engeln calls "beauty sickness." Media literacy should be taught to children to reveal the ways that photos can be manipulated or altered, as well as the subtle messages conveyed in daily life about appearance. Women perform more "self-checks" and spend more time thinking about their appearance than men: "Is my skirt riding up? Should I apply more makeup? Does my hair look messy? Is that person staring at me?"<sup>47</sup> Comfort and practicality differ when comparing male and female clothes. Why do women more often wear uncomfortable clothes or clothes that restrict movement as opposed to men? Social pressures constantly influence one's life and reinforces gender biases and gender roles dictated by social customs. What is learned in childhood becomes internalized in adolescence and is subsequently reinforced in adulthood. Imagine how communities would appear and behave if there was less objectification and self-objectification: people could be happier, healthier, and even wealthier.

## Conclusion: A Changing Perspective

Humans need to change the intrinsic ways individuals communicate, perceive, and appreciate themselves while learning to better represent the diverse beauty of humanity. As social creatures, humans learn from the behaviors of others. Diversity will be more widely

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<sup>45</sup> Nealie Tan Ngo, "What Historical Ideals of Women's Shapes Teach Us About Women's Self-Perception and Body Decisions Today." *AMA Journal of Ethics* 21, no. 10 (2019).

<sup>46</sup> Ngo "What Historical Ideals of Women's Shapes Teach Us."

<sup>47</sup> Renee Engeln, *Beauty Sick: How the Cultural Obsession with Appearance Hurts Girls and Women* (New York: HarperCollins, 2017), 76-78.



represented and celebrated if society rethinks beauty standards and the cultural mechanisms in place that dictate these ideals.

Organizations such as the National Eating Disorder Association, individuals such as Connie Sobczak, the founder and executive director of “The Body Positive,” and many others are speaking out against beauty standards, confronting gender roles, and creating an inclusive space for communication, collaboration, and celebration.<sup>48</sup> Body positivity movements are gaining momentum and recognition. Clothing brands and fashion representatives are starting to alter their practices. Serena Williams’ “S by Serena” and Rihanna’s “Savage X Fenty” are just a few examples of prominent individuals advocating for body acceptance by creating size-inclusive clothing lines themselves while also utilizing a diverse pool of models to showcase their brands. An increasing number of companies are catching on while others are beginning brands whose core mission is to ensure inclusivity and diversity. For example, gender-neutral clothing brands including Human Nation, I and Me, One DNA, and Telfar are modeling their companies off mottos such as “It’s not for you – it’s for everyone,” to emphasize that clothes are made for all people and should be created with every person in mind.

Although this movement began to draw attention to the beauty sickness experienced by women, in particular, body positivity is much more expansive and should advocate for every human. Society must also acknowledge that reinforcing the gender binary through beauty standards hurts everyone through the insidious biases of gender roles. Although this discussion has been centered on those who identify as women, men also experience unrealistic beauty standards, while everyone else who does not adhere strictly to these two gender identities feels either left out of the conversation or feel pressured to conform and fit in.

Only by addressing cultural beliefs surrounding socially upheld beauty standards can humanity hope to achieve meaningful and enduring change in relation to eating disorders. Analyzing these disorders through the perspective of evolutionary medicine provides new insights that can lead to innovative treatment methods and more effective solutions. Humanity cannot divorce itself from the modern environment but should be informed by the evolutionary past to be more mindful of the present so we may shape a healthier future that unifies our biology with our modern society.

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## The Emotional Experiences of Active vs. Passive Instagram Users: A Psychological Anthropological Analysis

Marisa DeBell

### Abstract

From a psychological anthropological perspective, my study investigates if Instagram has certain effects on the emotional experiences of different user subcultures and the possible motivations behind being a part of one group or the other. In this context, the two subcultures contain active participants, those who constantly upload posts while also interacting with others' content, and passive observers, who are not as noticeable on the platform. A method used in this study is a survey in which participants rank their feelings related to Instagram as well as giving optional short answers on how they describe their experiences on the platform. This helps us understand if active or passive Instagram users experience distressful emotions such as anxiety, jealousy, and insecurity, and which user type may experience more pleasant effects such as joy, inspiration, and amusement. It is predicted that those who are active participants will have more distressful emotional experiences. Literature from both psychology and anthropology is digested and analyzed to understand the culture on Instagram as well as compare it to the data found from the survey. Instagram has been used as a platform for unrealistic body and lifestyle standards with those with large followings posting images and modifying their bodies and settings with software so that they appeal more to audiences, though they do not typically disclose such facts. This leads many young people to feel like they are not good enough and can cause distressful emotional experiences. However, social media is also a place that can cause positive emotions with the social connection to friends and family as well as being a source of entertainment. This study examines if and why people are more affected by these standards and entertainment based on if they are in the subculture of passive or active participants on the platform, Instagram.

### Introduction

With the rise of social media, there is an increased need to understand how and why different cultures on online platforms encounter different emotional experiences, especially subcultures that may include active and passive users. In this context, active users are those who are more noticeable on an online platform by posting consistently. For this study, I define active users on Instagram as someone who posted within the past 6 months on their main profile and on their “story”, where one can temporarily post a picture that disappears in 24 hours. Active users also commonly interact with others through liking, commenting, and sharing.<sup>49</sup> Conversely, passive users go more unnoticed on online platforms and have not posted in the past 6 months.

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<sup>49</sup> Briana Trifiro and Jennifer Gerson. “Social Media Usage Patterns: Research Note Regarding the Lack of Universal Validated Measures for Active and Passive Use.” in *Social Media + Society* 5, no. 2(2019)

Passive users leave little to no footprint on the platform and rarely interact with others, especially those they do not know.<sup>50</sup>

Released in late 2010, Instagram is a social media platform that was created to “exemplify the new era of *modern photography*”.<sup>51</sup> It was first released for the iPhone 4 and by 2015, Instagram had obtained 400 million users.<sup>52</sup> Instagram culture heavily relies on visual media as users primarily share photos to the platform in hopes for others to like and comment on their posts. Scholars theorize that visual social media, especially Instagram, can cause distressful emotional experiences when using it in an active way due to the need of wanting to live up to social expectations.<sup>53</sup> A study done by Yvonne Kelly and her colleagues focuses on the distressful emotions teenage girls experience based on the lifestyles and beauty standards they consume on Instagram.<sup>54</sup>

Social expectation and the toxic culture of Instagram play a large role in this research. In this context, toxicity is the expression of insults, identity-based hate, threats, and obscenities.<sup>55</sup> Usually, toxicity is in the comments of Instagram posts leading users to feel insecure or overwhelmed. Toxicity can also take the form of actual photos/posts. An example is the overwhelming amount of information or posts that perpetuate unrealistic beauty standards. Social expectations and obligations surround the feeling of needing to fit into societal norms, such as engaging in social media.

Along with these negative aspects of social media, it is also important to recognize the pleasant emotions that come out of online platforms. During a late 2020 study, I conducted research led by Dr. Jeffrey Snodgrass examining the importance of online connection during the early stages of the COVID-19 pandemic. This research elucidated how important online connections were, both prior to and during the beginning of the 2020 pandemic; especially with those users who were not able to see others in person often (due to both the pandemic and/or other life changes). Instagram’s entertainment aspect also creates pleasant emotions. This article argues that different emotional experiences active and passive users have based on Instagram’s social media expectations, social connections, and entertainment value to gauge whether active or passive users have a healthier way of engaging with Instagram. I hypothesized active users tend to experience more distressful emotions because they are more exposed to competition and criticism than passive users.

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<sup>50</sup> Trifiro and Gerson

<sup>51</sup> Lev Manovich. *Instagram and Contemporary Image*. Academia, 2017.

<sup>52</sup> Manovich

<sup>53</sup> Katherine Picchiotti, "Optimistic Anthropology: Identity and Well-Being on Instagram" (WWU Graduate School Collection, 2021)

<sup>54</sup> Yvonne Kelly et al. “Social Media Use and Adolescent Mental Health: Findings from the UK Millennium Cohort Study.” in *EClinicalMedicine* 6 (2018): 59–68.

<sup>55</sup> Sheth

## Methods

Primary ethnographic methods were employed to understand the different emotional experiences of active and passive subcultures on Instagram. I conducted a digital survey based on convenience sampling where participants were recruited by email and Instagram. The survey had 41 respondents, 92% of the participants were between the ages of 18-25 and were mostly students from Colorado State University. The survey consisted of 26 questions within four sections:

- 1) Questions that determined if the participant is an active or passive user-based on post frequency.
- 2) Questions that ranked the frequency of 10 emotions that users experience while using Instagram.
- 3) Optional, open-ended short answer questions to allow participants to expand on their certain emotions.
- 4) Questions on their demographics.

To qualify as a fully active user, the participant had to have posted on both their main profile and “story” on Instagram within the past 6 months. They also had to commonly like others’ posts. 19 respondents qualified as active users and 7 as passive users. Fully passive users did not post on their main profile or “story” within the past 6 months. Those who did not qualify as either fully passive or active were removed from the data. Although the sample size is relatively small, the short answer section of the survey allows for an in-depth analysis of respondents’ emotional responses to their Instagram usage.

For the second set of questions in the survey, I asked participants to rank a set of 10 emotions based on how often they felt them when using Instagram. The emotions participants ranked were amusement, anger, anxiety, fulfillment, insecurity, inspiration, jealousy, joy, sadness, and success. This set of emotions was inspired by the “Feeling wheel” created by therapist Gloria Willcox to help aid people communicate their feelings.<sup>56</sup> To rank the emotions, participants picked a number on a scale from 1-4 on how often the emotion was felt (1 being “rarely felt” and 4 being “almost always felt”). After ranking the emotions, respondents could choose if they wanted to delve into why they felt these emotions. Out of all 41 participants, 23 responded to some short answer questions. Thematic analysis was used to dissect these answers.

## Results

Data from the survey demonstrated my hypothesis was incorrect and offered alternative insights. Active users did not tend to experience more distressful emotions. Numerical data asking participants to rank emotional experience based on occurrence illuminated three emotional differences between active and passive users. Active users tend to feel *less joy*, *less anxiety*, and *less insecurity* than passive users when on Instagram. Besides *joy*, *anxiety*, and

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<sup>56</sup> Gloria Willcox. “The Feeling Wheel.” *Transactional Analysis Journal* 12, no. 4 (1982): 274–76.

*insecurity, passive and active users encountered amusement, anger, fulfillment, inspiration, jealousy, sadness, and success with the same frequency when using Instagram.*

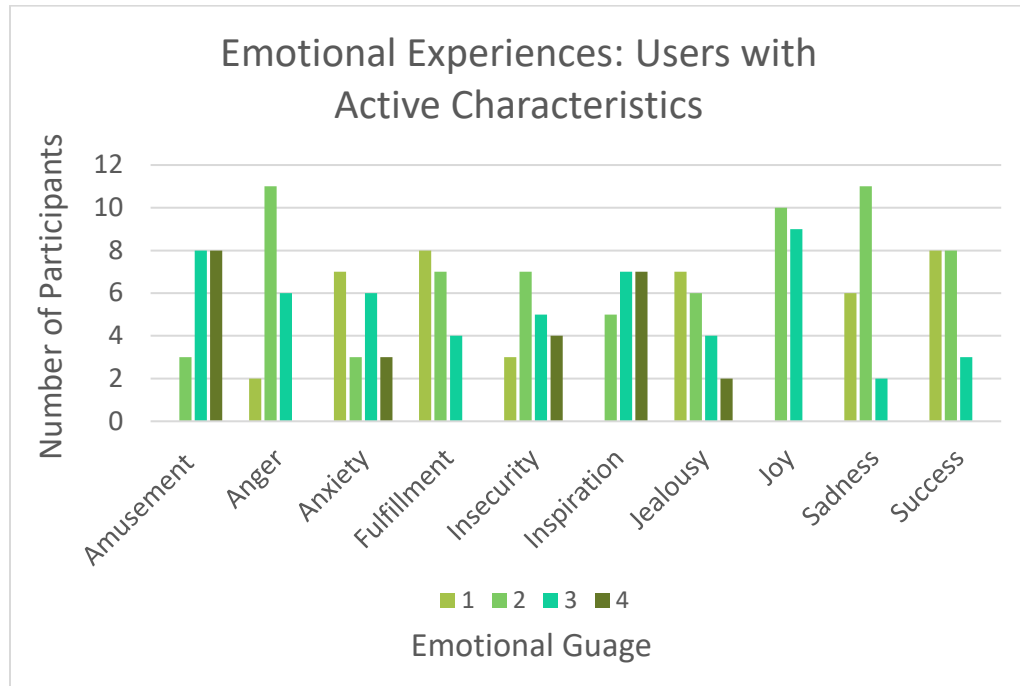


Figure 1. Graph representing active users’ experience with certain emotions when engaging with Instagram. 1 being “rarely felt” and 4 being “almost always felt”.

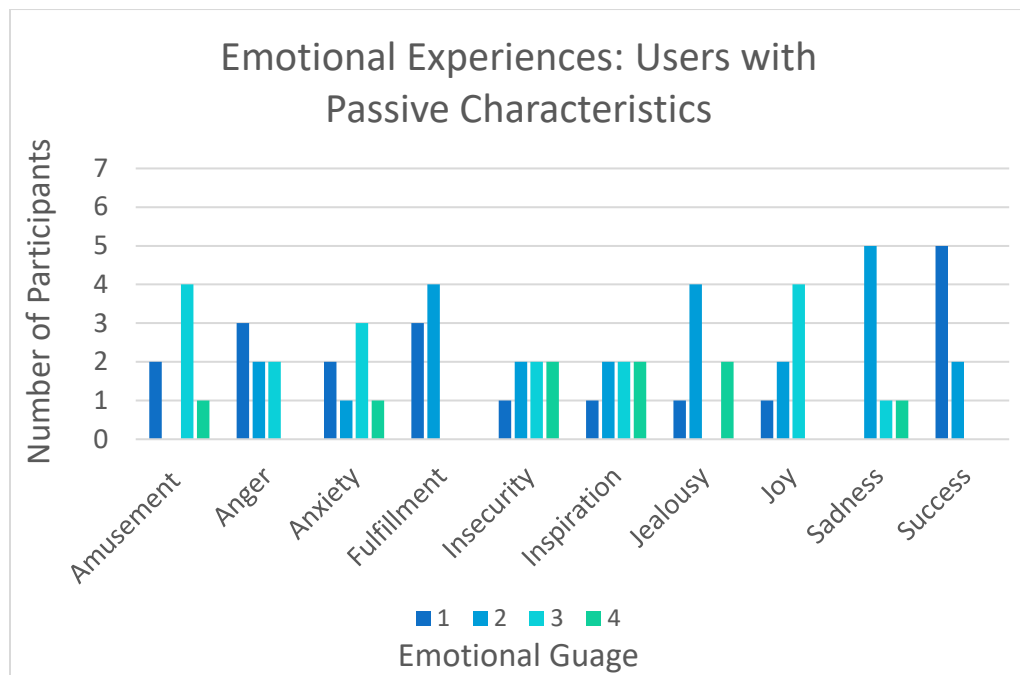


Figure 2. Graph representing passive users experience with certain emotions when engaging with Instagram. 1 being “rarely felt” and 4 being “almost always felt”.

The short answer questions included in the survey allowed participants to expand on why they were feeling different emotions and help contextualize the quantitative data. Active users’ responses included both the positive and negative aspects of Instagram. Respondents tended to talk about two primary topics: the beneficial social connection Instagram provides, and user awareness of the toxic environment Instagram creates. For example, one active user stated:

“I mainly avoid the things I know will impact my mental health. I know how to avoid anything unrealistic or anything that will affect my mental health and I'm pretty self-aware about the nature of social media so that area doesn't affect me too much.”

Passive users’ responses tended to be as shorter and focused on disliking social media in general. The number of passive users who participated in the study was much less than the number of active users. This could be because there are simply fewer passive users on Instagram, or they did not engage in the study due to their passivity. One passive respondent stated that they “hate social media” and they only go on Instagram if “a friend specifically asks me to check something out.” Another passive respondent explained how they dislike the “fakeness” that is prevalent on the platform and they “haven’t posted in years and feel[s] like posting can be superficial.” Broadly speaking, passive users try to avoid Instagram’s toxic culture by sparingly using the platform only to connect with friends.

The majority of passive and active participants agreed on how toxic the content on Instagram is. This ranged from “fakeness”, “self-fulfilling disappointment”, and overwhelming “current events”. They also agreed that Instagram remained a useful place to stay socially connected. One active user expressed,

“It is the way I communicate with a lot of my family members that I would not keep in touch with other ways. It makes me feel good for them to see what I'm doing in my life and me the same with them.”

Passive and active users view Instagram in the same light: a social media platform filled with toxic content, but also a platform that allows for useful social interaction.

## Theoretical Analysis and Discussion

I contextualized the survey data with a literature review and theoretical analysis. I connected many different theories to my research including Marxist theory, the theory of mass society, critical theory, and the theory of symbolic interactionism. I draw upon and make connections to other social media research studies, most prevalently, studies done by Katherine Picchioti (2021) and Yvonne Kelly et al. (2018).

In recent years there have been several studies pertaining to how social media affects the mental health of teenagers, especially teenage girls. Kelly (et al, 2018), conducted a study on



10,904 14-year-olds regarding the relationship between social media and depressive symptoms. They found that, on average, young teenage girls experienced more online harassment and developed more depressive symptoms compared to boys.<sup>57</sup> These researchers also concluded that to counteract these depressive symptoms, social media should have stricter guidelines, including tightly regulated hours of social media use.<sup>58</sup>

Straying away from teenagers, Picchiotti (2021) studied how young adults practiced well-being through identity performance on Instagram. Picchiotti found that to practice well-being on Instagram, one must depend upon the “development of communities tied to self-expression, the performance of multifaceted identities, and the navigation of perceived toxic environments within the application”.<sup>59</sup> Our research came to a similar conclusion regarding the need to be aware of toxicity across Instagram to stray away from stressful emotional experiences.

I argue that our study became different from Kelley et al. and similar to Picchiotti due to age. In Kelly et al. studies, participants were younger teenagers relatively new to social media. Their work is very important in understanding the effects of teenagers but doesn't extend to the effects of young adults. Both age periods are highly important in relation to social expectations and the want to fit into social media culture. The experience with social media and navigating toxic environments can be the key to surviving social media with a healthy mind. The discrepancies between conclusions made by Picchiotti and Kelly et al. demonstrate that younger teenagers are unable to do this simply due to their age. Picchiotti conducted her research around participants who were ages 18-47 and focused a large part of her research around monitoring toxicity and practicing well-being. We both found that the mental effects created by Instagram depended on individual ability to navigate through toxic content.<sup>60</sup> Another similarity between Picchiotti's work and this study is the inclusion of understanding social expectations and the effects of social norms.

The survey results suggest that those who are more active on Instagram understand how to avoid toxic behavior on the platform. This may be because those who are more active on the platform are more exposed to toxic behavior, and therefore are more capable of knowing how to avoid it than passive users. Thus, active users are more equipped to adapt their usage patterns. Adaptive behavior could help active users to feel less anxious and insecure, yet less joyful because they might be aware that they are contributing to and supporting a toxic platform. Instead of leaving the app due to their knowledge of toxicity, the feeling of social obligation keeps active users on the platform. The social obligation to be on social media is very clear, especially among younger generations. When you meet someone new in a classroom or at a party, they usually ask what your social media handles are. Without providing that information, it can feel awkward or make someone without social media feel left out.

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<sup>57</sup> Kelly et al.

<sup>58</sup> Kelly et al.

<sup>59</sup> Picchiotti

<sup>60</sup> Picchiotti

To reflect on the observed trends within these two Instagram subcultures, I investigated several psychological anthropological theories including the theory of “mass society”. The “mass media” concept states that “mass media are responsible for the emergence of a homogenized mass culture and the fragmentation of communities.”<sup>61</sup> Within the culture of social media and Instagram, two ways to manage conflict between emotional distress and social norms were created through the paths of passive and active users.<sup>62</sup> To deal with the toxic context on the platform, passive users go on Instagram only for particular reasons, such as connecting with friends, rarely posting, and avoiding interaction with most users. However, they still have an Instagram account to accommodate the social expectations of having one. On the other hand, active users learn and avoid toxicity while still maintaining a visible presence on Instagram. Active users fulfill the social expectations of having social media by posting and actively interacting with the platform. This leads to greater exposure to emotionally distressful content which allows active users to understand how to avoid and deal with toxic behavior better. While both users are conscious of the toxic behavior on Instagram, such as “fakeness” and unwanted news from current events, the two subcultures tend to deal with avoiding the behavior in different ways.

Social Comparison Theory (SCT) can also be used to understand the emotional discrepancies between active and passive users. According to SCT, people determine their opinions and capabilities respective to the opinions and abilities of others.<sup>63</sup> Pressure to conform to social norms on social media could explain the loss of joy in active users. By engaging with social media, one may fit in with their peers more, but in turn, these users may compare themselves to other users.<sup>64</sup> Instagram is a visual platform where pictures and videos are shared, so it is easy for one to assess what they have and do not have compared to others – materially and socially. Individual opinions may be warped based on what is popular to believe online. This could be the reason that active users felt less joy when interacting with the platform. Based on the different lines of evidence from the survey and interview questions, active users may be aware that they are contributing to toxic behavior by conforming to the social expectations of social media, making their time on Instagram less enjoyable.

The Theory of Symbolic Interactionism can explain why passive users feel more insecure and anxious. This theory explains members of society recognize a finite set of social situations and hopefully master the norms and roles for each.<sup>65</sup> Most individuals desire to be accepted into their social groups, thus they choose to conform to the social norms that have been constructed by society.<sup>66</sup> Even though users may be aware that most Instagram content leaves them feeling disappointed, users still want to be a part of the culture to fit in with the social expectations of

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<sup>61</sup> Debra Spitulnik “Anthropology and Mass Media.” in *Annual Review of Anthropology* 22, no. 1 (1993)

<sup>62</sup> Spitulnik

<sup>63</sup> Joseph B. Bayer et al. “Social Media Elements, Ecologies, and Effects.” in *Annual Review of Psychology* 71, no. 1 (2020)

<sup>64</sup> Bayer et al.

<sup>65</sup> Jack Eller, *Psychological Anthropology for the 21st Century* (London: Routledge, 2019).

<sup>66</sup> Eller

having social media. Active users can be present and show that they are a part of the social norm without encountering distressful situations by avoiding toxic aspects of the platform. Passive users, on the other hand, do not participate in the social norms as much as those who are active on Instagram. Even though they have an account and go onto the platform, passive users do not embrace the expectations of posting and interacting with others' content. This may cause passive users to feel like outsiders because they do not live up to social norms, which could lead to anxiety and insecurity.

Lastly, Critical Theory suggests mass media does not reflect 'reality,' but represents dynamic sites of struggle over-representation, and complex spaces in which subjectivities become constructed and identities become contested within a capitalistic society.<sup>67</sup> Through the new space of social media that developed over the past few decades, subcultures arose, and social norms and expectations evolved. Modern media is partially the way it is due to the developments of capitalism and the proliferation of mass-produced objects and images in contemporary society.<sup>68</sup> The construction of capitalism mixed with social media brings a new market for one to feel like they need to fit in on a certain platform. People who have a large following in the context of pop culture, create a new capitalistic market on social media. With pictures being involved, one visually sees how they are or are not good enough in the public eye standards. Those with high economic and social standing can use their platform for advertising brands and showing material goods, which can make users feel the need to buy. Perhaps, active users are more aware of the capitalistic strides of those with large followings, so they might be able to avoid those certain accounts and product placements more. On the other hand, perhaps passive users are unable to avoid capitalistic pressures as much as active users due to their lack of experience. Again, this may be the reason for passive users to feel excluded from social standards, but this is just a hypothesis.

## Conclusions

This study became an interest based on which subculture on Instagram represented the most beneficial way to interact with the platform. However, rather than revealing one healthier usage pattern, the data highlights the influence social expectations inflict on the emotional experiences of users. Active and passive users deal with these set social expectations in different ways. Active users may feel like they fit in more but will experience less joy while using the platform due to the awareness of their conformity to a toxic environment. Passive users may experience more joy by avoiding this toxic content, but also feel more anxiety and insecurity due to avoiding these social obligations of social media. It is difficult to say if active or passive usage is healthier in relation to emotional experiences, but both groups express clear benefits and disadvantages of using Instagram.

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<sup>67</sup> Spitulnik

<sup>68</sup> Spitulnik

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## International Development Cultures and the Global System

Marie Handy

### Abstract

Development and progress are related but different terms. Both are included in many international development plans. This paper reviews historical approaches to development such as the ideas put forth by Adam Smith in the 18th century (with an emphasis on human happiness as well as wealth), in addition to concepts from the last century such as being free from 'fear and want' seen in the 1941 Atlantic Charter, and United Nations approaches in the last few decades. UN plans have included the role of aid and international finance and 'new' capitalism in the form of neoliberalism. Sustainability and environmentalism have also come to the fore in recent plans. Gender equality and diversity are two of many additional issues also recently given emphasis in progress and development plans. Less common planning concepts such as group/national effort, the 'players' who will get the job done, popular will, and leadership are also considered.

### International Development

We are approaching a new age of synthesis. Knowledge cannot be merely a degree or a skill... it demands a broader vision, capabilities in critical thinking, and logical deduction without which we cannot have constructive progress.

- Li Ka-Shing<sup>69</sup>

Development is not synonymous with progress, but the two are related. Progress implies forward movement towards an improved state. Development implies bringing all members of a group up to a certain level. Yet both ideas - and other ideas - are often assumed in international plans for the future. Semantics aside, it's fair to say current international development pronouncements and plans include far more than how to bring everyone up to a certain level of income or standard of living. This is good and necessary. It is not realistic to push for more and more wealth, as has long been recognized. Happiness - well-being, or the general welfare - is clearly important. Maintaining diversity and competition are also important goals. Limits set by concerns over nuclear war, global warming, and pandemics must be part of any development plan.

Although planning is necessarily more complicated today than in the past, there is a real concern that excessive detail and bureaucratic decision-making might weaken the vision for humanity's future. Leaders, planners, and all of us must guard against this.

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<sup>69</sup> Preber, Bradley J., "Financial Expert Witness Communication: A Practical Guide to Reporting and Testimony," 2014.

Human groups have always planned for the future. As societies have become more complex over time and the rate of change has increased, adaptation has become a natural part of such plans. Progress and development were central aspects of the enlightenment in Europe, and if anything, change and the anticipation of change have become more important since then. Although the example of Europe might be particularly dramatic, many states around the world planned ahead in this way before the modern European transformation.

As Nicola Sturgeon points out in her 2019 Ted Talk, Adam Smith focused on wealth and general welfare in his 18<sup>th</sup>-century writings<sup>70</sup>. He was a trailblazer in the logical and scientific analysis of wealth and other elements decision makers use to set goals and plan progress. The more recent concept of ‘development’ at the international and state level derives in part from Smith’s work.

A major step in international discussions about development was the post-World War II planning by allied powers, particularly the United States and the United Kingdom. The vision was to create a world that would ultimately be free from ‘fear and want’ - as described in the 1941 Atlantic Charter<sup>71</sup>. One aspect of these discussions was planning for a new international monetary system at the Bretton Woods Conference in New Hampshire in 1944<sup>72</sup>. Delegates from 44 allied nations met to lay out the plan. In 1945, representatives of the United Nations (UN) met in San Francisco to write and adopt a charter for the nascent organization. The Charter preamble expresses the allied vision of a better post-war world, including the goal of the people of the United Nations “...to employ international machinery for the promotion of the economic and social advancement of all peoples.”<sup>5</sup> Western states became heavily over-represented in the meetings. This resulted in the Bretton Woods agreement and the UN Charter.

A resurgence of capitalist ideas affected development plans, particularly after 1980, in reaction to a global economic downturn in the 1970s. This ‘neoliberalism’ involves privatization, deregulation, free trade, and reduction in government spending<sup>73</sup>.

The UN General assembly tasked the World Commission on Environment in 1983 with drafting a development vision for the world. The resultant program for international development laid out in Gro Harlem Brundtland's 1987 report to the UN Secretary-General should be looked at in the context of a white paper prepared for an international organization. At the time, the world was bipolar (US and Soviet Blocs) and perhaps more emphasis was placed on objective wealth measures than today. The report emphasizes sustainable economic and social development that does not sacrifice the future environment for short-term development gains.

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<sup>70</sup> Sturgeon, Nicola. “Why Governments Should Prioritize Well-Being.” TED, TED Talk, 2019.

<sup>71</sup> Churchill & Roosevelt, Atlantic Charter, 14 August, 1941.

<sup>72</sup> Berganini, Stefanie. “Week 9, International Development.” Anthropology 200. <sup>5</sup>

United Nations, Charter of the United Nations, 24 October 1945.

<sup>73</sup> Berganini. “Week 9, International Development.” 200.

In 1990, the UN Development Programme began the publication of the Human Development Report, which places a greater emphasis on human enrichment, not just wealth. This resulted in an increased focus on well-being in international development plans<sup>74</sup>.

The 2000 UN Millennium Development goals included gender equality as a universal development goal<sup>75</sup>. In 2015, the UN General Assembly set up 17 ‘Sustainable Development Goals,’ including access to clean water, sustainable energy sources, full employment, resilient infrastructure, sustainable industrialization, and climate change measures, among other goals.<sup>76</sup>

Nicola Sturgeon’s 2019 Ted Talk represents the point of view of just three nations but is intended as a development plan for the world. She places greater emphasis on the importance of subjective ‘well-being’ measures focusing on topics such as education, health, access to technology, and exposure to ‘shocks.’ Although not a new idea (she references Adam Smith’s 1759 book *The Theory of Moral Sentiments*), the emphasis on well-being represents a change in the emphasis on development goals.

Since 1987, the need for coordinated political action and responsibility among nations has increased and changed. The Soviet bloc has collapsed. The world has become richer<sup>77</sup> (World Bank, 2021). Wealth is more evenly distributed, though still uneven. Science and technology continue to change the world. Significant examples from the last few decades include the expansion of the Internet and advances in genetic science and technology such as CRISPR.

Over time, ideas on human progress and development changed and became more complex-- influenced by philosophical, academic, scientific, and technological study and thought. I argue that planning for responsible, sustainable development should include more than wealth measures. The increased emphasis since 1987 on relatively subjective well-being measures is necessary and positive.

As development is discussed and planned, it's important that goals included under the heading ‘development’ be as clear and consistent as possible. To get from here to there, we must agree on what ‘there’ is, beyond a ‘better world.’ Visions of progress have become more complex over time and have differed depending on the goals of groups and states around the world through history. The current consensus includes 1) limits set by sustainability, environmental, security, and health considerations; 2) the accumulation of wealth such as gold, money, land, and capital; 3) measures of personal happiness and general welfare; and 4) the preservation of diversity (biodiversity, human groups, and cultures).

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<sup>74</sup> United Nations, Human Development Report, 1990.

<sup>75</sup> United Nations, Millennium Development, 2000.

<sup>76</sup> Berganini. “Week 9, International Development.” 200.

<sup>77</sup> “World Bank Group - International Development, Poverty, & Sustainability.” World Bank.

Brundtland advocates in *Our Common Future* for "a new era of economic growth" that is "socially and environmentally sustainable."<sup>78</sup> Clearly, this is sensible and necessary - and specific elements such as the well-being of children and green spaces are both appropriate and essential. Though challenging, development planning has not reached the stage of despair; Brundtland's goals are achievable. Other factors such as biodiversity, diversity of human groups, and the freedom and diversity of thought should also be included.

Just as well-being has become more recognized in the last few decades for its importance in any development plan, maintaining diversity is also seen by more and more experts, leaders, and people as a goal of development. Promotion and preservation of diversity should be explicitly included in many development plans. Agreement on the importance of diversity, in general, is widespread in many areas of study. Different points of view, free speech, freedom of conscience, diversity of culture, language, and group attitude - all are forms of diversity that should not be ignored in any 'development' plan, particularly when 'well-being' is considered. In addition, concepts of the diversity of species and environments should not be ignored<sup>79</sup>.

Diversity of 'group attitude' or collective thought at various levels (e.g., family, tribe, state, alliance of states) level is not often emphasized but should be considered. Considering states, one might well consider why post-WWII Germany developed so effectively, why Japan did so after US Commodore Perry's 1853 visit, or China in recent decades. Great human achievements and progress have resulted from the efforts of individual states, such as the United Kingdom's 19th Century Anti-slavery Squadron patrols to end the Atlantic Slave trade and the US space program resulting in the first lunar landing in 1969. Different group (national or otherwise) approaches have been successful and should be promoted in any global development plan. In other words, diversity, competition, and resultant great achievements should not be ignored in any universal plan for humanity.

Goals for development should be fair to all, but implementing changes to reach those goals requires leadership, resources, and support from those that have the power to make changes happen. We must ask 'who will get the job done?' At the most organized level the UN, powerful states such as the USA and China, and groups of states such as the European Union must participate to maximize chances for success. NGOs, scientists, and other experts also have a crucial role to play regarding scientific and technical considerations in any development plan. For example, the global response to Covid-19 is a recent test of a universal approach to maintaining and improving human health and should be used to improve future initiatives. Agreement on forum and process is also necessary. For example, the UN and its dispute resolution procedures are a suitable instrument for the creation of a universal plan for development.

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<sup>78</sup> Brundtland, Gro Harlem. "Our Common Future": Report of the World Commission on Environment and Development. The Commission, 1987.

<sup>79</sup> Wilson, Edward O. 1992. *The diversity of life*. Cambridge, Mass: Belknap Press of Harvard University Press.



Popular will must not be forgotten. No development plan can work if popular will stops its implementation. On the other hand, good leadership sometimes involves a plan that may not be supported by the majority initially. There must be a tension between the goals set in any development plan and what is simply ‘popular.’

The disparity in representation when crucial development plans and decisions are made remains a long-standing problem. Efforts must be made to bridge the gap between who is getting developed and who is doing the developing; Europe and the West versus the rest of the world; rising states like China and those states that are still poor in many ways.

Plans for development must be pragmatic enough that they can be implemented. Again, ultimately popular will must be respected - including people representing ALL nations and human groups. A mechanism for changing the plan is also crucial, such as the provision in the US Constitution for amendments. If the plan is not working, it must be changed.

Looking at international plans for development, particularly in the last few decades, I see trends that are both encouraging and concerning. I believe the increased emphasis on well-being, environmental considerations, sustainability in general, and other factors such as clean water and responsible industrialization are all good. However, no plan can include all answers to all questions, and excessive detail and bureaucratic decision-making must be guarded against. Although the UN’s recent 17-point plan contains worthy items, it tends towards too much detail for the ordinary person to easily engage with. That being said, though clarity and simplicity are important goals, the possibility that major concerns are still missing remains.<sup>80</sup> Hence the importance of good leadership and an amendment process. Ideas that perhaps are not emphasized adequately include a diversity of collective thought (akin to culture) and diversity of attitude stemming from competition between groups. Equality and fairness are all well and good, but space must be made for competition, both in the marketplace of wealth and the marketplace of ideas.

The UN is not trusted by all. Commenting and protesting against the organization in the United States (often focusing on an alleged unfair payment burden) and other nations (such as the Democratic Republic of the Congo regarding UN security actions) reminds us that this organization is not universally well regarded.<sup>81</sup> Yet popular support is vital to the success of the UN in general and many international development plans. The popular will must be regarded by the UN, and leaders must respond to that will. Still, no plan will be effective if the only goal is popularity. A tension must exist between development goals and what is possible.

Historically, human groups have planned for the future in a variety of ways. Some events such as interruptions in the food supply have always been planned for. Planning to avert famine during years of poor harvest is as old as agriculture - at least ten thousand years. As societies

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<sup>80</sup> United Nations, The 17 Goals, 2015.

<sup>81</sup> “Un Denounces Attack on Peacekeepers in DR Congo | UN News,” United Nations (United Nations), 2021.

became more complex, plans for the future did also. The Romans learned by the fourth century AD that stationing legions on the border was not enough to secure the empire, so they developed an adaptive plan: mobile field armies.<sup>82</sup>

During the Enlightenment, ideas for progress and development began to include analyses of wealth, banking, capital, trade, and even human well-being, as Adam Smith's writings show.<sup>83</sup> In the wake of two destructive world wars in the 20th century, the accumulation of knowledge, and the increased rate of change in the world, development plans have become more complex in response. Clean water, gender equality, environmental, health, and other concerns, - all have come to the fore as the world becomes subjectively smaller every year.

However, complexity can fade into pointless detail if leaders and other planners are not on guard. The popular will sometimes intervene to correct overly complicated designs. A good plan lasts. Some of the most durable and important documents in history have lasted in part because of their simplicity.

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<sup>82</sup> Roman Military Research Society, 2013.

<sup>83</sup> Smith, Adam. "The theory of moral sentiments", London: Printed for A, 1759.

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## Women Rebuilding: Mental Health Outcomes of Female Bosnian Genocide Survivors

Emily Smith

### Abstract

Recovering from traumatic events can be difficult regardless of the situation. Yet being a woman in the wake of the 1995 Bosnian Genocide included the added struggle of recovery from gender-based violence. In this paper, I analyzed the published literature in cultural anthropology and psychology that focuses on women's social activities and health services after the genocide. I particularly addressed female survivors' recovery in Bosnia and analyzed how their recovery differed from that of female refugees that resettled outside of Bosnia. These differences became evident due to more favorable mental health outcomes in women that partook in community-backed rebuilding in their communities and Bosnia more broadly. The results show bodily/emotional symptoms resulting from sociosomatic relations manifest less among Bosnian women who remained in Bosnia than among Bosnian women who relocated to the United States.

### Introduction

In the 1990s, war ripped through the former Yugoslavia after the multiethnic communist state collapsed.<sup>84</sup> The Bosniak ethnic group, also known as Bosnian Muslims, fought against the Bosnian Serbs and Serbian army in this war. During this time of conflict, Bosnian women were disproportionately affected by gender violence and trauma. Opposing men physically and mentally violated women through interpersonal violence and through the loss of their sons, brothers, husbands, and fathers in the war.<sup>85</sup> The International Criminal Tribunal at The Hague referred to the violence in Bosnia as genocide against the Bosniaks, perpetuated by the Serbs.<sup>86</sup> There has yet to be a focus on the gendered aspect of the trauma and healing from the war. This essay seeks to address this gap in the literature by synthesizing and analyzing the gendered effects and aftermath of the Bosnian genocide. My analysis is based on (1) the history of the genocide in Bosnia and women's roles during the massacre, (2) an understanding of different community groups in Bosnia; (3) and a comprehensive examination of an 11-year study of female Bosnian genocide survivors. In this paper, I argue that the community-based healing systems utilized by female survivors of the genocide who remained in Bosnia provided better mental health outcomes than those that sought mental health care in the United States as refugees. In this paper, I especially focus on the mental health outcomes of women who

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<sup>84</sup> Selma Leydesdorff, "Narratives of Survivors of Srebrenica: How Do They Reconnect to the World?" in *Women and Genocide: Survivors, Victims, Perpetrators*, ed. Elissa Bemporad and Joyce W. Warren (Bloomington: Indiana University Press, 2018).

<sup>85</sup> Elissa Bemporad "Memory, Body, and Power: Women and the Study of Genocide," in *Women and Genocide: Survivors, Victims, Perpetrators*, ed. Elissa Bemporad and Joyce W. Warren (Bloomington: Indiana University Press, 2018) and Richard Vize, "Trying to Heal the Scars Left by the War in Bosnia," *BMJ* 8161 (2018): 366.

<sup>86</sup> Vize, "Trying," 366.

remained in Bosnia, this is due to the availability of published research as well as a concerted effort to highlight the importance and efficacy of community-based care.

### Theoretical Framework

In this article, I draw on ideas of somatization, which are broadly defined as practices outside and separate from the mind, language, and even conscious thought.<sup>87</sup> However, I specifically draw on Arthur Kleinman's theory of somatization: he contends somatization represents a biological manifestation of a social problem.<sup>88</sup> With socio-somatization highlighting a biologically manifested social problem on the cultural level. Kleinman argues against the popular theory that somatization represents a fixed mental illness. He states that creating fixed categories for psychological illnesses is not adequate - these fixed categories are pulled from The Diagnostic and Statistical Manual of Mental Disorders (DSM).<sup>89</sup> Instead of these fixed categories, the illness must always be understood in relation to social and cultural context.<sup>90</sup> Pulling from secondary interview data collected in the post-war period, I investigate how Kleinman's theory of somatization applies to survivors of the Bosnian Genocide. Furthermore, I explore the post-war period using the social productions of health to understand how survivors of the Bosnian genocide use community – both post-war community and folk health - to heal.

### Historical Background of the Bosnian Conflict

In 1991 Bosnia and Herzegovina declared their independence from Yugoslavia (see Map 1). Soon after, in 1992, war broke out due to goals of self-determination by ethnic groups for the land that Yugoslavia was once on. The Yugoslavian government held the multiethnic area together in the past, but the country's collapse in 1992 exposed the lack of shared regional identity binding these ethnic groups. This war broke out between the Christian Serbs and the Muslim Bosnians (also known as Bosniaks) and by 1993 the Serbs imposed large-scale murder, rape, plundering, and forced relocation imposed upon the Muslim Bosnians.<sup>91</sup> Because of the war, many Bosnians fled to military-protected "safe areas" or enclaves established by the UN. Srebrenica was a small town designated to be a safe area, (see Map 2), it was protected for two years, but fell in 1995 fell to Serbian forces. This led to some of the deadliest days in the Bosnian Genocide, in which 7,749 people were killed, and more were left traumatized, brutalized, and alone.<sup>92</sup>

Unfortunately, violence against women during times of war and genocide is frequently underexamined and the research on Srebrenica and Bosnia widely proves no different. Though

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<sup>87</sup> Brenda Farnell and Charles R. Varela, "The Second Somatic Revolution," *Journal for the Theory of Social Behaviour* 34, no 3 (2008).

<sup>88</sup> Norma C. Ware and Arthur Kleinman, "Culture and Somatic Experience: The Social Course of Illness in Neurasthenia and Chronic Fatigue Syndrome," *Psychosomatic Medicine* 54 (1992): 554.

<sup>89</sup> Ware and Kleinman, "Culture and Somatic Experience," 550.

<sup>90</sup> Ware and Kleinman, "Culture and Somatic Experience," 546-547.

<sup>91</sup> Leydesdorff, "Narratives," 250.

<sup>92</sup> Leydesdorff, "Narratives," 250-251.

previous literature has shown the horrors of genocidal mass killings, this research often fails to recognize the gendered aspect of this violence.<sup>93</sup> Sex-based crimes can go unnoticed due to cultural conditions and taboos, less visible traumas, and the discomfort that victims and survivors can face when seeking support.<sup>94</sup> The practice of sexual violence in conflict and wartime not only increases but also culturally creates a more masculinized and militarized society.<sup>95</sup> Militarization can encourage bonding between male perpetrators, creating a culture between them in which the “opposing” women’s bodies become their battleground and a way of eradicating the “social pollution.”<sup>96</sup> The women of Bosnia faced all these factors of gender violence, militarization, and masculinization both of and around their bodies.

For children of rape, the perpetrators constructed identity. In Bosniak and Serbian culture, with patrilineal kinship, men have been socially constructed to be seen as the continuation of the family, and thus the children of these rapes took on the father’s identity.<sup>97</sup>

In using this cultural approach to kinship, the Serbs exploited this to create more Serbs as part of the effort to ethnic cleanse the Bosniaks, as seen in the likening to social pollutants. One slogan used by the Serbian forces stated, “You will give birth to a Chetnik (Serbian) soldier.”<sup>98</sup> This view subordinated the women in their ethnic understanding of self by causing Bosniak women to view their ethnic belonging as a threat. But the women’s ethnic views of themselves also played a role in how they viewed their children that came from this violent and traumatic experience.<sup>99</sup> The women giving birth to children of rape found it hard to detach from viewing their children as being born of the killer and rapist “other.”<sup>100</sup> One survivor stated in an interview that when she looked at her child she felt “it was responsible, responsible for everything that happened.”<sup>101</sup> This trauma forced many women to make the difficult choice to abandon their children. Women who chose to keep the children often reported that the child became the “embodiment of their trauma and violence.”<sup>102</sup> Even years after the war, these children continued to embody the violence women faced. One child of rape stated that “She [his mother] got what

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<sup>93</sup> Joyce W. Warren, “Preface,” in *Women and Genocide: Survivors, Victims, Perpetrators*, ed. Elissa Bemporad and Joyce W. Warren (Bloomington: Indiana University Press, 2018), xi.

<sup>94</sup> Sally Engle Merry, *Gender Violence: A Cultural Perspective* (West Sussex: Wiley-Blackwell, 2009), 174.

<sup>95</sup> Merry, *Gender Violence*, 1.

<sup>96</sup> Bemporad “Memory,” 2.

<sup>97</sup> Marie-Eve Hamel. “Ethnic Belonging of the Children Born out of Rape in Postconflict Bosnia-Herzegovina and Rwanda,” *Nations and Nationalism* 22, no. 2 (2016): 296.

<sup>98</sup> Hamel, “Ethnic Belonging,” 295.

<sup>99</sup> Hamel, “Ethnic Belonging,” 291.

<sup>100</sup> SW Pictures, “Bosnia’s Rape Children,” 2005, <https://video.alexanderstreet.com/watch/bosnia-s-rape-children>.

<sup>101</sup> SW Pictures, “Bosnian’s Rape Children.”

<sup>102</sup> Hamel, “Ethnic Belonging,” 298.

she asked for.”<sup>103</sup> The trauma and violence women face influence how women choose to speak about their experiences.

In the decade following the genocide, Leydesdorff (2018) interviewed women survivors in Bosnia and refugee camps. She found that many women were hesitant to speak out about their own sexual violence or about the subject more broadly.<sup>104</sup> Women felt shame and mourned not only their loss of personal safety but also the loss of safety in their communities.<sup>105</sup> A very common story for women all over Bosnia is the very personal trauma of both losing male family members and also being violated. This data suggests a need for trauma recovery for survivors in Bosnia, as well as women in the diaspora who fled Bosnia after the genocide ended. Comtesse et al. (2019) studied mental health following the Bosnian genocide and found that the survivor’s settlement location influenced their mental health outcomes 11 years after the genocide ended.

These mental health outcomes examined the female survivors’ psychological levels by measuring and evaluating psychological markers. These markers included phobic anxiety, interpersonal sensitivity, depression, hostility, paranoid ideation, and obsessive compulsion. Among the women who had stayed in the war zone, psychological levels on a five-point scale – from 0 meaning no psychological markers to 5 meaning high psychological markers - decreased; those who resettled had persistent psychological distress, and those who returned to Bosnia after a period in a refugee camp had increased psychological distress on the same five-point scale.<sup>106</sup> This distress manifested in different ways for individuals of all groups studied, ultimately leading to somatization for some individuals; including neurological issues like persistent headache and fatigue, and digestive issues, including nausea, vomiting, general abdominal pain, constipation, and diarrhea.<sup>107</sup> For those who remained and those who returned to Bosnia, this somatization was lower than the somatization levels experienced by those who moved to new countries and stayed there. The somatization in groups who moved away permanently is also frequently paired with obsessive-compulsive disorder, anxiety, hostility, paranoid ideation, and depression.<sup>108</sup>

## Discussion

For women in post-genocide Bosnia, rebuilding their communities had a deep impact as it was the healing of rebuilding that they sought out. Many neighborhoods and buildings were destroyed and left in shambles and to compound this tragedy, many found it difficult to seek out institutional aid due to the state of the nation.<sup>109</sup> In post-genocide Bosnia, many professional biomedical healers like doctors and nurses helped to treat people at therapy centers. For instance,

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<sup>103</sup> SW Pictures, “Bosnian’s Rape Children.”

<sup>104</sup> Leydesdorff, “Narratives.”

<sup>105</sup> Leydesdorff, “Narratives,” 257.

<sup>106</sup> Comtesse et al. “Long-Term Psychological Distress of Bosnian War Survivors: an 11-Year Follow-Up of Former Displaced Persons, Returnees, and Stayers,” *BCM Psychiatry* 19, no. 1 (2019): 6, 9.

<sup>107</sup> Comtesse, “Long-Term,” 6-7.

<sup>108</sup> Comtesse, “Long-Term,” 6.

<sup>109</sup> Merry, *Gender Violence*, 156.

Medica Zenica in central Bosnia which aimed to treat people who have experienced sexual violence with targeted treatments for post-traumatic stress disorder, family problems, and illnesses associated with violence.<sup>110</sup> However, professional biomedical care was scarce in the country due to the lack of medical infrastructure before the war. The lack of medical infrastructure manifested in post-war time as high-fee, low-benefit scarcely placed medical institutions which only served 5% of the population.<sup>111</sup> The lack of biomedical care was only exacerbated after the war as high numbers of professional doctors and nurses left the country during the conflict.<sup>112</sup>

Many Bosnian women accessed folk-based healing and community rebuilding due to Bosnia's deep history of folk healing it was not surprising women sought out the common practice. One example is the healing intervention of *strava* which aims to rid the body of anxiety and depression. *Strava* is imbued water which is carefully prayed on by the individual administering it.<sup>113</sup> One study observed the *strava* treatment had a high efficacy within smaller towns with more local connections, where many older Bosnian women choose to seek out traditional forms of healing due to the lack of biomedical assistance and availability as well as the historical precedent of this healing in the past.<sup>114</sup>

Many *strava* practitioners also participated in public health imitative of community-based mental health groups. Following the genocide, many women engaged with both *strava* and community-based mental health groups because many women saw healing as necessary. *Strava* healers could also heal by drawing on their traditional *strava* healing but also by leading conversations about mental health.<sup>115</sup>

Community-building often involved conversations that allowed women to speak through their mental health struggles and further enabled communal rebuilding and healing. Many women decided to address the hurt and suffering they saw in their communities by organizing support groups which led to improved undisclosed psychological outcomes – as seen on the five-point scale - that were far better than those for women who did not participate in them.<sup>116</sup> Corroborated by the findings of Comtesse et al. (2019) there were lower levels of physical somatization among women who participated in support groups compared to women who did not

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<sup>110</sup> Vize, "Trying," 366.

<sup>111</sup> Vladimir J Šimunović, "Health Care in Bosnia and Herzegovina Before, During, and After 1992-1995 War: A Personal Testimony," *Conflict and Health* 1, no. 7 (2007): 3.

<sup>112</sup> Šimunović, "Health Care," 2; Mohamed H. Elzarka, "Mental Health in Bosnia and Herzegovina: Situational Assessment and Policy Recommendations" (Master's Thesis, University of Cincinnati, 2019), 29-30.

<sup>113</sup> Larisa Jasarevic, "Pouring Out Postsocialist Fears: Practical Metaphysics of a Therapy at a Distance," *Comparative Studies in Society and History* 54, no. 4 (2021): 915-916.

<sup>114</sup> Jasarevic, "Pouring Out," 923-924.

<sup>115</sup> Jasarevic, "Pouring Out," 914-915 and Elzarka, "Mental Health," 27.

<sup>116</sup> Inclusive Security, "Bosnian Women Reclaim Peace," Accessed October 10, 2021.

<https://www.inclusivesecurity.org/bosnian-women-after-srebrenica-massacre/#home>; Elzarka, "Mental Health," 16.



participate in them. Some women who stayed in Bosnia following the war found themselves empowered to create peace in their own communities. Vesna Kisić, an ethnically Bosnian woman married to a Serb who remained in Bosnia during the conflict, found herself advocating for women's greater engagement with the political process in post-genocide Bosnia, and in the process, she "founded a community that helped with mental needs."<sup>117</sup> For Kisić, "Ethnic backgrounds aren't essential to us in our work. We understand each other very well. Why wouldn't we? We're all women."<sup>118</sup> Bound together by their identity as women, Kisić and her brought meals to elderly neighbors, took care of children for mothers in need and removed rubble in their neighborhoods to rebuild the community in a tangible way.<sup>119</sup>

On a much broader scale, the female-founded and UN-sponsored group, Inclusive Security, aims to help women reclaim both mental and physical peace within their home countries after the war.<sup>120</sup> Inclusive Security argues there is no doubt that these community groups, with friends and family open to listening and helping, had a role in how women were able to reclaim their sense of self.<sup>121</sup> Similarly, Elzarka (2016), in a public health assessment on mental health in Bosnia, stated that community engagements within community building were highly successful. These engagements addressed the mental health concerns and significant challenges that women faced in Bosnia.<sup>122</sup> These groups included women from differing backgrounds, including both Bosniak and Serb women who came together for the community.<sup>123</sup> Before the foreign intervention, women were "the one group that consistently reached across ethnic lines, braving sniper fire to mobilize for peace."<sup>124</sup>

As previously mentioned, women of Srebrenica showed particular bravery in reaching out over ethnic lines, as previously mentioned at the beginning of this article. Years later in Srebrenica there are mass graves, fields of landmines, and perpetually empty and abandoned houses that serve as reminders of the loss.<sup>125</sup> These palpable losses have caused far greater needs for community engagement. Alongside public health efforts to improve mental health, community-led commemorative gatherings at sites for remembrance of the loss aid in community engagement.<sup>126</sup> These multi-ethnic gatherings enabled women to engage with the multiplicity of their identities and rethink their belonging within the community. This

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<sup>117</sup> Inclusive Security, "Bosnian Women."

<sup>118</sup> Inclusive Security, "Bosnian Women."

<sup>119</sup> Inclusive Security, "Bosnian Women."

<sup>120</sup> Inclusive Security, "Bosnian Women."

<sup>121</sup> Inclusive Security, "Bosnian Women."

<sup>122</sup> Elzarka, "Mental Health," 31.

<sup>123</sup> Elzarka, "Mental Health," 18.

<sup>124</sup> Inclusive Security, "Bosnian Women."

<sup>125</sup> Aida A. Hozić. "Writing After the Genocide: Lessons from Srebrenica and the Meaning of Community After Violence," *Journal of Muslim Minority Affairs* 35, no. 3 (2015): 427.

<sup>126</sup> Janet Jacobs. "The Memorial at Srebrenica: Gender and the Social Meanings of Collective Memory in Bosnia-Herzegovina," *Memory Studies* 10, no. 4 (2017).

engagement finally allowed a dialogue between the Bosniaks and the Serbs, in one of the bloodiest regions of the conflict.<sup>127</sup>

At the beginning of the conflict, Srebrenica was deemed a “safe area” or “safe enclave” for Muslim Bosnians and was protected by the UN peacekeepers. Many of these peacekeepers in the region were Dutch and followed the orders of the UN and the Dutch military. In 1995, the Dutch broke their protection and allowed Christian Serbs to enter the safe enclave, with this it became the bloodiest time in the Bosnian conflict.<sup>128</sup> A collection of women who lost loved ones in the genocide came together to bring a case against the Netherlands as they were the ones tasked with stopping the Serbian forces from allowing the bloodshed to ensue.<sup>129</sup> These women formed a group called the “Mothers of Srebrenica” to fight for the visibility of survivors and those lost in Srebrenica and to help foster a community that bridged the gap between Bosnian and Serbian survivors in Srebrenica.<sup>130</sup> The founder of the group, Hatidza Mehmedovic, stated that the women came together living through the memories of their children who perished during the genocide.<sup>131</sup>

As another example, the previously mentioned Vesna Kisic, created “Antonia,” a smaller satellite group housed within the UN-funded Inclusive Security group.<sup>132</sup> In Antonia, women volunteered their time to care for the elderly, educate other women, and generally meet the needs of the community. She stated that this time, in which women from her community came together to help one another, caused her to finally see a future in her life.<sup>133</sup> Similarly, other community-based mental health organizations have argued that the mere existence of mental health organizations has brought hope to smaller underserved communities and that there is “now no way to return to institutionally based care.”<sup>134</sup> As Leydesdorff states “suffering seems individual but is collective,” with this understanding of these community-based mental health organizations in Bosnia, as well as the documented mental health outcomes in populations of survivors that stayed in Bosnia, one may conclude that these community-based healing systems, in the form of

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<sup>127</sup> Hozic, “Writing,” 426.

<sup>128</sup> Leydesdorff, “Narratives.”

<sup>129</sup> Ryngaert, Cedric and Kushtrim Istrefi, “Introduction: Special Issue ‘The Legacy of the *Mothers of Srebrenica Case*,” *Utrecht Journal of International and European Law* 36 no. 2 (2021): 114-115.

<sup>130</sup> Jasmina Rose, “‘Mothers of Srebrenica’ Justice Advocate Hatidza Mehmedovic Dies,” *Deutsche Welle*, July 24, 2018. <https://www.dw.com/en/mothers-of-srebrenica-justice-advocate-hatidza-mehmedovic-dies/a-44798537>.

<sup>131</sup> Rose, “Mothers of Srebrenica.”

<sup>132</sup> Inclusive Security, “Bosnian Women.”

<sup>133</sup> Inclusive Security, “Bosnian Women.”

<sup>134</sup> Lagerkvist et al., “The Swedish Support to Bosnia Herzegovina: Rebuilding Mental Health Services After the War,” *Intervention* 11 no. 3 (2013): 256.

help, aid, and community mental health services, assisted in the positive mental health of female survivors in Bosnia.<sup>135</sup>

Women who fled to the United States also express a deep loss that permeates their being. A female informant in the Bosnian diaspora in America explained to Hutton (2005) her conceptions of home as “the mundane details of everyday life, the taken-for-granted nature of life that she misses, besides the dense and caring social network.”<sup>136</sup> This coincides with research done by Karamelic-Muratovic and Cheah (2012) that looked at community mental health for those seen as “new Americans.” Their research concluded that there is greater psychological symptomology in Bosnian refugees in the United States than among those who remained in Bosnia.<sup>137</sup> The psychological symptomology outlined in their study includes PTSD, major depressive disorder (MDD), chronic pain, and other undefined somatic complaints. One of the reasons mental health outcomes for refugee populations is lower are the barriers that Bosnian refugees face. Refugees face a slew of barriers that may explain why mental health outcomes are worse for Bosnian women in the diaspora. These barriers include lack of knowledge of the American healthcare system, not feeling confident in their English to speak with healthcare workers, and hesitancy to seek out care.<sup>138</sup>

Lepper et al. (2017) synthesized the above studies and found that women consistently ranked higher than men in the categories “worrying a lot, feeling tired or sleepy, being fidgety, restless, nervous, or tense, sleeping too much or too little, and doing or thinking something over and over to get rid of unpleasant feelings.”<sup>139</sup> While refugee women had better access to hospitals and licensed professionals in the United States, women who remained in Bosnia and sought out community groups reported better mental health outcomes compared to women who did not use these resources.

Community groups in Bosnia likely result in better mental health outcomes because they allow women with similar traumatic experiences to feel safe sharing their stories. Leydesdorff’s (2018) interviews with multiple female survivors of the Bosnian genocide revealed that women often do not feel comfortable speaking to outsiders about their experiences.<sup>140</sup> However, when in

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<sup>135</sup> Leydesdorff, “Narratives,” 265.

<sup>136</sup> Laura Huttunen. “‘Home’ and Ethnicity in the Context of War: Hesitant Diasporas of Bosnian Refugees,” *European Journal of Cultural Studies* 8, no. 2 (2005): 181.

<sup>137</sup> in Lepper et al. “Mental Health Screaming in a Bosnian Refugee Population Using the Primary Care Behavioral Health screener – Bosnian Translation,” *Journal of Clinical Psychology in Medical Settings* 24 (2017).

<sup>138</sup> Craig et al., “Complicated Grief and Its Relationship to Mental Health and Well-Being Among Bosnian Refugees After Resettlement in the United States: Implications for Practice, Policy, and Research,” *Traumatology* 14, no. 4 (2008).

<sup>139</sup> Lepper et al. “Mental Health Screaming in a Bosnian Refugee Population Using the Primary Care Behavioral Health screener – Bosnian Translation,” *Journal of Clinical Psychology in Medical Settings* 24 (2017).

<sup>140</sup> Leydesdorff, “Narratives,” 257.

the company of women who have the same experiences and Muslim upbringing, they begin to feel more comfortable sharing, thus allowing women to grapple with, grow from, and heal from the trauma that they experienced.<sup>141</sup> With the understanding of Kleinman's theory of socio-somatization, the data suggest that improved mental health outcomes help reduce the occurrence of somatization. The links of body and emotion and their changing situation from genocidal struggle to more community-based groups of recovery highlights the diminishing of socio-somatization.<sup>142</sup> However, decreased somatization was not observed in women in the United States who do not have this access to the community of women rebuilding. So, by understanding the experiences of mental health services available to women who remained in Bosnia and refugee women who are refugees in the United States we come to see a picture that there are consistently more favorable mental health outcomes for women residing in Bosnia. I argue this is possibly in part due to the lack of community groups and volunteer work within their community of origin in the United States. But also may be compounded by the difficulty of being a refugee in a new country, navigating a new culture, and grappling with the loss of family both through death and relocation.

## Conclusion

Through highlighting the history of the genocide and women's roles during it, an understanding of different community groups in Bosnia, and a comprehensive look at an 11-year study of female Bosnian genocide survivors, I aim to show that Bosnian community-based healing is rewarding both personally and collectively and more successful than individual healing for refugees in the United States. The individual reward is found in the women's favorable experiences with their communities created after the conflict and in the women's positive health outcomes; as exemplified by Vesna Kisic. Furthermore, the success of community-based mental health centers, smaller community aid groups like Antonia, and more global groups like the UN-supported group Inclusive Security depict the collective benefits of Bosnian community-based healing.

The loss of family and friendship during the genocide "mingles with a ... loss of trust in the world. The survivors are left with unsettling grief, mourning, and conflicting emotions, with no stable sense of normalcy to provide a counterbalance."<sup>143</sup> Yet with the community of Bosnian women helping to rebuild, this grief and mourning have changed; now a shared understanding of the pain and trauma of the gendered experience of the genocide has emerged due to the community's encouragement of sharing trauma. And within this understanding of the pain and trauma, there emerges a goal to work towards the bettering of the community in hopes of honoring the dead. "We honor the dead and show that we really mean it when we say 'Never

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<sup>141</sup> Leydesdorff, "Narratives," 263.

<sup>142</sup> Norma C. Ware and Aurthur Kleinman, "Culture and Somatic Experience: The Social Course of Illness in Neurasthenia and Chronic Fatigue Syndrome," *Psychosomatic Medicine* 54 (1992).

<sup>143</sup> Leydesdorff, "Narratives," 267.

again’.”<sup>144</sup> Despite the lack of accessible biomedical institutions, many women found resilience by creating a safe space to recover from their pain and tragedy which allows for more personal, community-based healing.

### Authors Note

While I am not ethnically Bosnian, nor from the region, I believe that my stance as an outsider to the conversation is able to provide a new and interesting perspective. As I do not have any stake in the conversation, I believe that I am able to approach the conversation of post-genocide healing without an opinion of the efficacy of one healing mode over another. However, I do acknowledge that I was born and socialized in the United States and that as a non-Muslim person I might not completely grasp how those with this identity were affected during the genocide. Yet, I aim to show how women’s community healing helped in rebuilding, which crossed identities for both Christian and Muslim Serbian and Bosnian women; thus, I do not consider this lack of identity to be pertinent to the overall argument.

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<sup>144</sup> Swanee Hunt In Inclusive Security, “Bosnian Women.”

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## Appendix



**Map 1:** Map of the former Yugoslavia and the current nations.<sup>145</sup>

<sup>145</sup> United Nations, Socialist Federal Republic of Yugoslavia [map], “United Nations International Criminal Tribunal for the former Yugoslavia,” <https://www.icty.org/en/about/what-former-yugoslavia>, accessed April 1, 2022.





**Map 2:** Current map of Bosnia and Herzegovina denoting Sarajevo and Srebrenica.<sup>146</sup>

<sup>146</sup> Financial Times, Map, "Srebrenica Massacre Continues to Cast Long Shadow Over Balkans," <https://www.ft.com/content/88f57bae-262c-11e5-9c4e-a775d2b173ca>. Published July 10, 2015.



## Palaeonictis occidentalis Reconstruction

Jenny Lee

### Abstract

The most dominant order of the North American Eocene (~56-33 Mya) was Creodonta, which included a weasel or cat-like animal from the family *Oxyaenidae*. Previous analyses of these extinct carnivores suggested that their dentition and jaw shape gave them bone-crushing abilities, similar to modern hyenas. However, this has never been tested. Here, I hope to gain a better understanding of the diet of these extinct carnivores by using 3D technology to reconstruct the bite force and infer the diet of an extinct *Oxyaenidae* member. I analyzed a partial skull of a 56.8-48.6 million-year-old fossil carnivore from Carnegie Mellon University creating a virtual reconstruction of the skull to calculate bite force and bone crushing abilities. The results suggest that this extinct carnivore was incapable of bone-crushing and instead adapted to flesh-eating and slicing – similar to the modern gray wolf. My analysis provides a clearer picture of dietary evolution within carnivores and suggests that variation in diet became established by the Eocene when both bone crushers and flesh slicers competed for prey.

### Introduction

Although much has been learned about extinct carnivores, little is known about dietary capabilities – specifically, bite force and implied dietary behaviors. Fossil reconstruction is often difficult because fossil specimens are typically broken and incomplete. As a result, 3D digital models of bone morphology are frequently used in paleontology and anthropology.<sup>147</sup> Turning a fossil into a digitalized, 3D model can enable measurements, dissections, mirroring, and many manipulations typically not directly possible with the fossil remains.<sup>148</sup>

Due to the fragmented nature of the fossil record, minimal research exists on the bite force or dietary behaviors of *Palaeonictis occidentalis* or most *Oxyaena* species. Here, I aim to shed light on the ecology and dietary behavior of the early Eocene carnivores by digitally reconstructing a fossil specimen of *Palaeonictis occidentalis* (CM 8955). I reconstruct diet by calculating bite force and body size, and I compare this data to modern carnivores of varying dietary specialties to discern *Palaeonictis*' bone crushing or flesh slicing adaptations.

I hypothesize that modern forms of carnivory evolved in the Eocene and can be observed in fossil specimens from this epoch. To test this, I ask the following questions:

- 1) What is the bite force of *Palaeonictis occidentalis* (CM 8955)?
- 2) What is the dietary behavior of the *Palaeonictis occidentalis* (CM 8955)?

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<sup>147</sup> Molnar, JL, SE Pierce, JA Clack, and JR Hutchinson. "Idealized Landmark-Based Geometric Reconstructions of Poorly Preserved Fossil Material: A Case Study of an Early Tetrapod Vertebra." *Palaeontologia Electronica*, 2012. <https://doi.org/10.26879/274>.

<sup>148</sup> Molnar et al., "Idealized Landmark Reconstruction", 2012.

I made the following predictions regarding *Palaeonictis occidentalis* (CM 8955):

- 1) If *Palaeonictis occidentalis* is a bone cruncher then dental morphology and bite force will be most similar to *Crocuta crocuta*<sup>149</sup> (spotted hyena).
- 2) If *Palaeonictis occidentalis* is a flesh eater, then its dental morphology and bite force will be most similar to *Canis lupus lupus* (gray wolf).

## Background

### Carnivores

In order to truly understand how modern-day carnivores evolved to these unique adaptations and dietary behaviors, past carnivory needs to be examined. Studying some of the first carnivores helps create an image of how different types of carnivory evolved – in this case, how bone crunching evolved.

Carnivores require a high amount of animal protein in their diet to survive resulting in anatomical adaptations that facilitate mastication of meat, including enlarged canines, a carnassial pair, and relatively high bite force.<sup>150</sup> Carnassial dentition consists of a pair of teeth, one upper and one lower, on either side of the jaw, which are enlarged and fit to form a slicing tool affording efficient meat-eating.<sup>151</sup> Most carnivores will have a carnassial pair and enlarged canine teeth, which receive the maximum bite force used for biting and consuming meat.<sup>152</sup> The major masticatory muscles that affect bite force are the jaw adductor muscles: *M. masseter*, *M. temporalis*, *M. pterygoideus lateralis*, and *M. pterygoideus medialis*.<sup>153</sup> These muscles control jaw movement and bite force.<sup>154</sup> The bite force is a measure of force the masticatory muscles place on the occlusal surface of teeth, often measured in Newtons (N).<sup>155</sup> Additionally, the

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<sup>149</sup> Erxleben, Johann Christian Polycarp. *Systema Regni Animalis per Classes, Ordines, Genera, Species, Varietates: Cum Synonymia Et Historia Animalium*. Impensis Weygandianis, 1777.

<sup>150</sup> Bellani, Giovanni G. "Order of Carnivores (Carnivora)." Essay. In *Felines of the World: Discoveries in Taxonomic Classification and History*, 1–12. London, England: Academic Press, 2019. <https://www.sciencedirect.com/book/9780128165034/felines-of-the-world>; Bellani, "Order of Carnivores," 2019; Ginsberg, Joshua R. "Mammals, Biodiversity Of." *Encyclopedia of Biodiversity*, 2013, 681–707. <https://doi.org/10.1016/b978-0-12-384719-5.00089-7>.

<sup>151</sup> Ginsberg, "Mammals, Biodiversity Of" 2013.

<sup>152</sup> Ibid.

<sup>153</sup> Wiersma, Jonathan H. "Maximum Estimated Bite Force, Skull Morphology, and Primary Prey Size in North American Carnivores." *National Library of Canada*, July 2001, 1–179. <https://www.bac-lac.gc.ca/eng/Pages/home.aspx>; Kim, Se Eun, Boaz Arzi, Tanya C. Garcia, and Frank J. Verstraete. "Bite Forces and Their Measurement in Dogs and Cats." *Frontiers in Veterinary Science* 5 (2018). <https://doi.org/10.3389/fvets.2018.00076>.

<sup>154</sup> Kim et al., "Bite Forces," 2018.

<sup>155</sup> Gu, Yingzhi, Yuxing Bai, and Xianju Xie. "Bite Force Transducers and Measurement Devices." *Frontiers in Bioengineering and Biotechnology* 9 (2021). <https://doi.org/10.3389/fbioe.2021.665081>.

temporomandibular joint (TMJ) acts as the pivot point for all lever arms formed by the masticatory muscles.<sup>156</sup>

### Fossil Specimen

Specimen CM 8955 was loaned from the Carnegie Museum of Natural History (see *Images 1-5*).<sup>157</sup> The collected components include: a crushed skull, left and right mandibles (incomplete, with associated fragments), and fragmented postcranials. The specimen was found in Shooty Gulch, CO, by J Leroy Kay in 1948 who originally identified it as *Oxyaena sp.*, however, B. Burger added a note on October 8, 2010, stating “*Palaeonictis occidentalis*, smaller than *Oxyaena sp.*, compare with AMNH 110, holotype.” Because this comparison has not been done, both *Palaeonictis occidentalis* and the genus *Oxyaena* are considered.

### Past Carnivory

The order Creodonta<sup>158</sup> lived from the late Cretaceous (~65 Mya) until their extinction during the Miocene, with the last Creodont members going extinct around 9 Mya.<sup>159</sup> During this time the planet was warmer and lacked polar ice caps with minimal temperature variations seasonally or latitudinally.<sup>160</sup> By the late early Eocene (50-52 Mya), temperatures peaked and created the Early Eocene Climatic Optimum with mean annual temperatures over 22° C (71.6° F).<sup>161</sup> Tropical rainforests with mean annual temperatures of 13° C (55° F) to over 15° C (59° F) covered much of North America at the end of the Paleocene.<sup>162</sup> It is during this tropical period in North America that many modern lineages evolved. In fact, the name Eocene is derived from the Greek “*eos*,” meaning “dawn,” giving reference to this epoch initiating the age of modern mammals, including carnivores.

Creodonts not only coexisted with the first Primates, but they also lived through the birth of the still extant order Carnivora for many years.<sup>163</sup> Creodonts are larger than Carnivora, and some were adapted to hypercarnivory.<sup>164</sup> The reason behind the Creodont extinction remains unknown. One hypothesis suggests extinction occurred due to both increasing competition with

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<sup>156</sup> Ibid.

<sup>157</sup> Loaned by the Vertebrate Paleontology collection manager, Amy Herenci. Collected by J. Leroy Kay in 1948, Shooty Gulch, CO (locality 1878), dated to the Early Eocene.

<sup>158</sup> Cope, Edward D. *On the Supposed Carnivora of the Eocene of the Rocky Mountains*. Proceedings of the Academy of Natural Sciences, 1875.

<sup>159</sup> Feldhamer, George A., Joseph F. Merritt, Carey Krajewski, Janet L. Rachlow, and Kelley M. Stewart. *Mammalogy: Adaptation, Diversity, Ecology*. 5th ed. Johns Hopkins University Press, 2020; “Creodonta.” Encyclopaedia Britannica. Encyclopaedia Britannica, Inc. Accessed February 23, 2021. <https://www.britannica.com/animal/Creodonta>.

<sup>160</sup> Rose, Kenneth D. *The Beginning of the Age of Mammals*. The Johns Hopkins University Press, 2006.

<sup>161</sup> Ibid.

<sup>162</sup> Ibid.

<sup>163</sup> Rose, *The Beginning of the Age of Mammals*, 2006.

<sup>164</sup> Ibid.

Carnivora and climate change after the middle Eocene.<sup>165</sup> A more recent study suggests that despite the competition, overspecialization seen in the last living creodonts likely caused their extinction, as Carnivora's more generalized carnivory gave them an evolutionary advantage.<sup>166</sup>

The family *Oxyaenidae*, which went extinct in the late Eocene, were long with short bodies, broad skulls, and deep mandibles.<sup>167</sup> Postcranial evidence suggests that they were most likely plantigrade (walking with palms on the substrate), with some features of an arboreal ancestry.<sup>168</sup> Both genus *Oxyaena* and *Palaeonictis* dispersed to Europe around the early Eocene and appeared to be terrestrial.<sup>169</sup>

The genus *Oxyaena*<sup>170</sup> falls under the subfamily *Oxyaeninae*, family *Oxyaenidae*, order Creodonta, and there are seven known species: *O. lupina*,<sup>171</sup> *O. gulo*,<sup>172</sup> *O. intermedia*,<sup>173</sup> *O. forcipata*,<sup>174</sup> *O. simpsoni*,<sup>175</sup> *O. pardalis*,<sup>176</sup> and *O. woutersi*.<sup>177</sup> *Oxyaena gulo* shows greater adaptations for shearing in the carnassials in comparison to sister taxa of the genus *Oxyaena*, but

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<sup>165</sup> Janis, Christine M., Kathleen M. Scott, Louis L. Jacobs, Gregg F. Gunnell, and Mark D. Uhen. *Evolution of Tertiary Mammals of North America Volume 1, Terrestrial Carnivores, Ungulates, and Ungulate like Mammals*. 1. Vol. 1. Cambridge University Press, 1998.

<sup>166</sup> Christison, Brigid Emily. "Testing the Competition Hypothesis: How Niche Overlap between Carnivoramorphans and Creodonts Changed from the Start to the End of the Eocene." *Carleton University Research Virtual Environment*, 2020, 1–124. <https://doi.org/10.22215/etd/2021-14358>.

<sup>167</sup> Rose, *The Beginning of the Age of Mammals*, 2006.

<sup>168</sup> Ibid.

<sup>169</sup> Ibid.

<sup>170</sup> Cope, Edward D. *Report upon Vertebrate Fossils Discovered in New Mexico, with Descriptions of New Species*. Government Printing Office, 1874.

<sup>171</sup> Ibid.

<sup>172</sup> Matthew, William Diller, and Walter Granger. *A Revision of the Lower Eocene Wasatch and Wind River Faunas*. Published by order of the Trustees, American Museum of Natural History, 1915.

<sup>173</sup> Denison, Robert Howland. "The Broad-Skulled Pseudocreodi." *Annals of the New York Academy of Sciences* 37, no. 1 (May 1938): 163–255. <https://doi.org/10.1111/j.1749-6632.1937.tb55483.x>.

<sup>174</sup> Cope, *Report upon Vertebrate*, 1874.

<sup>175</sup> Van Valen, Leigh. *Deltatheridia, a New Order of Mammals*. 132. Vol. 132. Bulletin American Museum of Natural History, 1966.

<sup>176</sup> Matthew and Granger, *A Revision of the Lower Eocene*, 1915.

<sup>177</sup> Smith, T., and R. Smith. "The Creodonts (Mammalia, Ferae) from the Paleocene-Eocene Transition in Belgium (Tienen Formation, MP7)." *Belgian Journal of Zoology* 131, no. 2 (2001): 117–35; Solé, Floréal, Emmanuel Gheerbrant, and Marc Godinot. "New Data on the Oxyaenidae from the Early Eocene of Europe; Biostratigraphic, Paleobiogeographic and Paleocologic Implications." *Palaeontologia Electronica* 14, no. 2 (2011): 1–41. [https://palaeo-electronica.org/2011\\_2/258/index.html](https://palaeo-electronica.org/2011_2/258/index.html); Gunnell, Gregg F., and Philip D. Gingerich. "Systemics And Evolution Of Late Paleocene And Early Eocene Oxyaenidae (Mammalia, Creodonta) In The Clarks Fork Basin, Wyoming." *Contributions From The Museum Of Paleontology The University Of Michigan* 28, no. 7 (September 30, 1991): 141–80.

not to the degree of *O. intermedia*.<sup>178</sup> *Oxyaena intermedia* is much larger than *O. gulo* and it is mildly smaller in size compared to *O. forcipata*.<sup>179</sup>

The genus *Palaeonictis*<sup>180</sup> falls under the subfamily *Palaeonictinae*,<sup>181</sup> family *Oxyaenidae*, order Creodonta, and there are four known species: *P. gigantea*,<sup>182</sup> *P. occidentalis*,<sup>183</sup> *P. peloria*,<sup>184</sup> and *P. wingi*.<sup>185</sup> *Palaeonictis* lived from the late Paleocene through the early Eocene (56.8–48.6 Mya) throughout North America and Europe, with *P. occidentalis*, *P. wingi*, and *P. peloria* found in North America, and *P. gigantea* in Europe.<sup>186</sup> *Palaeonictis occidentalis* is most closely related to *P. wingi* and it is believed *P. wingi* gave rise to *P. occidentalis* after the Paleocene-Eocene Thermal Maximum (PETM) global warming event (~55.8 Mya).<sup>187</sup> *Palaeonictis occidentalis* lived the longest of all four *Palaeonictis* species.<sup>188</sup> A full skeleton of *P. occidentalis* from the Lower Eocene reported on by Sinclair and Jepsen, showed evidence for a low, powerful body with a long tail, and a possibility for bone-crushing.<sup>189</sup> Dietary analyses done on *Palaeonictis sp.* have shown that although it mainly ate meat, it was not an obligatory carnivore.<sup>190</sup> Chester et al. argued that means it was possibly the most derived species of *Palaeonictis*.<sup>191</sup> The M<sup>2</sup> is reduced similarly to the first molar in extant Felids.<sup>192</sup> There are variances in the mandibular depth found in *P. occidentalis*, which could be from sexual dimorphism; *P. wingi* showed variances in diastema size between P<sub>2</sub> and P<sub>3</sub>, which could also be sexual dimorphism.<sup>193</sup>

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<sup>178</sup> Gunnell and Gingerich, “Systemics And Evolution,” 1991.

<sup>179</sup> Ibid.

<sup>180</sup> Blainville, H. M. “Des Viverras. Ostéographie Ou Description Iconographique Comparée Du Squelette Et Du Système Dentaire Des Mammifères Récents Et Fossiles Pour Servir De Base à La Zoologie Et à La Géologie.” *J.B. Baillière et Fils*, no. 10 (1839).

<sup>181</sup> Denison, “The Broad-Skulled Pseudocreodi,” 1938.

<sup>182</sup> Blainville, “Des Viverras,” 1839.

<sup>183</sup> Osborn, Henry Fairfield, and J. L. Wortman. “Fossil Mammals of The Wahsatch and Wind River Beds. Collection of 1891.” *Bulletin American Museum of Natural History IV*, no. 1 (1892): 81–147. <https://doi.org/10.5962/bhl.title.154255>.

<sup>184</sup> Rose, Kenneth David. *The Clarkforkian Land-Mammal Age and Mammalian Faunal Composition across the Paleocene-Eocene Boundary*. Museum of Paleontology, University of Michigan, 1981.

<sup>185</sup> Chester, Stephen G., Jonathan I. Bloch, Ross Secord, and Doug M. Boyer. “A New Small-Bodied Species of *Palaeonictis* (Creodonta, Oxyaenidae) from the Paleocene-Eocene Thermal Maximum.” *Journal of Mammalian Evolution* 17, no. 4 (2010): 227–43. <https://doi.org/10.1007/s10914-010-9141-y>.

<sup>186</sup> Solé et al., “New Data on the Oxyaenidae,” 2011.

<sup>187</sup> Chester et al., “A New Small-Bodied Species,” 2010.

<sup>188</sup> Solé et al., “New Data on the Oxyaenidae,” 2011.

<sup>189</sup> Sinclair, William J., and Glenn L. Jepsen. “A Mounted Skeleton of *Palaeonictis*.” *Proceedings of the American Philosophical Society* 68, no. 3 (1929): 163–73. <https://www.jstor.org/stable/984205>.

<sup>190</sup> Chester et al., “A New Small-Bodied Species,” 2010.

<sup>191</sup> Ibid.

<sup>192</sup> Osborn and Wortman, “Fossil Mammals of The Wahsatch,” 1892.

<sup>193</sup> Chester et al., “A New Small-Bodied Species,” 2010.

## Modern Carnivory

Variations in dietary behaviors reflect bite force adaptations. In this study, I examine the behavior and adaptations of bone-crushing abilities. The spotted hyena (*Crocuta crocuta*, family *Hyaenidae*, suborder Feliformia) is one of the most well-known bone crunching carnivores, with a maximum estimated bite force of 4500 N.<sup>194</sup> *Crocuta crocuta* is able to crunch and digest all bone portions due to large and structurally adapted P<sup>3</sup>, P<sub>3</sub>, and P<sub>4</sub> (all part of their carnassial pair).<sup>195</sup> *Crocuta crocuta* has a sinus-filled sagittal crest which enables the skull to withstand heavy stress without increasing skull weight.<sup>196</sup> Hyenas scavenge and hunt in groups, reaching speeds of around 60km/h and often killing the young of larger ungulates, and occasionally adult zebra or buffalo.<sup>197</sup> Since a hyena can eat up to 1/3 of its body weight during one meal and have highly concentrated hydrochloric acid in their stomachs, they represent the most efficient mammal at obtaining nutrients from bones.<sup>198</sup>

The gray wolf (*Canis lupus lupus*, family *Canidae*, suborder Caniformia) does not have the same abilities to crunch bone as *C. crocuta*.<sup>199</sup> *Canis l. lupus* lacks the skull and tooth adaptations of *C. crocuta* that allow for efficient bone consumption. Specifically, the estimated maximum bite force for *C. l. lupus* is only 2255 N.<sup>200</sup> While *Canis l. lupus* can consume bone when necessary, they are ill-equipped for this behavior and bone consumption damages their teeth.<sup>201</sup> Nevertheless, *C. l. lupus* is a successful carnivore and is well adapted for flesh consumption. Living and hunting in packs allow *C. l. lupus* to effectively kill significantly larger animals (e.g., moose, which are roughly 10 times the height of wolves)<sup>202</sup> which make up 56-96% of their diet.<sup>203</sup> For example, in Yellowstone National Park, *C. l. lupus* accounts for 10-15%% of elk calf mortality in the first 30 days of their life.<sup>204</sup>

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<sup>194</sup> Binder, Wendy J., and Blaire Valkenburgh. "Development of Bite Strength and Feeding Behaviour in Juvenile Spotted Hyenas (*Crocuta Crocuta*)." *Journal of Zoology* 252, no. 3 (2000): 273–83. <https://doi.org/10.1111/j.1469-7998.2000.tb00622.x>.

<sup>195</sup> Biknevičius, Audrone R. "Functional Discrimination in the Masticatory Apparatus of Juvenile and Adult Cougars (*Puma Concolor*) and Spotted Hyenas (*Crocuta Crocuta*)." *Canadian Journal of Zoology* 74, no. 10 (1996): 1934–42. <https://doi.org/10.1139/z96-218>.

<sup>196</sup> Ibid.

<sup>197</sup> Macdonald, David W., ed. "Hyena Family." In *The Princeton Encyclopedia of Mammals*, 620–625. Princeton, NJ: Princeton University Press, 2009.

<sup>198</sup> Macdonald, "Hyena Family," 2009; Burnie, David, and Don E. Wilson, eds. *Animal*. 3rd ed. DK Publishing, 2001.

<sup>199</sup> Macdonald, David W., ed. "Wolves." In *The Princeton Encyclopedia of Mammals*, 592–97. Princeton, NJ: Princeton University Press, 2009.

<sup>200</sup> Wiersma, "Maximum Estimated Bite Force," 2001.

<sup>201</sup> Van Valkenburgh, Blaire, Rolf O Peterson, Douglas W Smith, Daniel R Stahler, and John A Vucetich. "Tooth Fracture Frequency in Gray Wolves Reflects Prey Availability." *eLife* 8 (2019). <https://doi.org/10.7554/elife.48628>.

<sup>202</sup> Burnie and Wilson, *Animal*, 2001.

<sup>203</sup> Armstrong, David Michael, James P. Fitzgerald, and Carron A. Meaney. *Mammals of Colorado*. 2nd ed. Denver Museum of Nature & Science, 2011.

<sup>204</sup> Ibid.



Omnivory, seen in many ursids, is also a dietary behavior considered in this study. Bears have the largest skulls of any extant carnivore; however, their morphology reflects herbivorous activity making them omnivores.<sup>205</sup> The grizzly or brown bear (*Ursus arctos horribilis*,<sup>206</sup> family *Ursidae*, suborder Caniformia), has a maximum estimated bite force of 1266.39–1894.9 N.<sup>207</sup> While up to 90% of *U. a. horribilis* diet is plant matter, they also consume meat.<sup>208</sup> *Ursus a. horribilis* kills and consumes many different ungulates, and in Yellowstone National Park they account for 55-60% of elk calf mortality in the first 30 days of their life.<sup>209</sup>

## Methods

### Calculating Bite Force

I calculate bite force following the methods from Wiersma,<sup>210</sup> Christiansen and Adolfssen,<sup>211</sup> and Thomason.<sup>212</sup> Wiersma measurements utilized include: total skull length, length of mandible, cross-sectional length and width of *M. masseter*, cross-sectional length and width of *M. temporalis*, moment arm of *M. temporalis*, and moment arm of *M. masseter/M. pterygoideus medialis*.<sup>213</sup> An additional measurement of jaw joint to center of carnassial and canine from Christiansen and Adolfssen<sup>214</sup> is also used (see *Table 2* and *Table 3*).

Bone-crushing abilities are measured by applying the methods from Marean with the following measurements: P<sup>4</sup> protocone greatest length and breadth, P<sup>3</sup> protocone greatest length and breadth, and the greatest length and breadth of M<sup>1</sup>.<sup>215</sup> The level of bite force required to enable an animal to crush bone is debated within the scientific community. Therefore, to gain

<sup>205</sup> Macdonald, David W., ed. "Bear Family." In *The Princeton Encyclopedia of Mammals*, 574–575. Princeton, NJ: Princeton University Press, 2009.

<sup>206</sup> Linnaeus, Carolus. *Systema Naturae per Regna Tria Naturae, Secundum Classes, Ordines, Genera, Species, Cum Characteribus, Differentiis, Synonymis, Locis*. 10th ed. Editio Decima, 1758.

<sup>207</sup> Christiansen, P. "Evolutionary Implications of Bite Mechanics and Feeding Ecology in Bears." *Journal of Zoology* 272, no. 4 (2007): 423–43. <https://doi.org/10.1111/j.1469-7998.2006.00286.x>; Christiansen, Per, and Stephen Wroe. "Bite Forces and Evolutionary Adaptations To Feeding Ecology in Carnivores." *Ecology* 88, no. 2 (2007): 347–58. [https://doi.org/10.1890/0012-9658\(2007\)88\[347:bfaeat\]2.0.co;2](https://doi.org/10.1890/0012-9658(2007)88[347:bfaeat]2.0.co;2).

<sup>208</sup> Armstrong et al., *Mammals of Colorado*, 2011.

<sup>209</sup> Ibid.

<sup>210</sup> Wiersma, "Maximum Estimated Bite Force," 2001.

<sup>211</sup> Christiansen, Per, and Jan S. Adolfssen. "Bite Forces, Canine Strength and Skull Allometry in Carnivores (Mammalia, Carnivora)." *Journal of Zoology* 266, no. 2 (2005): 133–51. <https://doi.org/10.1017/s0952836905006643>.

<sup>212</sup> Thomason, J. J. "Cranial Strength in Relation to Estimated Biting Forces in Some Mammals." *Canadian Journal of Zoology* 69, no. 9 (September 1, 1991): 2326–33. <https://doi.org/10.1139/z91-327>.

<sup>213</sup> Wiersma, "Maximum Estimated Bite Force," 2001.

<sup>214</sup> Christiansen and Adolfssen, "Bite Forces," 2005.

<sup>215</sup> Marean, Curtis W. "Sabertooth Cats and Their Relevance for Early Hominid Diet and Evolution." *Journal of Human Evolution* 18, no. 6 (1989): 559–82. [https://doi.org/10.1016/0047-2484\(89\)90018-3](https://doi.org/10.1016/0047-2484(89)90018-3).

a better understanding of the fossil animal's capabilities, all calculations on the fossil specimen are also compared with similar calculations on eight modern carnivores.

### Fossil Reconstruction

To create a 3D model of fossil specimen CM 8955, laser scans were made of all pieces of the fossil. An Artec Spider 3D laser scanner was used in pair with Artec 3D Studio. Each piece of the fossil required three to five scans to produce as much detail as possible on all sides. Each scan was then aligned to create a full 3D image of each piece of the fossil. Once these steps were complete, pieces of the fossil that broke off could be re-assembled digitally to create the most complete version of the fossil possible with no manipulations or additions. After the fossil was fully transcribed into 3D scans, portions of modern carnivore skulls were superimposed on the sections that were missing from the fossil to create a complete skull and mandible of the animal (see *Images 6-9*). A portion of a gray wolf cranium was placed from the eye orbits to the posterior portion of the skull, spotted hyena zygomatic arches were placed on the skull, and a wolf nose was used from the canines to the end of the skull/incisors. These two carnivores were chosen based on similar anatomy within the nose, cranium, and zygomatic arches, and availability of 3D models. The fossil specimen's morphed zygomatic arches were most similar to the form and shape of the spotted hyena and the elongate, thin nasal structure was most similar to the gray wolf.<sup>216</sup> This, plus mirroring of the least distorted side of the fossil skull, completed a 3D model of the fossil. All measurements were then taken from this digital reconstruction using the measurement tools within Artec 3D Studio software.

### Extant Taxa

The muscles of mastication are examined as well as bite force analyses. To complete these measurements, pictures were taken of the modern carnivore skulls in three views (superior, inferior, and lateral), of mandibles in one view (lateral), and images were measured using ImageJ software.<sup>217</sup>

All extant mammals compared to the fossil specimen were separated into three general categories: bone crunchers, meat slicers, and omnivores (see *Table 1*). These categories assist in visualizing the different eating behaviors, however, there are some overlaps (i.e., all carnivores are meat slicers, but some are more adept than others to this adaptation). Bone crunchers include *C. crocuta* (spotted hyena), *Gulo gulo*<sup>218</sup> (wolverine), and *Puma concolor*<sup>219</sup> (mountain lion). These animals consume most, if not all bones found in their prey animal – including the larger bones, such as limb bones, without damaging their dentition. This leads to a higher bite force for body size (see *Table 4* and *Graph 2*). Meat slicers are efficient and well adapted for rapid

<sup>216</sup> Further studies should be done using different morphology combinations to compare.

<sup>217</sup> All specimens were housed in both the Zooarchaeology Laboratory and the Mammalogy/Zoology Department on campus at Colorado State University.

<sup>218</sup> Linnaeus, "Systema Naturae," 1758.

<sup>219</sup> Linnaeus, Carl von. *Car. a Linné, Mantissa Plantarum: Generum Editionis VI. Et Specierum Editionis II. Impensis Direct. Laurentii Salvii*, 1771.

consumption and tearing of flesh from their prey animals. Unlike hyenas, meat slicers do not actively consume bone in their diet, but will consume epiphyseal ends for grease and other nutrients they can ingest while gnawing. This, in turn, generally leads to a slightly lower bite force for body size. The meat slicers include *Canis latrans* (coyote),<sup>220</sup> *C. l. lupus* (gray wolf), and *Vulpes vulpes*<sup>221</sup> (red fox). The omnivores studied consume some bones, but not all bones; though it is not something actively seen in their diet. The diet of these animals includes non-meat items (such as grass, berries, etc.), which reflects in the wider and more general dentition. Omnivores include *U. a. horribilis* (grizzly bear), and *Ursus americanus* (black bear).<sup>222</sup>

## Results

### Bite Force

The bite forces of all specimens (see *Table 4 and Graph 1*), fossil and extant, show that the highest bite force is *C. crocuta* at 4878.513 N and the lowest bite force is *V. vulpes* at 1878.775 N. Bite force in CM 8955 is 2317.666 N, which falls between *C. latrans* (2291.544 N) and *U. americanus* (2856.841 N) indicating the fossil probably could not crunch bone. However, when bite force is plotted against body mass (see *Table 4 and Graph 2*) CM 8955 follows the trendline seen in the bone cruncher group and near the meat slicers.

### Bone Crunching Index

The bone crunching index of CM 8955 falls between the omnivores and the meat slicers, though closer to the omnivores (see *Table 5 and Graph 3*). The posterior tooth index is 1.193 and its anterior tooth index is 1.038. This is much lower than bone crunchers which are found in the ranges of 1.603-2.074 (posterior) and 1.616-1.719 (anterior) in this study.

### Body Size

When bite force is plotted against body size (see *Graph 2*), three distinct trajectories are seen within the three dietary behavior groups. Bite force tends to increase with body size, as can be seen with the larger-bodied omnivores (the ursids). Within the bone-crunching group, there is a steep trendline indicating that, despite their body size, they have a higher bite force than other groups. The meat slicing group has a similar trajectory as the bone-crunching group, however, their trendline is not as steep and they show an overall lower bite force per body size rate comparatively. Lastly, the omnivores/light crunchers highlight how body size correlates with bite force as their high bite forces are a function of their large body sizes. The fossil specimen falls in between the bone cruncher and meat slicer groups, however, it does follow the trendline seen in bone crunchers.

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<sup>220</sup> Say, Thomas, Stephen H. Long, and Edwin James. *Account of an Expedition from Pittsburgh to the Rocky Mountains, Performed in the Years 1819 and '20*. H.C. Carey and I. Lea, 1823.

<sup>221</sup> Linnaeus, "Systema Naturae," 1758.

<sup>222</sup> Pallas, Peter Simon. *Petri S. Pallas Spicilegia Zoologica: Quibus Novae Imprimis Et Obscurae Animalium Species Iconibus, Descriptionibus Atque Commentariis Illustrantur. Prostant apud Gottl. August. Lange, 1780.*

## Discussion

### Bite Force

Bite force for CM 8955 falls into the range of *Canis latrans*, and *C. l. lupus* and indicates that it could be placed in the meat slicer group. This is remarkable given that its body size is similar to that of a fox. The behavior and life history of *C. latrans* are one of the most studied and well-documented Canids.<sup>223</sup> They are often solitary animals but will travel in groups and consume carrion together. *Canis latrans* is one of the most adaptable carnivores with animal matter accounting for 90% of their diet.<sup>224</sup> West and Midwestern diets consist mainly of jackrabbits, cottontail rabbits, and rodents as *C. latrans* has the ability to run up to 40mph/65kph.<sup>225</sup>

As discussed previously, *C. l. lupus* lives and hunts in packs (though it can survive in solitude) of 5-12 individuals on average.<sup>226</sup> This pack lifestyle enables *C. l. lupus* (and other Canids who participate in this strategy) to kill animals significantly larger than they are, with these prey items totalling over half of their diet.<sup>227</sup>

With bite force in mind, it is possible that the fossil specimen was either a scavenger or hunted in packs, or possibly both, and was able to hunt animals larger than itself. It does not fall into the bite force range of the bone crunchers, so it most likely did not crunch bones like *C. crocuta*. If the fossil specimen leaned towards the lifestyle of *C. latrans*, it most likely hunted smaller animals and would scavenge the leftover kills of larger carnivores in that time period, periodically traveling with other members of its species. If the fossil specimen hunted and lived in the pack lifestyle similar to *C. lupus*, that would open up the opportunity for hunting and consuming much larger prey items.

### Body Size

The body size estimates place the fossil specimen (see *Table 4*) near the size of *V. vulpes*. *Vulpes vulpes* are opportunistic hunters and will eat what is available.<sup>228</sup> They are known to hunt ground-nesting birds (sage grouse, waterfowl, etc.) and their eggs, various rabbits, and the occasional pocket gopher. Some hunting techniques include stalking and chasing. Known predators of *V. vulpes* include *C. latrans*, eagles, bobcats, and *C. l. lupus*.<sup>229</sup> The smaller-sized canids with lower bite forces (i.e. *C. latrans* and *V. vulpes*) do not generally participate in a pack hunting lifestyle, likely due to the combination of prey size/types, body sizes, and bite forces. Smaller carnivores generally consume smaller prey that do not require a pack to kill (e.g. wolves

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<sup>223</sup> Armstrong et al., *Mammals of Colorado*, 2011.

<sup>224</sup> Ibid.

<sup>225</sup> Armstrong et al., *Mammals of Colorado*, 2011; Burnie and Wilson, *Animal*, 2001.

<sup>226</sup> Burnie and Wilson, *Animal*, 2001.

<sup>227</sup> Burnie and Wilson, *Animal*, 2001; Armstrong et al., *Mammals of Colorado*, 2011.

<sup>228</sup> Armstrong et al., *Mammals of Colorado*, 2011.

<sup>229</sup> Ibid.

hunt small animals alone outside of a pack), and carnivores with lower bite forces eat smaller animals. For example, if the prey type consisted of larger animals with thicker hides and large bones, the carnivore would need a higher bite force in order to overpower the animal and pull apart the carcass.<sup>230</sup> Based on this evidence that predators with smaller body sizes often eat prey smaller than themselves and that prey size, in turn, does not require a pack or large group to hunt, indicates that the fossil specimen was most likely not a pack hunter and may have hunted alone.

### Bone Crunching Index

The bone-crushing index illustrates that a meat slicer tends to have longer and narrower teeth, whereas bone crunchers have shorter and wider teeth. The omnivores are more variable and have more equally balanced teeth in breadth and height. This index (see *Table 5* and *Graph 3*) places the fossil closer to *U. americanus* and *U. a. horribilis*, which are omnivores. As previously discussed, up to 90% of the diet of *U. a. horribilis* is plant matter, but they will kill and consume many different ungulates mainly by taking over other kills that are made by other carnivores.<sup>231</sup> *Ursus americanus* is very adaptable and able to live in a variety of environments consuming a variety of foods including different vegetation, berries, and carrion.<sup>232</sup> The diet of *U. americanus* is dependent on the season and what foods are available, in the spring grasses and certain flowers are preferred and in the summer into fall, berries, fruits, and acorns are preferred.<sup>233</sup> *Ursus americanus* is also known for killing and consuming small mammals (i.e. rabbits, rodents, etc.) as well as carrion, which is an important nutrient source in the spring after hibernation.<sup>234</sup> This teeth anatomy shown in the index further indicates that the fossil specimen consumed other forms of food besides meat (i.e. was able to eat both meat and other foods such as grasses and berries).

### Summary

Dietary anatomy is mixed in the fossil specimen. Bite force for CM 8955 falls into the range of both coyotes and gray wolves and indicates that it could be placed in the meat slicer group. However, when scaled to body mass, CM 8955 lies on the trend line for bone crunchers, such as *G. gulo* (see *Graph 2*). Further confounding the interpretations, it appears that the bone-crushing index in CM 8955 is consistent with that seen of more omnivorous carnivores with equally balanced teeth in breadth and height seen in both *U. a. horribilis* and *U. americanus*.

One interpretation could be that the specimen was one of the species beginning to evolve bone crunching adaptations, but had not yet achieved the required level of bite force and tooth

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<sup>230</sup> Christiansen and Wroe, "Bite Forces," 2007.

<sup>231</sup> Armstrong et al., *Mammals of Colorado*, 2011.

<sup>232</sup> Macdonald, David W., ed. "American Black Bear." In *The Princeton Encyclopedia of Mammals*, 584–85. Princeton, NJ: Princeton University Press, 2009.

<sup>233</sup> Armstrong et al., *Mammals of Colorado*, 2011.

<sup>234</sup> Armstrong et al., *Mammals of Colorado*, 2011.

anatomy. I would argue that this specimen falls between meat slicers and bone crunchers in terms of dietary behaviors. The body size of the fossil specimen is closer to *V. vulpes*, but the bite force is closer to that of *C. latrans*, an animal roughly three times the size of the fossil. Why does this fossil specimen have a high bite force given its small body size? From an evolutionary perspective, it does not make sense to spend energy on a higher bite force, and the musculature that goes along with it, if it is not being used.

Both *V. vulpes* and *C. latrans* hunt small animals and eat carrion more often and do not participate in hunting large animals as seen in *C. l. lupus*. Because *C. latrans* will create and travel in groups,<sup>235</sup> it is possible the fossil specimen traveled in small groups and fed on carrion together, but most hunting was likely done alone without the competition of the other members. *Vulpes vulpes* are also opportunistic hunters that will eat carrion, small mammals, and small invertebrates, however, they do not hunt or travel in packs and only pair for mating purposes.<sup>236</sup> This plus the evidence that smaller-bodied predators often eat prey smaller than themselves provides the possibility that the fossil specimen hunted alone on smaller animals and carrion. If it were to hunt in groups like *C. l. lupus*, they might have consumed animals significantly larger than themselves.<sup>237</sup> However, hunting animals that are much larger brings more risk for injury to a small-bodied predator and more competition with larger predators who hunt large animals regularly. Furthermore, the small body size indicates the fossil specimen would not be able to effectively kill large animals as it needs an equally large body to assist in killing a prey animal (e.g. a lynx will not hunt the same prey as a mountain lion as they are different body sizes and it would take more energy from the lynx to kill the larger prey).<sup>238</sup> This evidence, in addition to the bite force that is lower than *C. crocuta* and *G. gulo*, leads to the conclusion that the fossil specimen most likely did not actively hunt and kill prey animals larger than itself.

The high bite force could, however, create the possibility of consuming some but not all bones, similar to the omnivores, as the bone-crunching index placed them with that group. Because the high bite force was selected for evolutionarily, the fossil specimen may have been “cleaning up” carrion and older kills similar to *G. gulo* and *C. crocuta*,<sup>239</sup> and that carrion was an important part of the fossil specimen’s diet. In other words, other predators kill and consume most of the meat off their prey animal, but leave the skeleton and some connective tissues. Then the fossil specimen would scavenge and consume most of the bones (but leave the larger, more

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<sup>235</sup> Ibid.

<sup>236</sup> Forbes-Harper, J. L., H. M. Crawford, S. J. Dundas, N. M. Warburton, P. J. Adams, P. W. Bateman, M. C. Calver, and P. A. Fleming. “Diet and Bite Force in Red Foxes: Ontogenetic and Sex Differences in an Invasive Carnivore.” *Journal of Zoology* 303, no. 1 (2017): 54–63. <https://doi.org/10.1111/jzo.12463>; Armstrong et al., *Mammals of Colorado*, 2011.

<sup>237</sup> Burnie and Wilson, *Animal*, 2001.

<sup>238</sup> Christison, “Testing the Competition,” 2020.

<sup>239</sup> Macdonald, David W., ed. “Wolverine.” In *The Princeton Encyclopedia of Mammals*, 496–497. Princeton, NJ: Princeton University Press, 2009.

difficult ones to crunch). Carrion would not be the sole dietary intake of the fossil however, allowing it to hunt animals similar in size to itself.

In a study estimating bite force and prey size with the *Tyrannosaurus rex*,<sup>240</sup> prey size seen with modern-day carnivores was also used as a comparison. Meers<sup>241</sup> found that social predators who hunt in groups can take much larger prey, as seen and previously discussed with *C. l. lupus*. Predators that prefer to hunt alone (e.g. *Puma concolor*, *G. gulo*, *U. a. horribilis*), will often hunt prey equal to or smaller than their body size. Although *G. gulo* consumes large animals such as moose, these large animals are usually in the form of carrion. The correlation between predator and prey size is partially fueled by the dangers that come with larger prey defensive strategies. It is much easier for a predator to subdue an animal smaller than itself than twice as large, especially when they are hunting alone, as this means less risk for injury to the predator.<sup>242</sup> Furthermore, Meers<sup>243</sup> found that bite force plays a secondary role in the relationship between predatory body size and prey size. Although this study was on a different species, it is also applicable to the fossil specimen studied here.

Some possible prey items the fossil specimen (7.5kg) could effectively kill include: many primates and euprimates (such as the plesiadapiforms, thought of as “archaic primates,” with members weighing between 10g-4kg), ptilodontoids (multituberculates, about the size of a mouse/20-30g), small sized condylarths (ungulates; such as mioclaenids, *Hyopsodus* at >1kg), and arctostylopids (rabbit-sized/1-2kg animals).<sup>244</sup> It should be noted the primates during this time were arboreal (tree-dwellers) and there were other predators that showed scansorial (ability to climb and dwell in trees and terrestrially).<sup>245</sup> *P. occidentalis*, likely the fossil specimen’s correct species, is not scansorial, so the only times it may have encountered and consumed primates and euprimates is if one happened to be on the ground.<sup>246</sup> The fossil specimen was not the top apex predator of its time period as there were many other carnivores that were larger. Some of these predators included: *Patriofelis* and *Sarkastodon* (bear-sized oxyaenids), and *Hyaenodon* (species ranging from house cats to African lion size).<sup>247</sup>

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<sup>240</sup> Meers, Mason B. “Maximum Bite Force and Prey Size of *Tyrannosaurus Rex* and Their Relationships to the Inference of Feeding Behavior.” *Historical Biology* 16, no. 1 (2002): 1–12.  
<https://doi.org/10.1080/0891296021000050755>.

<sup>241</sup> Ibid.

<sup>242</sup> Ibid.

<sup>243</sup> Ibid.

<sup>244</sup> Rose, *The Beginning of the Age of Mammals*, 2006.

<sup>245</sup> Ibid.

<sup>246</sup> Ibid.

<sup>247</sup> Ibid.

## Conclusion

The fossil specimen has a high bite force for its body size, which is a trend seen in bone-crunching carnivores. The fossil specimen did not have the capability to crunch bone as seen in *C. crocuta* due to the lower posterior/anterior tooth indexes. However, the high bite force for small body size does indicate that some bone crunching was possible. Because CM 8955's bite force is not at the same level seen in the bone crunching carnivores compared, larger bones would be more difficult to consume. There is a certain level of body size to bite force that is achieved that allows for the bone crunchers like *G. gulo* and *C. crocuta* to consume all bones found in prey animals significantly larger than themselves. The fossil specimen is small bodied which limits prey body size and bone sizes it could consume. The placement the fossil has along the trendline for bone crunchers when comparing bite force and body size has evolutionary implications. First, this indicates that bite force evolved before the adaptation to bone-crunching. High bite force is important for carnivores to allow for efficient kills and prey consumption, but bone consumption is unnecessary for carnivore survival. Therefore, bite force becomes more important to the survival of carnivores and gives the possibility that it occurred first within their evolutionary timeline. Second, this has implications for *how* bone crunching abilities in carnivores evolved. Bone crunching animals follow a trend of high bite force for body size and the fossil specimen falls in line with this trend (but lacks the full bone crunching ability), which indicates that bone-crunching is only achieved once a certain ratio between bite force and body size are met. Tooth morphology also plays a role in bite force abilities. The fossil specimen's tooth morphology in the bone-crunching index falls near the omnivores, indicating that it was not yet evolved for efficient bone crunching and was likely in the process of evolving the ability to crunch some, but not all, bones.

These lines of evidence mean that *Palaeonictis occidentalis* was not fully adapted to crunch bone (as was originally thought by Sinclair and Jepsen).<sup>248</sup> The findings in this study support the dietary analyses done by Chester et al.<sup>249</sup> showing that *Palaeonictis occidentalis* was not an obligatory carnivore. It is possible that this more generalized diet within *P. occidentalis* is what enabled it to live the longest of all four *Palaeonictis* species.<sup>250</sup>

This study is a small step in a deeper understanding of carnivore evolution and how to bite force and bone-crunching abilities evolved throughout mammalian history. More research is needed that includes other carnivores and more data for a better comparison. With more studies on the bite forces and bone-crunching abilities of some of these first mammalian carnivores, the theory of bite force being more important evolutionarily can be further evaluated.

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<sup>248</sup> Sinclair and Jepsen, "A Mounted Skeleton," 1929.

<sup>249</sup> Chester et al., "A New Small-Bodied Species," 2010.

<sup>250</sup> Solé et al., "New Data on the Oxyaenidae," 2011.



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## Appendix

<b>Species</b>	<b>Common Name</b>	<b>N (Sample Size)</b>	<b>Dietary Adaptations</b>
<i>Canis lupus lupus</i>	Gray wolf	2	Meat slicer
<i>Canis latrans</i>	Coyote	5	Meat slicer
<i>Vulpes vulpes</i>	Red fox	5	Meat slicer
<i>Ursus arctos horribilis</i>	Grizzly bear	2	Omnivore
<i>Ursus americanus</i>	Black bear	6	Omnivore
<i>Crocota crocuta</i>	Spotted hyena	2	Bone cruncher
<i>Gulo gulo</i>	Wolverine	2	Bone cruncher
<i>Puma concolor</i>	Mountain lion	2	Bone cruncher

Table 1. All extant species that were measured and compared with the fossil specimen are listed including their sample sizes, common names, and dietary category.

Purpose	Measurement	Description	Source	
Bite force	Cross-section of <i>M. temporalis</i>	Back of the zygomatic arch to the end of the ossis frontale, through centroid	Thomason 1991	
	<i>M. temporalis</i> lever arm (in-lever)	Distance between centroid and perpendicular line drawn from the TMJ through the cross-sectional line	Thomason 1991	
	Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined	Lateral most point of the zygomatic arch to basicranium, through centroid	Thomason 1991	
	<i>M. masseter</i> lever arm (in-lever)	Distance between centroid and parallel line drawn from the TMJ through the cross-sectional line	Thomason 1991	
	Out-lever	Distance from bite point at canine or molars (canassial/M1) to TMJ?	Thomason 1991	
	Skull length	Maximum skull length	Thomason 1991	
	Skull length	Maximum skull length	Wiersma 2001	
	Mandible length	Maximum mandible length	Wiersma 2001	
	Cross-sectional length of <i>M. masseter</i> combined with <i>M. pterygoideus medialis</i>	Distance of most posterior point of the external posterior zygomatic arch to the most anterior inferior point of the zygomatic arch on the maxilla, through centroid	Wiersma 2001	
	Cross-sectional width of <i>M. masseter</i> combined with <i>M. pterygoideus medialis</i>	Distance of most lateral external point of the zygomatic arch to the basicranium, through centroid	Wiersma 2001	
	Moment arm of <i>M. masseter</i> and <i>M. pterygoideus medialis</i>	Distance between centroid of zygomatic arch foramen to TMJ	Wiersma 2001	
	Cross-sectional (rectangular) length of <i>M. temporalis</i>	Back of the zygomatic arch to the end of the ossis frontale, through centroid	Wiersma 2001	
	Cross-sectional (rectangular) width of <i>M. temporalis</i>	Maximum width of zygomatic arch foramen	Wiersma 2001	
	Moment arm of <i>M. temporalis</i>	Distance between centroid of <i>M. temporalis</i> to TMJ	Wiersma 2001	
	Skull length	Maximum skull length	Christiansen & Adolfssen 2005	
	TMJ (upper) to canassial	Distance from upper jaw joint cotyle to center of upper canassial	Christiansen & Adolfssen 2005	
	TMJ (upper) to canine	Distance from upper jaw joint cotyle to center of upper canine	Christiansen & Adolfssen 2005	
	Lower jaw length	Measure from dentary tip to jaw condyle	Christiansen & Adolfssen 2005	
	Moment arm of <i>M. masseter</i>	Distance from bottom of angular process to top of condyle	Christiansen & Adolfssen 2005	
	Moment arm of <i>M. temporalis</i>	Distance from top of condyle to top of coronoid process	Christiansen & Adolfssen 2005	
	TMJ (lower) to canassial	Distance from back of condyle to center of lower canassial tooth	Christiansen & Adolfssen 2005	
	TMJ (lower) to canine	Distance from back of condyle to center of lower canine	Christiansen & Adolfssen 2005	
	Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined	Lateral most point of the zygomatic arch to basicranium, through centroid	Christiansen & Adolfssen 2005	
	<i>M. masseter</i> lever arm (in-lever)	Distance between centroid and parallel line drawn from the TMJ through the cross-sectional line	Christiansen & Adolfssen 2005	
	Cross-section of <i>M. temporalis</i>	Back of the zygomatic arch to the end of the ossis frontale, through centroid	Christiansen & Adolfssen 2005	
	<i>M. temporalis</i> lever arm (in-lever)	Distance between centroid and perpendicular line drawn from the TMJ through the cross-sectional line	Christiansen & Adolfssen 2005	
	Out-lever	Distance from bite point at canine or molars (canassial/M1) to TMJ?	Christiansen & Adolfssen 2005	
	Bone-crushing abilities	Greatest length of upper P4		Marean 1989
		Greatest breadth of upper P4	Measured across protocone	Marean 1989
		Greatest length of upper P3		Marean 1989
		Greatest breadth of upper P3		Marean 1989
	Additional Measurements	Greatest length of upper M1	Done for Marean 1989 formula, adapted for canids who utilize P4/M1 instead of P3/4	
Greatest breadth of upper M1		Done for Marean 1989 formula, adapted for canids who utilize P4/M1 instead of P3/5		

Table 2. Measurements done with associated descriptions, purpose, and sources.

Purpose	Measurements Used	Description	Formula	Source	
Bite force	Cross-section of <i>M. temporalis</i>	Multiply by estimate of the maximum tension per unit area that mammalian muscle can generate (300 KPa)	$T = \text{Cross section of } M. \text{ temporalis} * 300\text{KPa}$	Thomason 1991	
	Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined	Multiply by estimate of the maximum tension per unit area that mammalian muscle can generate (300 KPa)	$M = \text{Cross sectional area of } M. \text{ masseter} * 300\text{KPa}$	Thomason 1991	
	Cross-section of <i>M. temporalis</i> (T) <i>M. temporalis</i> lever arm (t) Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined (M) <i>M. masseter</i> lever arm (m) Out-lever (o)	Cross-section areas need to be multiplied by 300 KPa first (above)	Bite force (skull) = $[2(M*m + T*t)]/o$	Thomason 1991	
	Cross-sectional (rectangular) length of <i>M. temporalis</i> (l) Cross-sectional (rectangular) width of <i>M. temporalis</i> (w)	Multiply width by length for <i>M. temporalis</i> area	$M. \text{ temporalis area} = w*l$	Wiersma 2001	
	Cross-sectional (rectangular) length of <i>M. masseter</i> combined with <i>M. pterygoideus medialis</i> (l) Cross-sectional (rectangular) width of <i>M. masseter</i> combined with <i>M. pterygoideus medialis</i> (w)	Multiply width by length for <i>M. masseter</i> combined with <i>M. pterygoideus medialis</i> area	$M. \text{ masseter combined with } M. \text{ pterygoideus medialis area} = w*l$	Wiersma 2001	
	<i>M. temporalis</i> area	Multiply by estimate of the maximum tension per unit area that mammalian muscle can generate (300 KPa)		Wiersma 2001	
	<i>M. masseter</i> combined with <i>M. pterygoideus medialis</i> area	Multiply by estimate of the maximum tension per unit area that mammalian muscle can generate (300 KPa)		Wiersma 2001	
	Cross-section of <i>M. temporalis</i> (T) Moment arm of <i>M. temporalis</i> (t) Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined (M) Moment arm of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> (m) Mandible length (lower jaw)		Maximum estimated bite force = $[2(M*m + T*t)]/\text{lower jaw}$	Wiersma 2001	
	Cross-section of <i>M. temporalis</i>	Multiply by estimate of the maximum tension per unit area that mammalian muscle can generate (370 KPa)		Christiansen & Adolfsen 2005	
	Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined	Multiply by estimate of the maximum tension per unit area that mammalian muscle can generate (370 KPa)		Christiansen & Adolfsen 2005	
	Cross-section of <i>M. temporalis</i> (T) <i>M. temporalis</i> lever arm (t) Cross-section of <i>M. masseter</i> and <i>M. pterygoideus medialis</i> combined (M) <i>M. masseter</i> lever arm (m) Out-lever (o)	Cross-section areas need to be multiplied by 370 KPa first (above)  NOTE: they <b>do not</b> multiply by 2, all data from this formula gives bite force for <b>one half</b> of the skull	Bite force (skull) = $(M*m + T*t)/o$	Christiansen & Adolfsen 2005	
	Bone-crushing abilities	Ratio of length/breath of upper P3 and P4	Put on plot, 1-2 upper P3 and P4 ratio means bone crushing abilities		Marean 1989

Table 3. Application of measurements and associated formulas, descriptions, and sources.

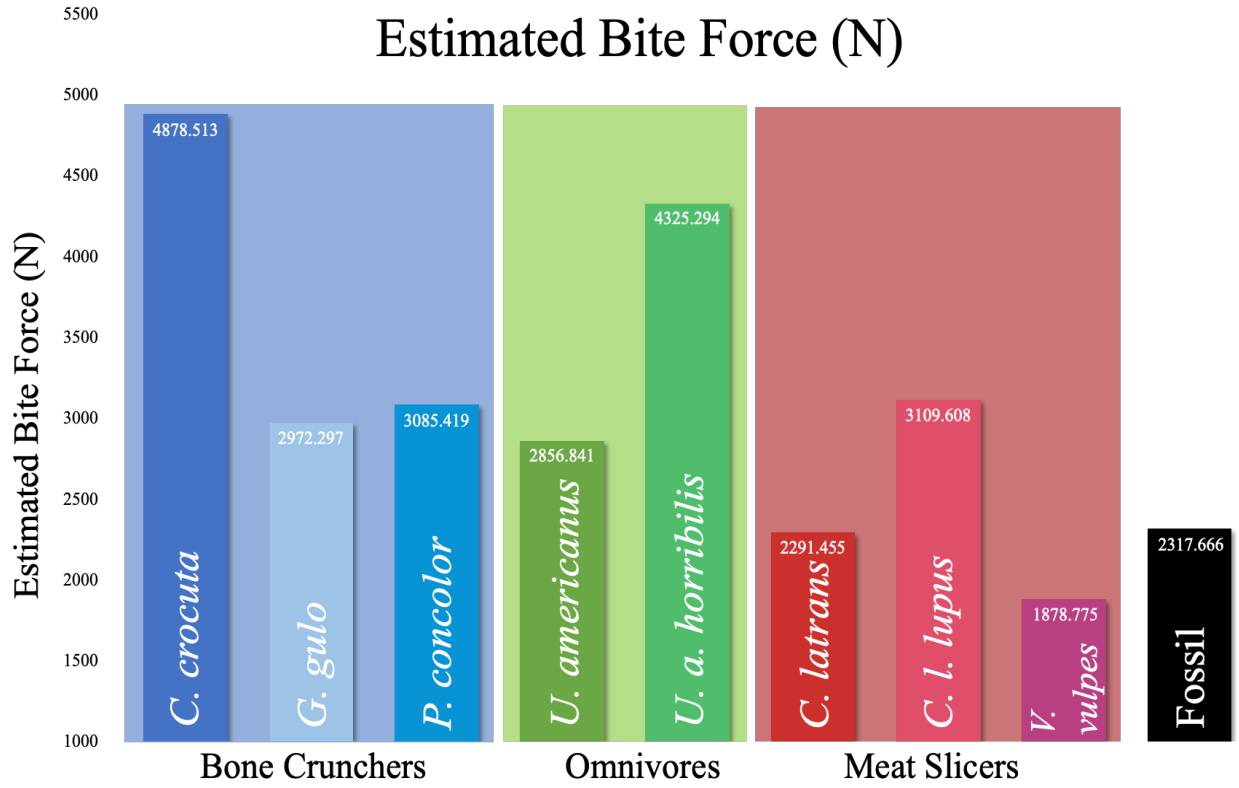


<b>Specimen Number</b>	<b>Species</b>	<b>Dietary Behavior</b>	<b>Bite Force (N)</b>	<b>Body Mass (Kg)</b>
M339	<i>C. crocuta</i>	Cruncher	4805.130	62.423
Replica	<i>C. crocuta</i>	Cruncher	4951.896	66.963
M288	<i>G. gulo</i>	Cruncher	2783.430	17.956
None	<i>G. gulo</i>	Cruncher	3161.164	28.895
M340	<i>P. concolor</i>	Cruncher	3652.330	38.762
None	<i>P. concolor</i>	Cruncher	2518.509	19.609
13459	<i>U. americanus</i>	Omnivore	3244.469	152.213
CC11-88	<i>U. americanus</i>	Omnivore	2039.772	106.924
CC11-90	<i>U. americanus</i>	Omnivore	2139.185	105.123
M338	<i>U. americanus</i>	Omnivore	2943.769	131.207
None	<i>U. americanus</i>	Omnivore	3445.328	83.456
None 2	<i>U. americanus</i>	Omnivore	3328.522	162.228
22418	<i>U. a. horribilis</i>	Omnivore	4479.722	194.122
A	<i>U. a. horribilis</i>	Omnivore	4170.865	187.925
748	<i>C. latrans</i>	Meat slicers	2232.930	26.738
12950	<i>C. latrans</i>	Meat slicers	2081.014	28.789
CC11-6	<i>C. latrans</i>	Meat slicers	2422.990	34.489
CC11-7	<i>C. latrans</i>	Meat slicers	2520.055	36.097
None	<i>C. latrans</i>	Meat slicers	2200.285	18.050
19.5	<i>C. l. lupus</i>	Meat slicers	3407.416	43.089
M280	<i>C. l. lupus</i>	Meat slicers	2811.800	40.690
13278	<i>V. vulpes</i>	Meat slicers	1939.640	6.117
BV131	<i>V. vulpes</i>	Meat slicers	1883.426	8.245
CC11-15	<i>V. vulpes</i>	Meat slicers	1797.091	8.178
None	<i>V. vulpes</i>	Meat slicers	1755.105	14.500
None	<i>V. vulpes</i>	Meat slicers	2018.612	8.043
CM8955	Fossil Specimen	Unknown	2317.666	7.534

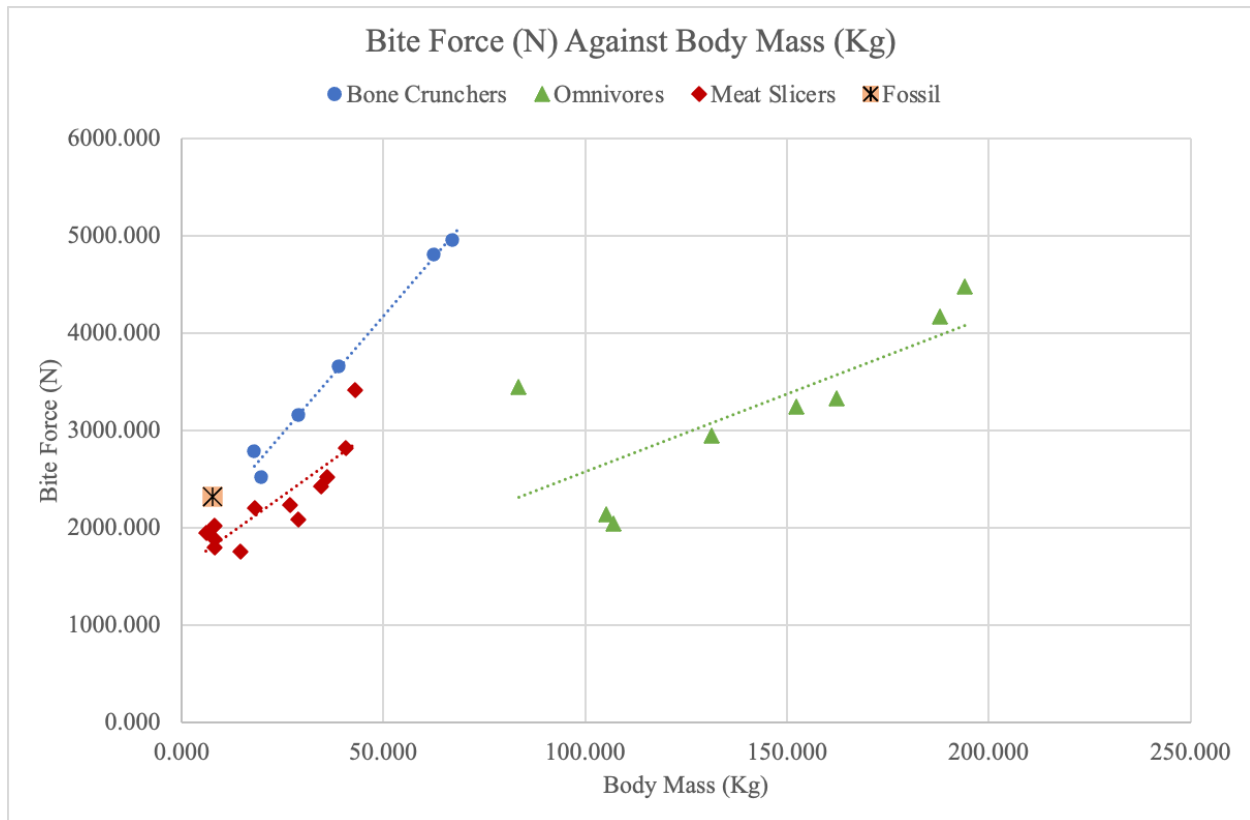
*Table 4. All bite force (N) and body mass (Kg) calculations for all specimens studied.*

<b>Specimen Number</b>	<b>Species</b>	<b>Dietary Behavior</b>	<b>Posterior Tooth Index</b>	<b>Anterior Tooth Index</b>
Replica	C. crocuta	Cruncher	1.99304912	1.122191781
None	G. gulo	Cruncher	1.603225806	1.616260163
M288	G. gulo	Cruncher	1.690311419	1.808149406
M340	P. concolor	Cruncher	1.856923077	1.719148936
None	P. concolor	Cruncher	2.073556797	1.687707641
CC11-88	U. americanus	Omnivore/Light Cruncher	1.384303112	1.276767677
None 2	U. americanus	Omnivore/Light Cruncher	1.424242424	1.295670539
M338	U. americanus	Omnivore/Light Cruncher	1.43481655	1.183649289
13459	U. americanus	Omnivore/Light Cruncher	1.469557965	1.528373266
None	U. americanus	Omnivore/Light Cruncher	1.524294671	1.468639053
None	V. vulpes	Meat slicers	0.753056235	1.862718708
19.5	C. lupus	Meat slicers	0.777232581	1.454084864
M280	C. lupus	Meat slicers	0.819389764	1.518387553
12950	C. latrans	Meat slicers	0.803988604	2.122266402
CC11-6	C. latrans	Meat slicers	0.808450704	2.054613936
748	C. latrans	Meat slicers	0.847277556	1.93231441
None	C. latrans	Meat slicers	0.867574257	3.012158055
CC11-7	C. latrans	Meat slicers	0.879790941	2.32826087
CC11-15	V. vulpes	Meat slicers	0.754303599	2.25872093
None	V. vulpes	Meat slicers	0.828521435	1.750948167
13278	V. vulpes	Meat slicers	0.86339381	1.971978984
CM8955	Fossil Specimen	Unknown	1.193471338	1.038167939

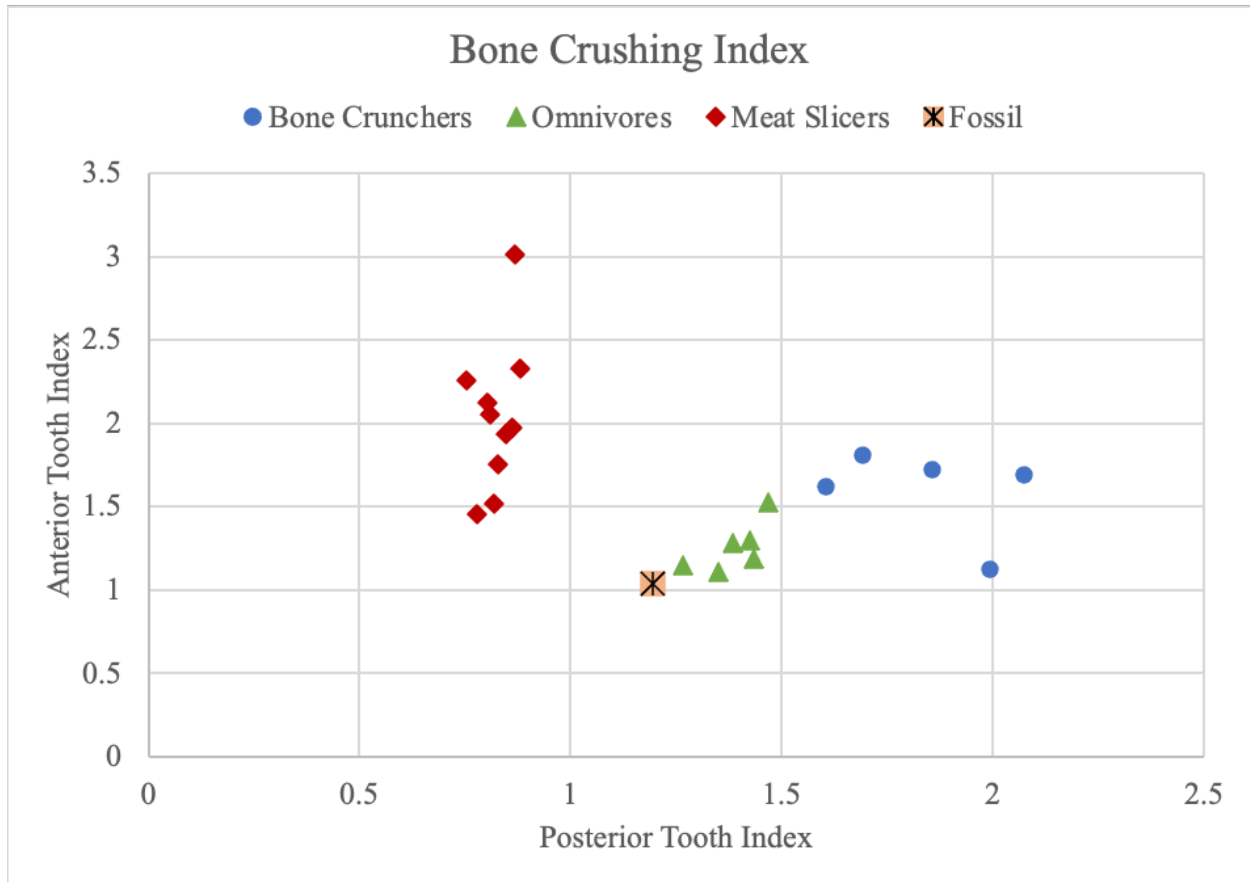
*Table 5. Bone crunching index calculations for all specimens studied.*



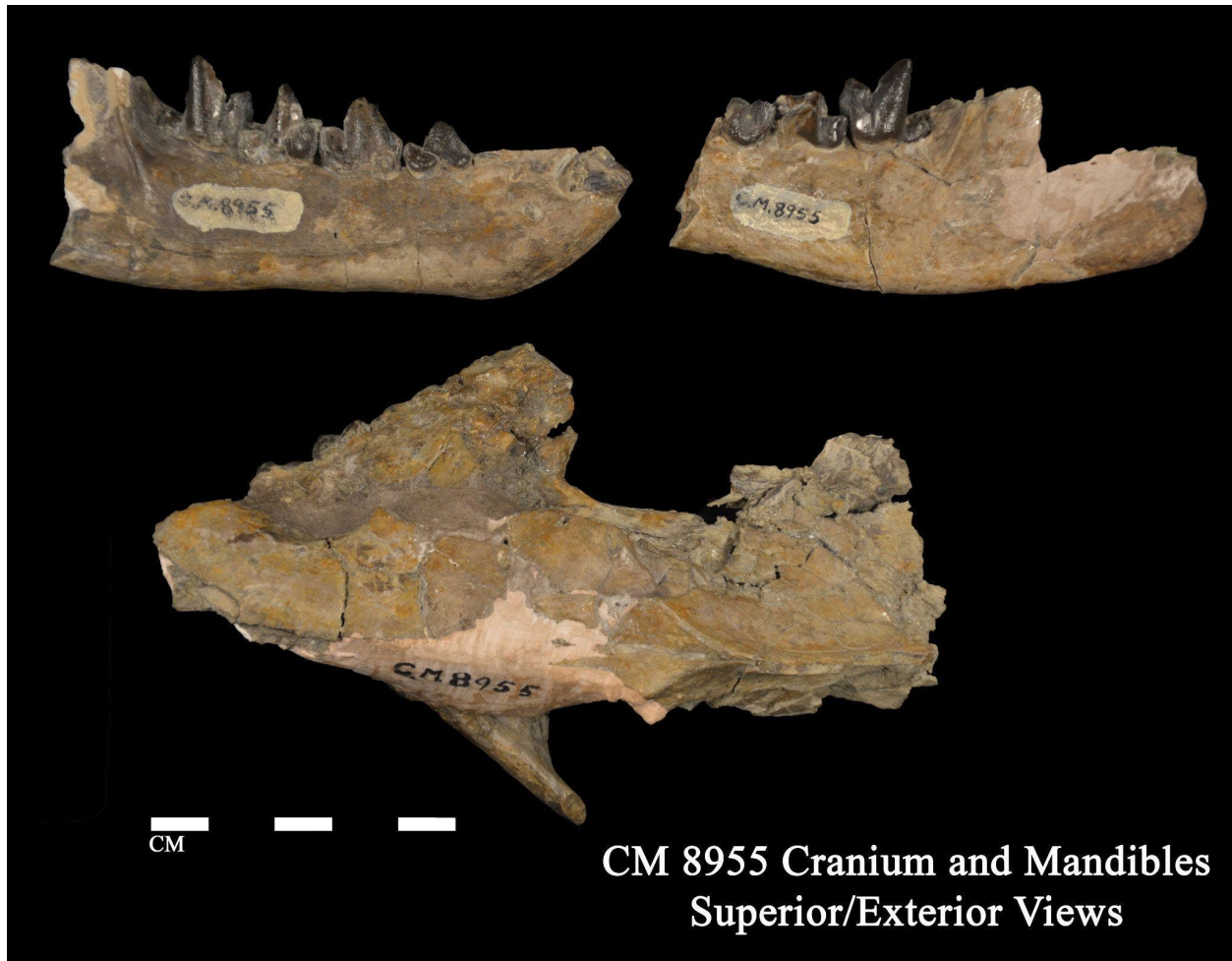
Graph 1. Average bite forces of each species and fossil specimen plotted.



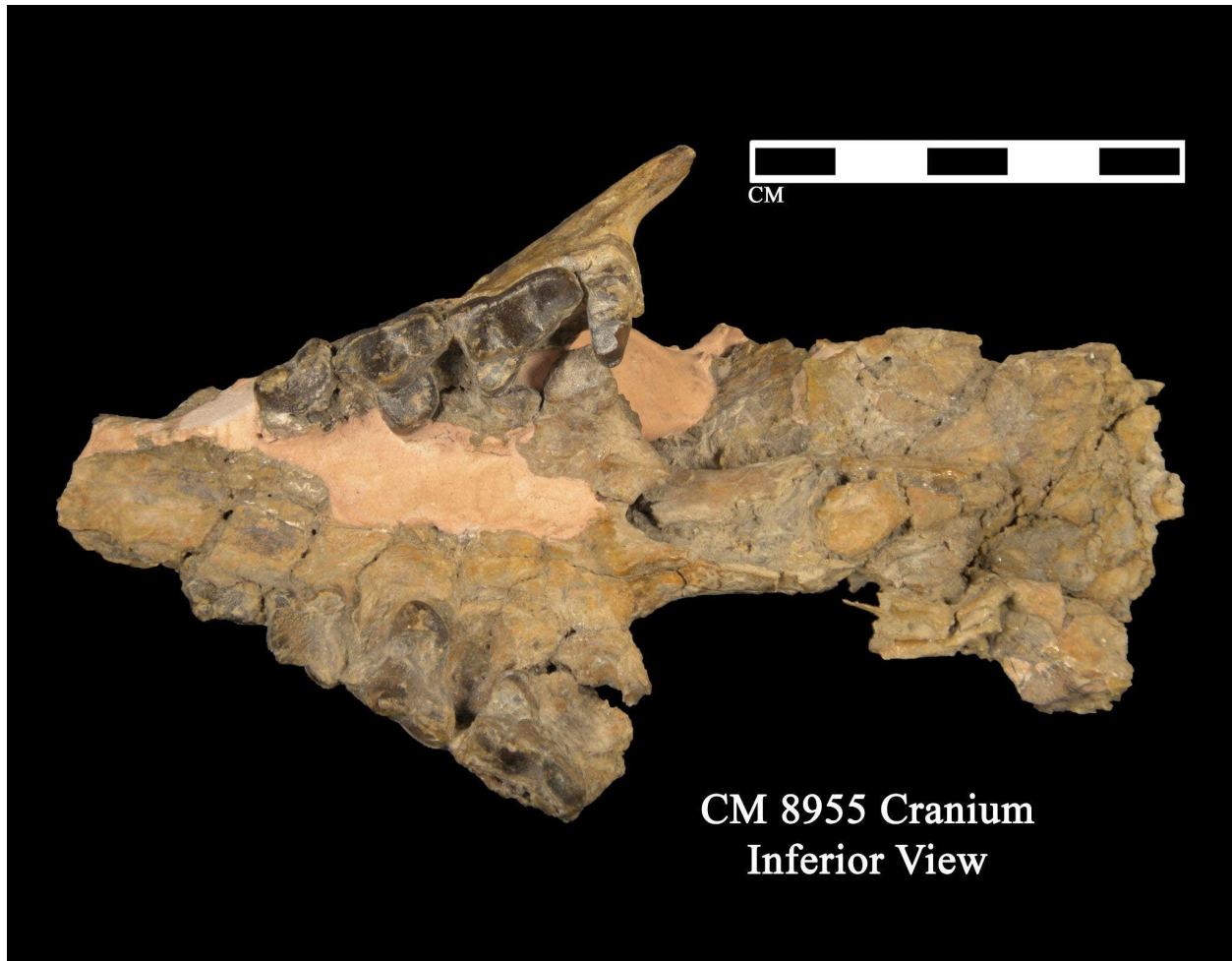
*Graph 2. Bite force in Newtons is plotted against Body Mass (Kg). Trendlines are placed for each group of carnivores compared to the fossil specimen.*



*Graph 3. The bone crushing index is plotted for all carnivores studied.*



*Image 1. Specimen CM 8955 cranium and mandibles in superior/exterior views.*



*Image 2. Specimen CM 8955 cranium in inferior view.*



*Image 3. Specimen CM 8955 cranium in right lateral view.*

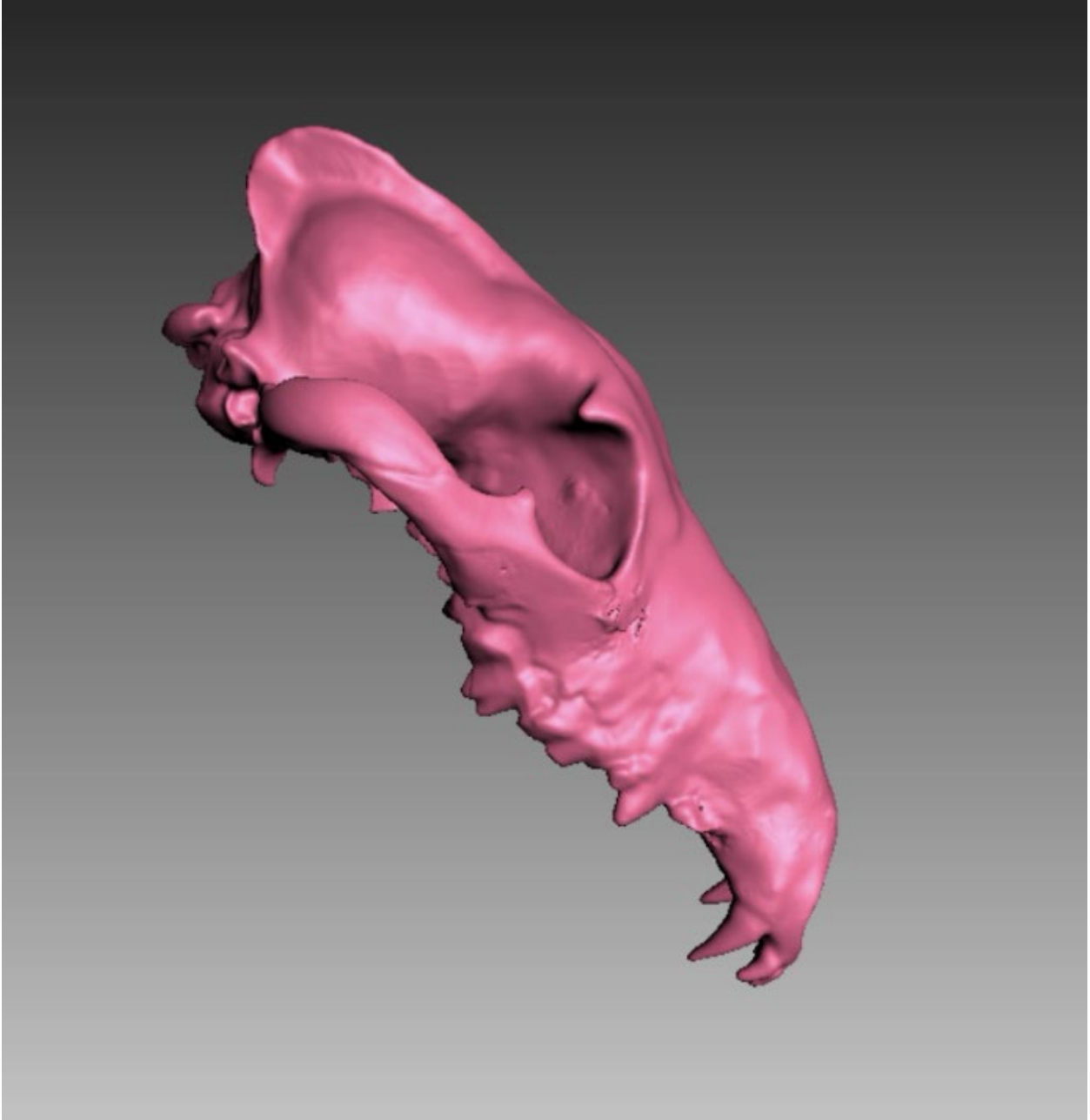




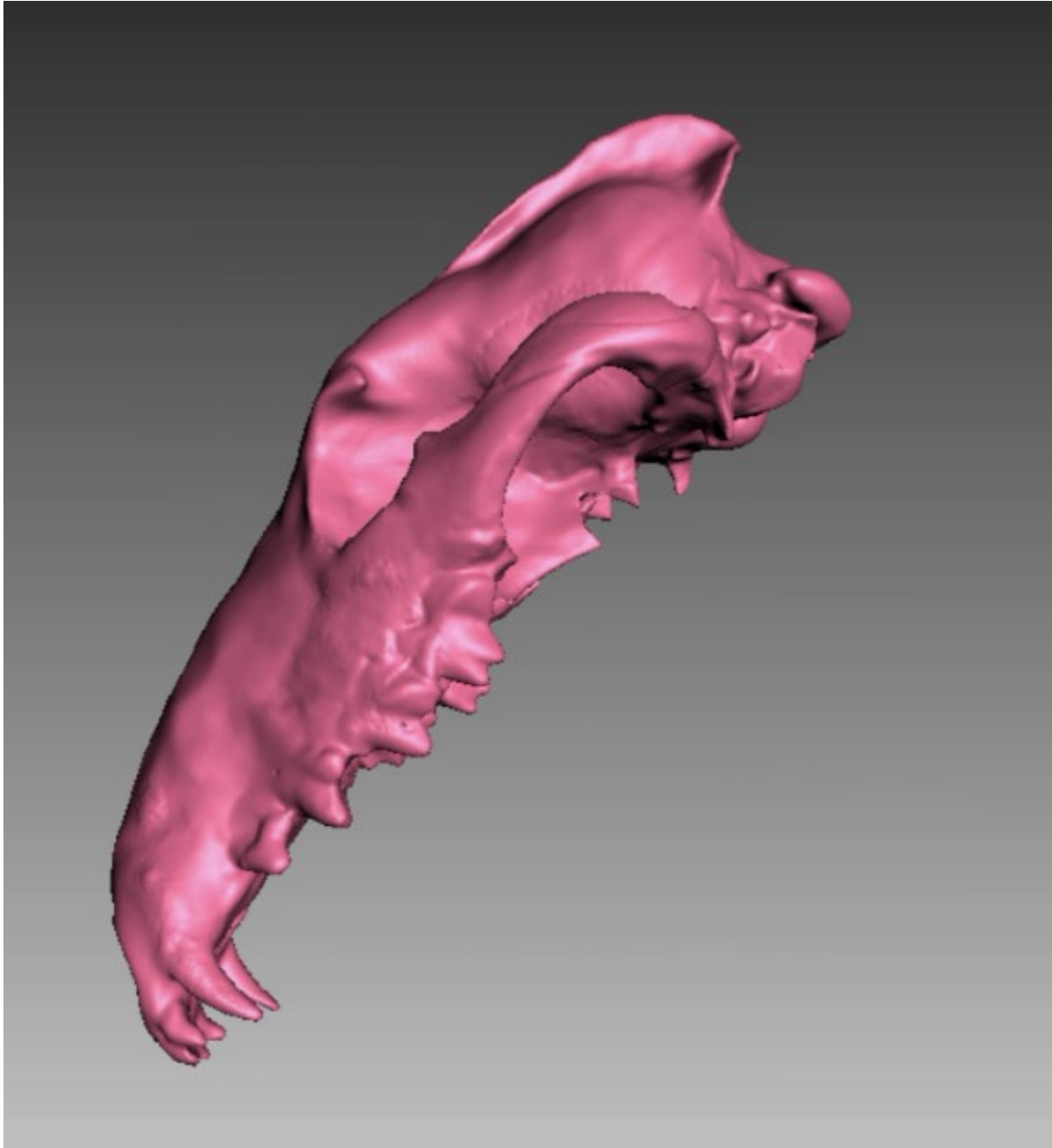
*Image 4. Specimen CM 8955 left mandible and associated fragments in exterior view.*



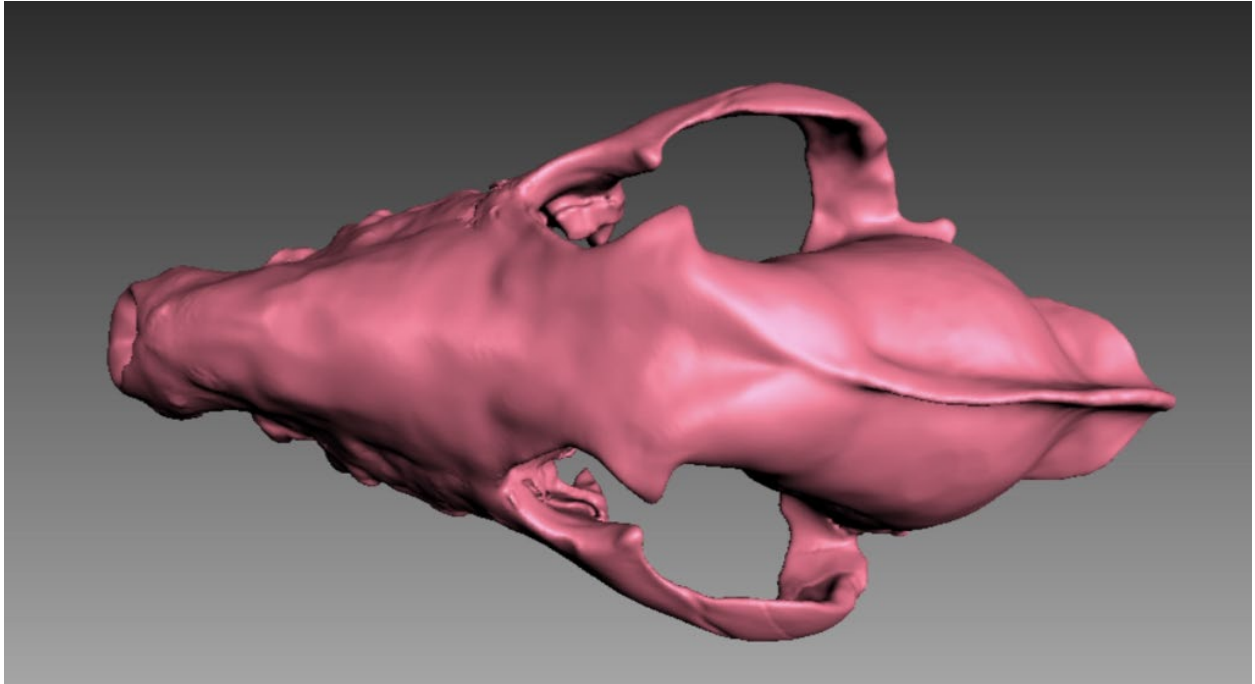
*Image 5. Specimen CM 8955 right mandible and associated fragments in exterior view.*



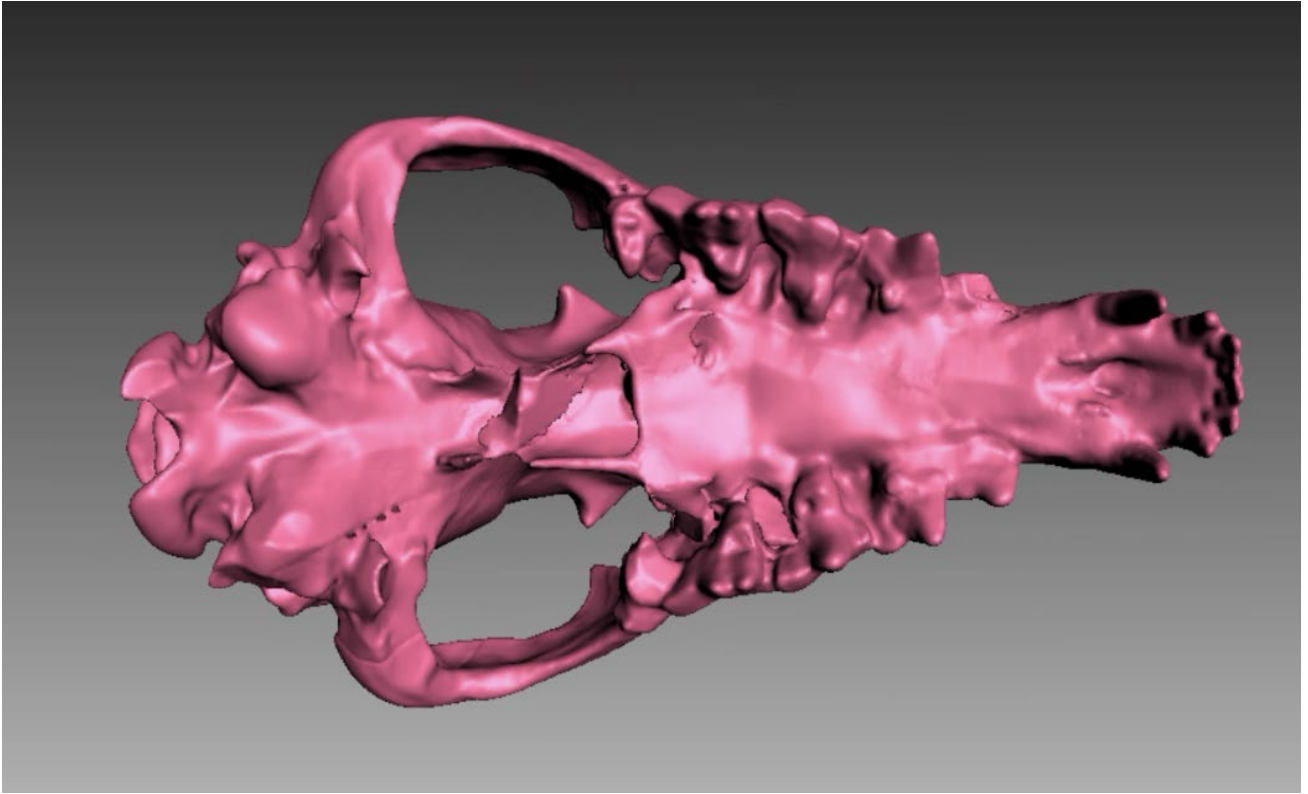
*Image 6. Final 3D model of fossil specimen CM 8955 with associated additional modern taxa additions in right lateral view.*



*Image 7. Final 3D model of fossil specimen CM 8955 with associated additional modern taxa additions in left lateral view.*



*Image 8. Final 3D model of fossil specimen CM 8955 with associated additional modern taxa additions in superior view.*



*Image 9. Final 3D model of fossil specimen CM 8955 with associated additional modern taxa additions in inferior view.*

## Determining Insect Prey of Early Eocene Primates From Trace Fossils, Willwood Formation, Bighorn Basin, Wyoming, USA

Jessica Grubbs

### Introduction and Objective

The lower Eocene Willwood Formation of the Bighorn Basin, WY yields fossils of the earliest known Euprimates (Omomyoidea, Adapoidea) and a wide array of invertebrate trace fossils. The order Primates contains two suborders: Euprimates and its extinct sister group Plesiadapiformes.<sup>1</sup> The suborder Euprimates includes all true primates and understanding the diet of its earliest members is important in understanding and making comparisons with the diets of extant primates. Omomyoids are small, tarsier-like early Euprimates that display adaptations for faunivory similar to tarsiers such as small body size and high-pointed molar cusps. This indicates that these primates were likely dependent on invertebrate proteins. Omomyoid taxa found in the Willwood Formation include *Tetonius* and *Teilhardina*. Adapoids are early Euprimates similar to lemurs that display adaptations for frugivory (low, rounded molar cusps) or folivory (sharp-crested molar cusps), but they may have opportunistically taken advantage of invertebrates as do many extant primates.<sup>1</sup> A common Adapoid taxa found in the Willwood Formation is *Cantius*.

Trace fossils are recurrent structures, such as trackways, burrows, nests, cocoons, etc., that resulted from an organism's activity altering the substrate in which it was fossilized.<sup>2</sup> Like body fossils -the fossilized remains of the organism itself- trace fossils provide an invaluable record of the presence of certain taxa. Trace fossils result from the organism modifying its environment or creating structures as it performs various behaviors, thus traces can provide vital insight into an organism's behavior. In addition, the likelihood of the organism coming into contact with other taxa, in this case, early Euprimates, may be inferred because these taxa may have acted as predators to the insects that made the trace fossil. Of the identifiable trace fossils found in the Willwood Formation, some can be attributed to or potentially attributed to insect taxa that are most commonly consumed by extant primates, such as beetles, termites, and cicadas.<sup>3</sup> By using patterns of insect consumption in extant primates as a model for insect consumption in Eocene omomyoids and adapoids it is possible to infer which invertebrates were most likely consumed by early Euprimates and discern their potential importance to their diets.

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1. Rose, Kenneth D. 2006. *The Beginning of the Age of Mammals*. Baltimore: The John Hopkins University Press; Raubenheimer, David, and Jessica Rothman. 2013. "Nutritional Ecology of Entomophagy in Humans and Other Primates." *Annual Review of Entomology* 58: 141-160.
  2. Genise, Jorge Fernando. 2017. *Ichnoentomology: Insect Traces in Soils and Paleosols*. Springer International Publishing.
  3. Raubenheimer, David, and Jessica Rothman. 2013; Gursky, Sharon. 2000. "Effect of Seasonality on the Behavior of an Insectivorous Primate, *Tarsius spectrum*." *International Journal of Primatology* 21 (3): 477-495; MacKinnon, John, and Kathy MacKinnon. 1980. "The behavior of wild spectral tarsiers." *International Journal of Primatology* 1 (4): 361-379; Bryer, Margaret A. H., Colin A Chapman, David Raubenheimer, Joanna E Lambert, and Jessica M Rothman. 2015. "Macronutrient and Energy Contributions of Insects to the Diet of a Frugivorous Monkey (*Cercopithecus ascanius*)." *International Journal of Primatology* 36: 839-854.

## Methods

Data collected were used to infer which invertebrate taxa were most likely to be consumed by early Eocene primates. To infer the omomyoid diet, an analogous model was examined using contemporary research on extant tarsier diets. Data on invertebrate consumption in non-faunivorous extant primates are used as a model for a possible adapoid diet. Data from literature focusing on invertebrate consumption in non-faunivorous primates often covers primates generally and discusses a wide range of taxa, but data for particular primate taxa were found for redbtail monkeys, geladas, and Hanuman langurs.<sup>4</sup> Identifications of insect taxa likely present in the Willwood Formation are taken from trace fossil specimens housed in the Primate Origins Laboratory at Colorado State University and were confirmed by Thomas Bown and Jorge Genise.

## Results

Of the invertebrates present as trace makers in the Willwood trace fossil assemblage, *Scaphichnium hamatum* (traces of dung beetle brood masses) and possible *Rebuffoichnus* (traces attributed to weevil pupation chambers) and *Fictovichnus* (can attributed to Coleopteran pupation chambers) suggest that Geotrupidae and other beetles were present in the Willwood Formation.<sup>5</sup> Faunivorous extant tarsiers consume a relatively high amount of beetle species (11% of their diet).<sup>6</sup> Specimens identified as possible *Termitichnus* and *Laetolichnus* suggest the presence of termites in the Willwood Formation. Termites make up approximately 13% of the tarsier's diet.<sup>7</sup> Tarsiers were also observed consuming spiders (approximately 2% of diet), cicadas (~4%), ants (~13%), moths (~14%), caterpillars (~17%), katydids and crickets (~5%), grasshoppers (~10%), cockroaches (~6%), and walkingsticks (~2%).

Cicadas, as indicated by specimens of *Feoichnus* (traces of cicada feeding chambers), were also present in the Willwood Formation.<sup>8</sup> Both Coleoptera and Isoptera represent some of the most common types of insects consumed by extant folivorous and frugivorous primates.<sup>9</sup> Cicadas are also consumed. Frugivorous redbtail monkeys have been recorded spending close to half of their feeding time targeting insects, 74% of which were identified as cicadas.<sup>10</sup> Other identifiable invertebrate trace fossils present in the Willwood Formation include *Edaphichnium* and *Taenidium barretti*, attributed to annelid worms, *Camborygma*, and *Spirographites*, attributed to crustaceans, and *Cellicalichnus chubutensis* and *Tombownichnus*, attributed to bees in the tribe Halictina and parasitic wasps respectively.<sup>11</sup>

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4. Bryer, Margaret A. H., Colin A Chapman, David Raubenheimer, Joanna E Lambert, and Jessica M Rothman. 2015. "Macronutrient and Energy Contributions of Insects to the Diet of a Frugivorous Monkey (*Cercopithecus ascanius*)." *International Journal of Primatology* 36: 839–854; Raubenheimer, David, and Jessica Rothman. 2013. "Nutritional Ecology of Entomophagy in Humans and Other Primates." *Annual Review of Entomology* 58: 141-160; Srivastava, A. 1991. "Insectivory and Its Significance to Langur Diets." *Primates* 32 (2): 237-241.
  5. Genise, Jorge Fernando. 2017. *Ichnoentomology: Insect Traces in Soils and Paleosols*. Springer International Publishing.
  6. Gursky, Sharon. 2000.
  7. Gursky, Sharon. 2000; MacKinnon, John, and Kathy MacKinnon. 1980.
  8. Genise, Jorge Fernando. 2017.
  9. Raubenheimer, David, and Jessica Rothman. 2013.
  10. Bryer, Margaret A. H., Colin A Chapman, David Raubenheimer, Joanna E Lambert, and Jessica M Rothman. 2015.
  11. Genise, Jorge Fernando. 2017.



## Discussion

Both omomyoids and adapoids were likely to prey on available beetles and termites, and adapoids likely also took advantage of cicadas. Tarsiers also consume cicadas, but more rarely than beetles and termites.<sup>12</sup> Tarsiers often feed on or close to the ground and have been recorded catching insects such as beetles. This means terrestrial beetles such as Geotrupidae became available to omomyoids if they also tended to forage in lower areas of the canopy.<sup>13</sup> *Teilhardina* in particular may have consumed large numbers of beetles as it has been suggested due to their teeth morphology that they may have focused on consuming hard-bodied insects.<sup>14</sup>

For non-faunivorous adapoids, invertebrates could have provided a supplemental source of protein, amino acids, fatty acids, possibly vitamin C and other antioxidants, and other micronutrients.<sup>15</sup> Insects are high in protein, and feeding on insects may be more efficient than feeding on plants as more nutrients can be obtained from a short feeding of insects than a longer feeding on plants.<sup>16</sup> Clumped or swarming insects (e.g., mass cicada emergences or eusocial insects such as termites) are easier to consume due to their prodigious numbers, thus the larger extant primates tend to focus on such insects, such as redbellied monkeys seeming to focus on cicadas.<sup>17</sup> Geladas also consume large numbers of locusts during locust outbreaks to the point where they replace much of the usual vegetation in their diet. Similarly, Hanuman langurs seasonally focus on consuming insects, during which they are a preferred food and their diet may include over 19% scale insects.<sup>18</sup> Vitamin C is also a dietary necessity for primates.<sup>19</sup> Insects may provide a quick, small boost of vitamin C and other antioxidants in addition to plant foods.

The study sample of invertebrate taxa available in the Willwood trace fossil record represents limited diversity, mainly due to preservation and sampling bias. Most invertebrate trace fossils are created by taxa that are fossorial for all or part of their development, increasing the chances of their activity becoming

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12. Gursky, Sharon. 2000. "Effect of Seasonality on the Behavior of an Insectivorous Primate, *Tarsius spectrum*." *International Journal of Primatology* 21 (3): 477–495.
  13. MacKinnon, John, and Kathy MacKinnon. 1980. "The behavior of wild spectral tarsiers." *International Journal of Primatology* 1 (4): 361–379; Fleagle, John G. 2013. *Primate Adaptation and Evolution*. San Diego, CA: Elsevier.
  14. Rothman, Jessica M., David Raubenheimer, Margaret A. H. Bryer, Maressa Takahashi, and Christopher C Gilbert. 2014. "Nutritional contributions of insects to primate diets: Implications for primate evolution." *Journal of Human Evolution* 71: 59–69.
  15. Raubenheimer, David, and Jessica Rothman. 2013. "Nutritional Ecology of Entomophagy in Humans and Other Primates." *Annual Review of Entomology* 58: 141–160; Kouřimská, Lenka, and Anna Adámková. 2016. "Nutritional and sensory quality of edible insects." *NFS Journal* 4: 22–26; Mattia, Carla Di, Natalia Battista, Giampiero Sacchetti, and Mauro Serafini. 2019. "Antioxidant Activities in vitro of Water and Liposoluble Extracts Obtained by Different Species of Edible Insects and Invertebrates." *Frontiers in Nutrition* 6.
  16. Bryer, Margaret A. H., Colin A Chapman, David Raubenheimer, Joanna E Lambert, and Jessica M Rothman. 2015; "Macronutrient and Energy Contributions of Insects to the Diet of a Frugivorous Monkey (*Cercopithecus ascanius*)." *International Journal of Primatology* 36: 839–854.
  17. Raubenheimer, David, and Jessica Rothman. 2013. Bryer, Margaret A. H., Colin A Chapman, David Raubenheimer, Joanna E Lambert, and Jessica M Rothman. 2015.
  18. Rothman, Jessica M., David Raubenheimer, Margaret A. H. Bryer, Maressa Takahashi, and Christopher C Gilbert. 2014; Srivastava, A. 1991. "Insectivory and Its Significance to Langur Diets." *Primates* 32 (2): 237–241.
  19. Milton, Katharine. 2003. "Micronutrient intakes of wild primates: are humans different?" *Comparative Biochemistry and Physiology* 47–59.

preserved. Insects in the Orders Lepidoptera and Orthoptera are some of the most frequently consumed insects by extant primates, but likely due to their general lack of fossorial behaviors these taxa are not as well represented by trace fossils as fossorial or partially fossorial taxa such as cicadas and beetles.<sup>20</sup> Trace fossils also tend to be underrepresented in fossil collections as collectors often do not recognize them. It is likely that early Euprimates had a much more diverse variety of prey available to them than most trace fossil samples suggest. Indeed, invertebrates such as crustaceans (represented by the crayfish trace *Camborygma*) and wasps (represented by *Tombownichnus* and possible *Fictovichnus*) occurred in the Willwood Formation and have also been recorded as prey for extant primates, but were unlikely to have been consumed in significant numbers by omomyoids or adapoids.<sup>21</sup>

## Conclusion

Based on patterns of invertebrate consumption in extant primates and insect taxa represented by trace fossils present in the early Eocene Willwood Formation, omomyoids and adapoids most likely consumed beetles (*Scaphichnium hamatum*, possibly *Rebuffoichnus* and *Fictovichnus*), termites (possibly *Termitichnus* and *Laetolichnus*), and cicadas (*Feoichnus*). These insects likely represented a significant percentage of the omomyoid diet, and adapoids likely utilized these insects as supplemental sources of protein and micronutrients in addition to a plant-based diet. These insects represent only a fraction of the invertebrates likely available to early Euprimates, but they do demonstrate that some of the most commonly consumed insects by primates today were also available to their earliest ancestors.

## Acknowledgements

I would like to acknowledge Kimberly Nichols and Tom Bown for their support and great assistance in this project, and for allowing access to the Department of Anthropology and Geography Primate Origins Laboratory in which the trace fossil specimens used in this study are housed. I would also like to acknowledge and thank Jorge Genise for his help in the positive identifications of the traces used in the study and invaluable insight in the field of ichnology.

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20. Raubenheimer, David, and Jessica Rothman. 2013. "Nutritional Ecology of Entomophagy in Humans and Other Primates." *Annual Review of Entomology* 58: 141-160.

21. Kouřimská, Lenka, and Anna Adámková. 2016; Mattia, Carla Di, Natalia Battista, Giampiero Sacchetti, and Mauro Serafini. 2019; Bryer, Margaret A. H., Colin A Chapman, David Raubenheimer, Joanna E Lambert, and Jessica M Rothman. 2015.

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## **Fair Trade in the Latin American Coffee Economy: A Critical Analysis of the Certification System's Viability and Impact on the Lives of Latin America's Coffee Producers**

Joshua Bauer

### **Abstract**

The production of coffee has been foundational to the national economies of Latin America since the beginning of the nineteenth century. Tropical climates, high elevations, and excellent soil conditions have made countries from Mexico to Peru ideal settings for growing this cash crop. Yet, societies of these regions have suffered centuries of upheaval, instability, and inequality stemming from violent and oppressive regimes. Such regimes have emerged out of colonialism, slave labor, dictatorships, and continue today under capitalism, despite the advent of democracy in Latin America.

These problems are apparent in Latin America's coffee sector, where existing socioeconomic challenges are expressed, reinforced, and often unabated. A market solution that has emerged in recent decades has been Fair Trade Coffee (FT), which operates under the principle that coffee consumers from wealthy nations will pay a premium for coffee grown under ethical conditions in poor nations. The impacts are especially intended to uplift the lives of the smallholder farmers, who disproportionately experience the harms of the coffee industry.

Here I review the incentives and logics underlying the fair-trade coffee system and discuss how they have impacted growers in Latin America. While there have been undeniable benefits experienced by some growers facing cyclical poverty, these benefits do not reach all smallholders who opt into the FT system. I discuss these disparate impacts and offer commentary on how this system could be improved. I conclude by speculating about the future and viability of this system, considering its many failures.

### **Introduction to the coffee economy in Latin America**

The production of coffee has been foundational to the national economies of Latin America since the beginning of the nineteenth century.<sup>251</sup> Tropical climates, high elevations, and excellent soil conditions make countries from Mexico to Peru ideal settings for growing this cash crop. Yet, societies of these regions suffered centuries of upheaval, instability, and inequality stemming from violent and oppressive regimes.<sup>252</sup> Such regimes emerged out of colonialism, slave labor, dictatorships, and continue today under capitalism, despite the advent of democracy in Latin America.<sup>253</sup>

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<sup>251</sup> Deborah Sick. "Coffee, Farming Families, and Fair Trade in Costa Rica: New Markets, Same Old Problems?" *Latin American Research Review* 43, no. 3 (2008), 195.

<sup>252</sup> Eduardo H. Galeano. *Las venas abiertas de América Latina*. (México: Siglo Veintiuno Editores, 1980).

<sup>253</sup> Mark A. Burkholder and Lyman L. Johnson. *Colonial Latin America*. (Oxford University Press, 2001).

These problems are apparent in Latin America's coffee sector, where existing socioeconomic challenges are expressed, reinforced, and often unabated. Fair trade (FT) coffee represents a market solution that has emerged in recent decades, which operates under the principle that coffee consumers from wealthy nations will pay a premium for coffee grown under ethical conditions in poor nations. The impacts are especially intended to uplift the lives of smallholder farmers, who disproportionately experience the harms of the coffee industry.

Here, the author reviews the incentives and logics underlying the FT coffee system and discusses how they have impacted growers in Latin America. While there remain undeniable benefits experienced by some growers facing cyclical poverty, these benefits do not reach all smallholders who opt into the FT system. He discusses these disparate impacts and offers commentary on how this system could be improved. The author concludes by speculating about the future and viability of this system, considering its many failures.

### How fair trade is meant to work in the coffee sector

Smallholder coffee farmers in Latin America find themselves in especially vulnerable positions. They became subjected to the volatility of the coffee market and the unpredictability of weather and ecosystems, operating on razor-thin profit margins. As small-scale farmers, they lack economic resources to protect against bust cycles and tend to suffer from poor political power which leaves them at a disadvantage in the global economy. In many cases, smallholder coffee farms must fold,<sup>254</sup> and owners face pressure to migrate out of their countries.<sup>255</sup>

The FT coffee system represents an alternative to a market which obscures unjust conditions that producer countries endure from consumer countries.<sup>256</sup> It seeks to improve the well-being of workers by attending to social, economic, and environmental factors that impact their lives. In broad terms, FT is meant to achieve these ends through dialogue, transparency, and respect. The main goal of FT is to secure equity in global commerce and foster sustainable development by granting better working conditions and basic human rights to producers and marginalized workers, especially those in the Global South. Industry growers and workers stand to benefit from improved wages, expanded access to loans, and access to educational and training services to sharpen their business acumen.<sup>257</sup>

In theory, the system is meant to appeal to the ethical concerns of consumers and hence sustain itself through buyer conscientiousness — increasing in the Global North since the

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<sup>254</sup> Sick, 194

<sup>255</sup> Vicent Ortells Chabrera and Pascual Ortells Chabrera. "El café en Nicaragua: Experiencias de producción y exportación en comercio justo." *Cahiers des Amériques Latines (Paris)* 60-61 (2009), 5.

<sup>256</sup> Christopher M. Bacon, Robert A. Rice, and Hannah Maryanski. "Fair trade coffee and environmental sustainability in Latin America". In *Handbook of Research on Fair Trade* (Edward Elgar Publishing, 2015), 388–404.

<sup>257</sup> Geoffrey Pleyers and Gautier Pirotte. "El comercio justo: una arena y un proyecto de desarrollo: El caso de los caficultores de la región de Matagalpa." *Encuentro (Managua)* 67, no. 1 (2004), 132–149.

1980s<sup>258</sup> — and their willingness to pay a higher premium for products.<sup>259</sup> Through consumer buy-in forms, an “arena” encompassing producers, workers, distributors, and consumers materializes, and thus establishes accountability throughout the value chain. By the early 2000s, different consumer countries including Japan, Germany, and the United States had their own FT certification entities, which are responsible for ensuring that socioeconomic and environmental standards are met in regions of production.<sup>260</sup>

On the ground, FT coffee producers receive a “guaranteed premium” on their product regardless of global market conditions.<sup>261</sup> As such, workers are meant to expect remuneration commensurate with the value of their labor and even advance payments on paychecks when necessary. Further, they are provisioned with working conditions that are not deleterious to their physical, mental, or emotional health. In addition, producers benefit from more direct relationships with their markets and can subvert the impacts from speculators and middlemen.<sup>262</sup> Beyond these benefits, buyers are expected to help support farmers in seeking access to credit, a profound benefit to historically disadvantaged people.<sup>263</sup> Importantly, cooperatives and producer associations — not individuals — are eligible to qualify for FT certification.<sup>264</sup> This structure is meant to foster meaningful connections among coffee growers, thus empowering them through strength in numbers.<sup>265</sup>

## Fair trade benefits in the Latin American coffee sector

### Tracing an origin

As consumers grew more concerned for social justice, FT coffee became more commonplace. Indeed, large purchasers such as university campuses, national governments, and private corporations began buying large quantities of FT coffee by 2008. As another promising sign, large retailers like Starbucks responded to public demand by serving FT coffee.<sup>266</sup> The mere fact that FT coffee highlighted structural inequities in the global supply chain is a critical benefit, as it engendered greater awareness among coffee consumers. However, despite the attendant demand for more socially and environmentally sustainable coffee from consumers in

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<sup>258</sup> Pleyers and Pirotte, 132–133.

<sup>259</sup> Lindsay Naylor. “Fair trade coffee exchanges and community economies.” *Environment and Planning* 50, no. 5 (2018), 1039.

<sup>260</sup> Pleyers and Pirotte, 135.

<sup>261</sup> Sick, 197.

<sup>262</sup> Pleyers and Pirotte, 134.

<sup>263</sup> Ortells Chabrera and Ortells Chabrera, 3.

<sup>264</sup> Sick, 197.

<sup>265</sup> Layla Zaglul Ruiz and Peter Luetchford. “Unpacking Fair Trade bananas and coffee: private financial investment and the state in Costa Rica.” *Development in Practice* 31, no. 7 (2021), 889. Coffee cooperatives serve to help commercialize the harvest of their constituent members, thus circumventing powerful corporate entities involved in processing and exporting. Throughout the 1990’s, roughly two-thirds of coffee on the market was grown by cooperatives, affirming the value of these institutions. Since then, their dominance has waned, and they were only accountable for 41% by 2015.

<sup>266</sup> Sick, 197.

the Global North, the impacts to producers in Latin America have been difficult to measure.<sup>267</sup> Still, patterns have emerged that support the viability of the system.

### Positive change in worker health and environment

A tremendous accomplishment of FT coffee is the reduction of harmful agricultural chemicals used by growers, which countless coffee farm workers in Latin America have long been exposed to. Prolonged exposure can lead to cancer, respiratory diseases, and skin diseases.<sup>268</sup> Workers already enduring low wages and poor living conditions may not have access to reliable medical care and could be left without incomes, disabled, and unable to provide for their families. Such misfortune can lead to difficult cycles of poverty for generations to come, thus prolonging deep socioeconomic inequities.

Many FT certification bodies require environmental standards for coffee growing, which furnish positive ecological impacts as well. In Latin American countries, these include biodiversity conservation, pollution reduction, climate change adaptation, erosion control, pest control, promotion of pollination, carbon capture, and water conservation. Much of these relate to shade-grown coffee, which is often tied to FT certification programs.<sup>269</sup> Shade-grown coffee systems lead to other commercial opportunities, such as the sale of timber and fruit.<sup>270</sup>

### Improved livelihoods in Nicaragua

Fairtrade certification in the coffee-growing regions of Matagalpa and Jinotega, Nicaragua led to notably positive impacts.<sup>271</sup> Here, like in most of the country, growers rely almost entirely on their earnings from coffee to sustain themselves as most of the other products in their polyculture plots are for their own consumption. These two regions became highly susceptible to coffee market fluctuations and suffer deep food insecurity as a result.<sup>272</sup> However, these growers have shown greater resilience to the unstable coffee market in comparison to their neighbors uninvolved in the FT market.

Many of the smallholders involved in FT — especially cooperatives — in these two regions enjoy increased access to credit, protection from collapses in the coffee market, and could afford schooling for their children.<sup>273</sup> Among the most valuable gains that FT afforded to

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<sup>267</sup> Ibid., 194.

<sup>268</sup> Diego Ivan Caviedes Rubio and Alfredo Olaya Amaya. “Impacto ecológico, social y económico de fincas certificadas en buenas prácticas agrícolas y comercio justo.” *Cuaderno de Desarrollo Rural* 17, no. 85 (2021), 13.

<sup>269</sup> Bacon et al. “Environmental Sustainability”, 395. Fairtrade International presently provides “climate change adaptation” as a stated goal in helping coffee growers. Their program has clear environmental mitigation strategies aimed towards limiting deforestation, fostering clean water use, and expanding shade systems.

<sup>270</sup> Caviedes Rubio and Olaya Amaya, 13–14.

<sup>271</sup> Pleyers and Pirotte, 133.

<sup>272</sup> Ibid., 138.

<sup>273</sup> Ibid., 139.



these people is access to the specialty coffee market, which yields higher prices and longer-term relationships with buyers.<sup>274</sup>

Another worthy benefit seen in some coffee markets is the improvement of women's participation. In Nicaragua, Ortells Chabrera and Ortells Chabrera found that women involved with FT coffee cooperatives could establish savings.<sup>275</sup> Providing women with an opportunity for financial advancement allows them to further support their families, depend less on husbands, and affords them resources to leave abusive relationships. In a similar vein, Ortells Chabrera and Ortells Chabrera observed that communities involved with those same FT programs could invest in local schools and provide their children with improved educational resources.<sup>276</sup> These tremendous assets available to women and children associated with FT cooperatives create cascading benefits to Latin American coffee-growing communities afflicted with poverty and poor education. These granular depictions of the direct impacts of the FT system have been key to its promotion since its inception.

### Economic benefits in Peru

In Peru, Ruben and Fort note that those coffee smallholders with long-term involvement in FT enjoy improved access to credit, greater animal stocks, perceived higher land value, improved health, income stability, and reduced out-migration.<sup>277</sup> The latter gains provide farmers with the security they need to invest in their assets and grow their businesses, thus increasing income in the long term. However, these benefits do not reach those farmers who only recently have opted into FT, suggesting that long term affiliation is needed by members to enjoy the benefits. Unfortunately, not all smallholders have the luxury of waiting. The author discusses these and other limitations of FT coffee below.

### Drawbacks of the fair-trade system

FT coffee began as a well-intentioned market-driven solution to chronic socioeconomic issues in our world. Yet, as third-party certified food and agricultural products become more commonplace in the world, critics have raised serious questions about how they function as so-called "alternatives" to conventional systems.<sup>278</sup>

### Grappling with a broader market

An issue that plagues FT coffee is how it remains situated within the broader coffee market. Pleyers and Pirrote note that Nicaraguan growers involved in the FT market there constitute only a paltry quarter of the total coffee growers of the country.<sup>279</sup> Indeed, FT coffee has struggled to compete with conventional coffee. In fact, the production of FT coffee

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<sup>274</sup> Ibid., 147.

<sup>275</sup> Ortells Chabrera and Ortells Chabrera, 15

<sup>276</sup> Ibid., 16.

<sup>277</sup> Ruerd Ruben and Ricardo Fort. "The Impact of Fair-Trade Certification for Coffee Farmers in Peru." *World Development* 40, no. 3 (2012), 570–582.

<sup>278</sup> Naylor, 1028.

<sup>279</sup> Pleyers and Pirrote, 138.

outweighs the demand, a dismal reality that compels growers to sell much of their product to buyers at a conventional rate. Here, it is apparent that FT coffee is hampered by unreliable relationships in the Latin American supply chain.<sup>280</sup> Worse, FT coffee does not always command a price higher than conventional coffee. Such a dynamic renders farmers unable to recover the costs of their certification process and the high burden of producing an FT product. It also may prevent FT growers from implementing strategies to improve the quality of the coffee, which affects its marketability.<sup>281</sup>

#### Prohibitive certification costs

The costs for attaining and maintaining FT certification status can be prohibitive. It is the producers and their associations who must bear the financial burden of certification, marketing, and inspection. These costs are not only frequently exorbitant, but also tend to entrench localized inequities further.<sup>282</sup> Pleyers and Pirotte argue that benefits remain unequally distributed to stakeholders who already enjoy a more privileged socioeconomic status.<sup>283</sup> Hanson and colleagues similarly found that in Nicaragua, the barriers to entry for FT coffee favored those smallholders with more socioeconomic resources.<sup>284</sup> As a result, the system leaves the most vulnerable unprotected from the measures embedded within the FT system. The authors further note that FT regulators did not inform some of the workers about the stipulations mandated by their product's FT certification. Beyond these burdensome expenses, producers must also pay a transaction fee to their FT labelling organization (e.g., the Fair-Trade Labelling Organization, FLO) which can amount to \$2USD per *quintal*.<sup>285</sup>

#### Accounting for market complexity

Fair trade coffee cannot account for the complexity of the market, and consequently may fail to generate a higher income for those growers who opt into the system. For instance, premiums of FT coffee do not respond as quickly to market demand as high quality specialty coffees.<sup>286</sup> Also, the FT system struggles to account for localized conditions such as ecological factors, distance to markets, and regional infrastructure. This last detail points to ineptitude at the state level, which FT attempts to correct.<sup>287</sup>

#### Interfacing with structural weakness

Other determinants to the success of FT programs include the competence of *finca*/cooperative leadership, the worker confidence they inspire, and the dynamics of the

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<sup>280</sup> Ruben and Fort, 570.

<sup>281</sup> Sick, 198–201.

<sup>282</sup> Ibid., 200.

<sup>283</sup> Pleyers and Pirotte, 138.

<sup>284</sup> Lori Hanson, Vincent Terstappen, Christopher M. Bacon, Jannie Leung, Alejandra Ganem Cuenca, Sandro Raúl Díaz Flores, and María Asunción Meza Rojas. “Gender, health, and Fairtrade: insights from a research-action programme in Nicaragua.” *Development in Practice* 22, no. 2 (2012), 175.

<sup>285</sup> Sick, 200. A *quintal* is roughly 100kg.

<sup>286</sup> Ibid., 204.

<sup>287</sup> Sick, 205.

collective involved in certification. If poor leadership already weakens institutions, the distribution of premium profits associated with FT sales may not be equitable.<sup>288</sup> Again, we see how FT can be abused/misused to further entrench existing inequities.<sup>289</sup>

In Costa Rica, FT coffee growers continue to face the structural inequalities embedded in state policies and market practices of the agricultural sector.<sup>290</sup> Zaglul Ruiz and Luetchford argue that FT is severely limited in effecting meaningful change in contexts of uneven development and socioeconomic marginalization.<sup>291</sup> They offer a compelling argument that the greenwashing and fetishization of the FT label for consumers ends up obscuring the true effects felt by producers and workers due to its capitalist entanglements. For instance, those cooperatives with superior products can command higher premiums for their coffee in open markets beyond FT. Meanwhile, those cooperatives with inferior coffees must settle for the sales prices of the FT market, which are subject to global market fluctuations. This entrenches unequal relations between coffee producers, leaves smallholders at a disadvantage, and illustrates how limited FT can be in transforming market dynamics, consumer trends, and producer impacts.<sup>292</sup>

### Paternalism and flawed assumptions

Another important drawback of the FT system is its foundational assumption that consumers of the Global North hold the key to economically and socially uplifting the Global South. Despite its moralistic foundation, this paternalistic framework was perhaps flawed from the beginning. Regardless, the FT system reinforces these dynamics and establishes a link between the two regions, which invites “exploitation and solidification of dependence.”<sup>293</sup> These dynamics further bolster the harmful construct of “needy producers” of Latin America and “wealthy consumers” of the Global North and tends to obfuscate the realities of exploitation and abuse in the market.<sup>294</sup> As Zaglul Ruiz and Luetchford remark, “Market-driven inputs into development are, in different ways, complicit in reproducing pre-existing inequalities and are not, by and large, effective in reconfiguring experiences and practices.”<sup>295</sup> FT coffee is not the only market-based solution guilty of operating under these assumptions, so northern consumers

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<sup>288</sup> Caviedes Rubio and Olaya Amaya, 13.

<sup>289</sup> Zaglul Ruiz and Luetchford, 891. FT can furnish benefits to some farmers and cooperatives, while leaving others further disadvantaged. The FT system tends to favor those areas with superior qualities and quantities of coffee, thus failing to uplift migrants and landless laborers unable to cultivate to these products. Hence, FT reinforces “forms of marginality and historically structured inequalities.”

<sup>290</sup> *Ibid.*, 885.

<sup>291</sup> *Ibid.*, 886.

<sup>292</sup> *Ibid.*, 890.

<sup>293</sup> Caviedes Rubio and Olaya Amaya, 14.

<sup>294</sup> Naylor, 1041.

<sup>295</sup> Zaglul Ruiz and Luetchford, 893.

need to think critically about the implications of these systems if they truly desire to see a changed world.<sup>296</sup>

#### Smallholders remain at bottom of value chain

Related to these dynamics is the fact that over ninety percent of profits related to coffee are generated after green beans enter the market from the farm. Middlemen, speculators, roasters, and distributors end up splitting these large profits, while farmers are left with less than ten percent of the value.<sup>297</sup> Again, we see the disproportionate distribution of wealth among northern consumers and producers in Latin America. While FT coffee is aimed at correcting these issues, they extend much deeper into the fiber of capitalism. As such, FT certification in coffee is insufficient to address the disparities fundamental to our economic system.

#### Inconsistent consumer consciousness

A conflict underlies the suboptimal success of FT coffee in Latin America. While enlightened consumer consciousness gave rise to the movement in the 1980s, attitudes may have shifted since then. Rios and colleagues find that most wealthy consumers did not consider the FT system compatible with their vision for social justice.<sup>298</sup> In other instances, wealthy consumers perceived social justice programs as a threat to their status of dominance.<sup>299</sup> The reality that FT coffee has failed to deliver the social justice it was intended to may reflect languishing consumer consciousness. Indeed, consumers' actions do not always reflect their beliefs.<sup>300</sup> These consumer archetypes and inconsistencies in social consciousness reveal how inadequate a market-driven solution such as FT is to address problems embedded into the fabric of society.

#### Lingering poverty and food insecurity

If coffee producers in Latin America continue to suffer from hunger, sustainable coffee marketing campaigns are hardly defensible.<sup>301</sup> The “hungry farmer paradox” common among smallholder farmers across the globe is also prevalent in the Latin American coffee sector. In Nicaragua, despite the benefits that FT certification can bring to a small-scale farm, coffee

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<sup>296</sup> Ibid., 890. The label “Fair-Trade producers” transfers agency from North to South and blurs the reality of economic relations and processes between the two regions. For instance, it does not account for the role of government and institutions in creating the need for the collaboration among poor growers through corruption and impunity. Assumptions behind FT fail to consider how coffee cooperatives pursue and broker favorable economic arrangements in the market. Also, FT does not account for the harmful lending practices smallholders face with credit and loan entities. It overlooks FT farmers' need to troubleshoot by selling to non-FT buyers, thus obfuscating the commercial creativity necessary to survive in agriculture. Finally, FT and its attendant assumptions can “obscure inequalities that are requirements for competitive commodity production, not least in relation to land and labor.”

<sup>297</sup> Ortells Chabrera and Ortells Chabrera, 18.

<sup>298</sup> Kimberly Rios, Stacey R. Finkelstein, and Jennifer Landa. “Is There a ‘Fair’ in Fair-Trade? Social Dominance Orientation Influences Perceptions of and Preferences for Fair-Trade Products.” *Journal of Business Ethics* 130, no. 1 (2015), 178.

<sup>299</sup> Rios et al., 178.

<sup>300</sup> Maria L. Loureiro and Justus Lotade. “Do fair trade and eco-labels in coffee wake up the consumer conscience?” *Ecological Economics* 53, no. 1 (2005), 129–138.

<sup>301</sup> Bacon et al., “Hungry Farmer”, 133.

farmers in its northern region remain susceptible to income risks (e.g., pests, rising production costs, volatile market conditions, etc.) which lead to seasonal hunger.<sup>302</sup> The FT system cannot protect farmers from the impacts of politics, economic trends, or natural hazards which leave farmers vulnerable during months without harvest.<sup>303</sup> FT coffee does not clearly reduce poverty in general. There is little evidence at the household level for poverty elimination in Nicaragua as research demonstrates that food security remains an enduring struggle for all coffee producers, including those involved in FT.<sup>304</sup>

In Peru, Ruben and Fort found that smallholders experienced a net loss after joining FT coffee programs.<sup>305</sup> Growers here became negatively impacted by the lower yields related with FT requirements. Despite the potential to receive a higher premium for their green beans, it was not enough to offset poverty among these farmers. Higher operation costs required to meet FT standards coupled with the reality that not all products grown under FT standards could be sold at FT prices created misfortune for smallholders. Furthermore, the researchers could not identify any positive changes to environmental conditions or gender relations due to FT programs in the Peruvian coffee sector. The authors postulate that the FT programs' profit-centered motivations could not attend to these other considerations. This detail again frames how capitalist logics remain ill-equipped to address social and environmental concerns, which operate in large part independent of the market.

#### Unaddressed women's issues

Hanson and colleagues note that Nicaraguan women involved in FT coffee report feeling inadequately recognized for their contributions to their cooperatives.<sup>306</sup> Despite increased income due to premium sales prices, gender inequities in their communities remained in effect. Other issues like "illiteracy, ascribed child-rearing responsibilities, household chores, *machista* culture, land tenure arrangements, and gendered power relations in terms of decision making" all disproportionately effect women and cannot be resolved through FT coffee alone.<sup>307</sup>

#### How to improve the system

##### Demanding competent and representative government

The success of FT coffee in Latin America depends on the conditions of each producing country and region where it is implemented. Social practices, economic policies, and political dynamics all play a role in the results produced through FT programs. If weak institutions, instability, and corruption plague a coffee growing region, then FT cooperatives will be

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<sup>302</sup> Ibid., 134.

<sup>303</sup> Ibid., 134.

<sup>304</sup> Ibid., 134–139. Credit for subsistence food purchases (leading to debt accumulation and asset loss), food rationing, and *la búsqueda* (desperate search/begging) are the most common coping mechanisms for farmers during the lean/dry months. Coffee growers in Central America frequently suffer from seasonal hunger (Guatemala, 61%; Mexico, 31%; Nicaragua, 44%) and research has found that these farmers employ similar survival tactics.

<sup>305</sup> Ruben and Fort

<sup>306</sup> Hanson et al., 172.

<sup>307</sup> Ibid., 172.

significantly hampered and likely not enjoy the premium profits guaranteed to them. As such, citizens in the coffee growing countries must advocate and vote for leadership that will defend their fundamental rights, protect their institutions, and work towards their economic prosperity.<sup>308</sup> Coffee growers, cooperatives, and citizens of these countries at large must demand political representation and hold leaders accountable for upholding their own constitutions. Certainly, crusaders of justice have undertaken these efforts in Latin America for centuries,<sup>309</sup> but the fight must continue if FT coffee is ever to realize its full potential. Ultimately, government agencies and state institutions remain responsible for the necessary public investment to reduce “threats to food security, livelihoods, and biodiversity” associated with coffee growers and their ecosystems. They, too, are accountable for crumbling economies.<sup>310</sup>

#### Effective communication on certification programs

Distributors in the North need to be more communicative about the benefits that FT coffee generates for producers in Latin America. Without consistent and transparent dissemination of this information to consumers, FT coffee could become little more than a “niche product.”<sup>311</sup> For a program founded on the principle of consumer consciousness, effective labeling systems and promotional apparatuses are paramount if optimal benefits are meant to reach smallholder coffee *fincas*.

#### Directly serving the needs of women

FT coffee remains inadequate in disentangling social issues like gender inequality, a pervasive problem in Latin America. In fact, many FT cooperatives do not even offer coherent definitions of gender equity, which leads to inconsistent expectations and consequences for women participants.<sup>312</sup> Therefore, a wider development of women-only cooperatives may ensure that women receive a fair and equal proportion of the benefits implicit in FT. Hanson and colleagues discuss the time poverty that women experience due to their double burden as breadwinners and homemakers.<sup>313</sup> Cooperatives run by and for women are best situated to understand these gendered experiences and dedicate resources to serving women’s needs. Further, Hanson and colleagues validate that FT certification bodies and cooperatives at large should ensure that gendered issues are among the quality standards required to join their programs.

#### Offsetting prohibitive certification costs for smallholders

Agricultural marketing cooperatives that address farmer food security are key components for the future of FT coffee and would require a comprehensive “year-round” approach to enhance social well-being.<sup>314</sup> As a final consideration, the cost of coffee would have

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<sup>308</sup> Ortells Chabrera and Ortells Chabrera, 19.

<sup>309</sup> Galeano

<sup>310</sup> Bacon et al., “Hungry Farmer”, 133.

<sup>311</sup> Ruben and Fort, 571.

<sup>312</sup> Hanson et al., 172.

<sup>313</sup> Ibid.

<sup>314</sup> Bacon et al., “Hungry Farmer”, 135.

to offset the higher costs of adhering to certification requirements for FT to remain appealing to smallholder farmers. Thus, certification organizations need to strategize on how to make these costs less prohibitive for the smallholder farmers already enduring poverty.

## Conclusions

The rich and fertile lands of many Latin American countries make them ideal for coffee agriculture. However, historically rooted social and economic issues plague these coffee growing nations and leave its smallholder farmers entrenched in poverty. The FT model reached this coffee sector over recent decades with the intention to reduce poverty and help coffee growers combat injustice in the market. Clear benefits have been furnished to some growers who opted into the program, such as improved access to credit, resilience to the volatility of the market, and more direct relationships with buyers.

However, the socially conscious system ultimately failed to meet its goal to reduce poverty in the Latin American coffee sector. The capitalist logic behind FT remains insufficient to attend to social issues that the market does not account for. These include gender inequities, inept governments, weak institutions, corruption in local economies, and environmental degradation. In some Latin American regions involved in FT coffee, the system reinforced these problems further.

Local conditions truncate the success of FT coffee. Poverty, food insecurity, corruption, and structural violence are all complex social problems, perhaps too complex and nuanced for a program like FT to resolve.

The clear failures of FT coffee may precipitate its decline and disappearance.<sup>315</sup> In fact, new programs designed for dexterity and adaptability seem poised to replace FT coffee in due time. Among these is the Direct Trade model, in which retailers and roasters shorten the supply chain by independently establishing relationships with smallholder growers and attend to sustainability standards that suit both producer and consumer needs.<sup>316</sup> If programs like these can appeal to consumer consciousness while striving for justice in the Latin American coffee sector, this writer says good riddance to fair trade coffee.

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<sup>315</sup> Elisa Reis Guimarães, Antonio Carlos dos Santos, Paulo Henrique Montagnana Vicente Leme, and Angélica da Silva Azevedo. "Direct trade in the specialty coffee market: contributions, limitations, and new lines of research." *Internext* 15, no. 3 (2020), 34.

<sup>316</sup> *Ibid.*, 36.

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## Entangling the Self: Emotions and Existence in Fanfiction Writing

Katya Xinyi Zhao

### Abstract

Fanfiction is defined as original stories written by fans based on stories and characters from works of other published creators. Previous studies in fandom and fanarts indicated that this realm has served the purpose of activism, emotional benefits, and identity negotiation. Using mixed qualitative and quantitative ethnographic methods, this paper explores the aspects of emotion/affect and reality-making in the process of fanfiction writing. By arguing that fanfiction writers can utilize writing as a tool to process adversity and explore liminal aspects of the self, this research expands current understandings of emotional healing, intersubjective relations, virtual culture, and reality negotiation.

Keywords: self, trauma, reality, intersubjectivity, fanfiction

### Introduction

To be honest, I was both thrilled and a little bit anxious when I discovered Gina's new story<sup>317</sup>. In a poetic seven-chapter piece, Gina exhibited the heaviness of time and the emotional lacerations of history through the journey of Hannah, who was given a second chance at happiness. Hannah, however, was not Gina's original character but a character from a long-standing CBS police procedural drama in which she had a less than fortunate fate. This form of writing, where authors develop partially original stories using already created characters, is called fan fiction and is popular across many fandoms online. Although fanfiction is dominated by mostly "teenage girls writing Mary Sue stories" according to Lara, another fanfiction writer I interviewed, I have noticed that fanfiction writing can be a more organized process that can contain meticulous plot development and highly polished narratives. During my fieldwork in online fandom and fanfiction writing communities, I have read and discussed fanfiction writing with multiple authors. As I got more involved in fanfiction communities, I realized that fanfiction writers wrote about fictional characters as an indirect way of expressing themselves; they included aspects of themselves they did not discuss openly, and they used fanfiction to understand and care for themselves. In this study, I conducted ethnographic fieldwork in several fanfiction communities over Tumblr, Archive of Our Own (AO3), and Fanfiction.Net. I employed methods including participant observation, semi-structured interviews, and surveys. Specifically, I investigated the fan communities based on the JAG Universe<sup>318</sup>, a TV franchise including

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<sup>317</sup> Pseudonyms are used instead of names and social media handles of fans, fanfiction writers, and some fictional characters to protect privacy.

<sup>318</sup> The JAG Universe, also known as Bellisarioverse, consists of eight TV series, JAG (1995), NCIS (2003), NCIS: Los Angeles (2009), NCIS: New Orleans (2014), Hawaii Five-0 (2010), MacGyver (2018), Magnum, P.I. (2018), and Scorpion (2014), all of them are crime/police procedural drama. They are designed to exist in the same fictional

several related shows developed by CBS Studio<sup>319</sup>. I conclude that writers utilize fanfiction writing to process and compensate for their offline loss and at the same time, explore and negotiate aspects of their identities.

### Theoretical Overview

This paper bases its theoretical roots in psychological anthropology, media, and communication studies. I utilize core theories about fan culture and virtual participation from Henry Jenkins<sup>320</sup>, Jeffrey Snodgrass<sup>321</sup>, and Brittany Kelley<sup>322</sup>.

Current theories about fandom and fanfiction focus on community building and transforming social norms. These emphasize how individuals use fandom to create collective forces and gain social connections and opportunities for advocacy. Henry Jenkins' *Textual Poachers*<sup>323</sup> represents one of the earliest studies that brought fandom and fanfiction into academic attention. Jenkins theorized five core dimensions of fan culture: mode of reception, critical practices, consumer activism, cultural production, and alternative social community. This speaks to the nature of fanfiction writing as both reactive and transformative, two dimensions important in both literature and my analysis in this paper.

The reactive nature is consequential to the fact that fans, especially fanfiction writers, have become highly absorbed into the fictional world and experience very real emotions and attachments to certain characters. The absorptive characteristic of participation, including fanfiction, online gaming, religious trance, and others can bring mental relief as well as positive emotional benefits<sup>324</sup>. In these highly absorptive experiences, participants often feel fully absorbed and immersed in another world. In fact, Boellstroff and colleagues argued that a sense of "worldness" represents one key aspect of virtual worlds<sup>325</sup>. The absorptive feature is important because it provides an opportunity for participants to redefine what is real and what is not; in

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universe and some shows have on-screen interactions. Some also consider First Monday (2002) as part of the universe because of its cross-over with JAG but this view is uncommon.

<sup>319</sup> Although JAG was originally aired on NBC before being transferred to CBS, and Donald P. Bellisario, the creator of NCIS had legal dispute with CBS over property rights and benefits, the JAG Universe overall is usually considered a CBS production and property.

<sup>320</sup> Henry Jenkins, *Textual Poachers: Television Fans and Participatory Culture* (New York: Routledge, 1992).

<sup>321</sup> Jeffrey G. Snodgrass, *The Avatar Faculty: Ecstatic Transformations in Religion and Video Games* (California: University of California Press, 2023).

<sup>322</sup> Brittany Kelley, "To My Betas, Endless Chocolate Frogs!: Exploring the Intersections of Emotion, the Body, and Literacy in Online Fanfiction," *University of Louisville Electronic Theses and Dissertations* (2016), <https://doi.org/10.18297/etd/2474>.

<sup>323</sup> Jenkins, *Textual Poachers*.

<sup>324</sup> Snodgrass, *The Avatar Faculty*.

<sup>325</sup> Tom Boellstroff et al., *Ethnography and Virtual Worlds: A Handbook of Method* (Princeton: Princeton University Press, 2012).

fanfiction's case, writers can try to make things real through conscious efforts, which I demonstrate in the findings of this paper.

Throughout my research, writers often considered fanfiction to be “an escape from real life” or “an emotional outlet.” This indicated the emotional relief writers gained from fanfiction. This absorption and stress reduction I noted echoes what Snodgrass observed in online gaming communities. Snodgrass argued that individuals within online gaming communities gained positive health influence when the demands from online gaming and offline life became negotiated to achieve minimal conflict thus exhibiting less cultural dissonance<sup>326</sup>. This usually required gamers to either prioritize offline achievement or legitimize the significance of online life.

Although Snodgrass' analysis was based on online gaming communities, I found similar implications in fanfiction writing, particularly within the relationship between writers and their writing. However, there is a critical difference in how online-offline conflicts are present in the two settings. Snodgrass emphasized resolving conflicts between the two demanding sides of life, while I emphasized how the loss of offline life can be achieved via online fanfiction writing. This emphasis mirrored Snodgrass' finding that some gamers succeed online but found offline conventional success challenging. In contrast, I argue that writers who use fanfiction to compensate for the loss in offline life often do so consciously. I found that writers did not report experiencing the conflicting demands from online and offline life—like gamers in Snodgrass' study did. Rather, they received compensatory success and emotional comfort in online settings that offline life failed to offer.

Another feature of fan culture is being transformative which allows writers the freedom to express themselves. De Kosnik elaborated on the transformative nature of fanfiction by arguing that online fandoms created spaces for marginalized individuals, specifically queer women who engaged in creative works in resistance to white heterosexist hegemony<sup>327</sup>. Similar analyses have been made by Dym and colleagues, who argued that digital space can be used to facilitate empowerment<sup>328</sup>. These perspectives, although common among scholars who discuss fan culture's role in gender and sexuality ideologies are not universal. Brittany Kelley, rhetoric and composition scholar and a passionate fanfiction writer herself, also argued that such resistance exists<sup>329</sup>. However, she also argued that this view of resistance ignores nuances when it comes to the process of re-habituating dominant ideologies in fanfiction writing.

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<sup>326</sup> Snodgrass, *The Avatar Faculty*.

<sup>327</sup> Abigail De Kosnik, *Rogue Archives: Digital Cultural Memory and Media Fandom* (Cambridge: MIT Press, 2016).

<sup>328</sup> Brianna Dym et al., “‘Coming Out Okay’: Community Narratives for LGBTQ Identity Recovery Work,” *Proc. ACM Hum-Comput. Interact.* 3, CSCW, Article 154 (2019), <http://doi.org/10.1145/3359256>.

<sup>329</sup> Kelley, “To My Betas”.

The ways these reactive and transformative aspects of fanfiction interact represent another critique. Some scholars attended to the cognitive aspect of writing fictional works and argued that fanfiction writing functions as a form of imaginary play, which contains significant emotional input and resistance to authoritative norms<sup>330</sup>. Jenkins noted that “[f]an viewers watch television texts with close and undivided attention, with a mixture of emotional proximity and critical distance.”<sup>331</sup> However, this proximity did not equal emotional absorption. Jenkins contended that fanfiction serves as a site for resistance precisely because fans did not use fandom as an escape, and they were not passively accepting the experiences.

Jenkins’ argument on resistance remains that emotional absorption and transformative criticisms are two divided and somewhat conflicting aspects of fandom. Many scholars, however, believe these two aspects are co-constituting. Kelley argued that fan practices “are as emotional as well as critical,”<sup>332</sup> serving the function of maintaining as well as resisting restrictive social structures<sup>333</sup>. In my analysis, fanfiction writers actively engaged and felt absorbed in the TV universe, used it as occasionally an escape, and at the same time using it as a site for resistance.

Focusing on writing as emotional, embodied, and connected to rhetoric and composition, Kelley stated that “there is something to be said about the body as a space of contestation, reimagining, and struggle for control in at least some fanfiction practices.”<sup>334</sup> I followed Kelley’s analysis of the body and contestation, arguing that in fanfiction writing, the use of self is at the center of identity negotiation.

Through participant observation results, survey data, and interview excerpts, I demonstrate how fanfiction writers incorporate aspects of the self into their writing. This included projecting personal feelings and desires, portraying a parallel self, and actively utilizing writing to coach and direct the self. Throughout this process, writers explored and negotiated aspects of their identities and processed their loss and trauma both of which they found difficult to achieve in offline settings. Writers often received emotional comfort at the same time. Fanfiction, or the separated but continuous written parts of self, served as a space for new

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<sup>330</sup> Jennifer Barnes, “Fanfiction as Imaginary Play: What Fan-written Stories Can Tell us about the Cognitive Science of Fiction,” *Poetics*, 48(2015): 69-82.

<sup>331</sup> Jenkins, *Textual Poachers*, 284.

<sup>332</sup> Kelley, “To My Betas,” 17.

<sup>333</sup> I have yet come to a definitive conclusion on whether Kelley misread Jenkins (unlikely) or Jenkins was discussing a kind of affective experience drastically different from what Kelley considered as “emotional,” which resembles how Snodgrass discussed the idea of absorption.

<sup>334</sup> Kelley, “To My Betas,” 233.

possibilities; these possibilities, while existing in liminality, were made, and felt as “real” through writing.

## Methods

This study retained a small scope and remained exploratory in nature. I incorporated mixed qualitative and quantitative ethnographic approaches. I conducted fieldwork on fan-made websites, Tumblr (blogs and group chats), and popular fanfiction sites including Archive of Our Own (AO3) and FanFiction.Net. Although I was not physically present in a geographically bounded field site, my participant observation experience was brought to a new level because of its virtual nature. The lack of restraint on time and space, along with easy accessibility, made my fieldwork flexible and prolific, giving me a situated experience of participating in this community. My experience thus echoed the advantages of virtual ethnography Boellstroff and colleagues have stated<sup>335</sup>.

During my participant observation, I paid attention to how situated knowledge and immersive experience contributed to my perspectives as a researcher. Specifically, I talked to fans and fanfiction writers both individually and in group chats. Then I went through and documented fandom posts and fanfiction archives. I also conducted semi-structured interviews with four fanfiction writers over email and google Docs. Using text-based interviews allowed respondents the needed time and space to process their thoughts and protect their anonymity. This proved to be the preferred communication method by many authors<sup>336</sup>. I designed the interview questions with a person-centered approach, which treats interviewees as both knowledgeable people of a cultural community and subjects of individual cases with unique histories and agency.<sup>337</sup> This is illuminating not only because it yields more complex data, but it also works better in tabooed and marginalized communities where members avoid discussing directly about themselves. When designing the survey, which was later re-blogged by others on Tumblr, I did not try to comprehensively capture fanfiction writing activities but sought to use writings and discussions in several fandoms as examples. The goal became to discover whether a certain phenomenon existed rather than justifying its prevalence. This goal followed Luker’s suggestion of considering “relevant categories at work,” rather than grasping the “distribution of a population among known categories.”<sup>338</sup>

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<sup>335</sup> Boellstroff et. al., *Ethnography and Virtual Worlds*.

<sup>336</sup> This may sound obvious at first glance—writers would of course prefer to communicate via writing—but it is the depth and ease and the clear signs of rumination and polishing of their answers that convinced me I would not have gotten far in this project if I had conducted video-chat or phone interviews even if they had agreed to it.

<sup>337</sup> Robert Levy and Douglas Holland. “Person-Centered Interviewing and Observation.” In *Handbook of Methods in Cultural Anthropology*, ed. Russ Bernard (Walnut Creek, CA: Altamira Press, 1998).

<sup>338</sup> Kristen Luker. 2008. *Salsa Dancing into the Social Sciences: Research in an Age of Info-glut* (Cambridge: Harvard University Press, 2008), 102.

I conducted data analysis using MAXQDA which codes qualitative field notes and interview responses along with basic summary statistics of surveys. While conducting the analysis I paid attention to codes and themes as well as how these themes interact.

## Findings

Much of my analyses started when I read fanfiction stories online and chatted with writers. I was able to get a glimpse at how Gina came up with her story of Hannah when I connected the dots; and these dots were scattered everywhere—her replies to comments under her story, her posts, and replies to other people’s posts on Tumblr, and what she told me in an interview. Gina talked about Hannah as the character she liked a lot, “Just something about her I keep coming back to.” In another post, “She somehow finds her way into every one of my damn stories.” I was fascinated by her narratives of these uncontrollable and lasting feelings, which I found common among fans and fanfiction writers. Sometimes they described this type of feeling as “being chosen,” and some discussed it as “falling in love.”

Aside from loving TV characters, fans and fanfiction writers also found canonical plots dissatisfying because their beloved characters were treated badly and did not receive the endings they deserve. Sometimes fans call this “lazy writing,” especially when the unfair treatment did not value certain characters’ desires and wishes. One fan mentioned this form of lazy writing when discussing how the CBS reboot *Hawaii Five-0* (2010) mishandled the relationship between two characters, “. . .no one really cares about what she feels, why is it?”<sup>339</sup> This author pointed out that male characters were being prioritized while female characters were expected to set aside their own desires and help their male counterparts to achieve their goals. I found that the characters believed to be mistreated by fans were mostly women—these women were often the romantic partners, mothers, daughters, or daughterly figures of main male characters.

Lara, a fanfiction writer with twenty years of experience and a sharp TV reviewer on Tumblr, remarked about the potential exit of a character on *NCIS* (2003), “If it is true, please, for the love of God, don’t kill her off. . . you know what would be even lazier writing? Killing off yet another female character. . .” She also pointed out that the excessive use of death for women on TV represents a lack of in-depth character development, which constitutes “lazy writing.” These discussions echo scholars who argue that fan culture and fanfiction writing provide space for resisting restrictive social norms. I have also found related discussions in writers’ explanations of their plot inspiration and in my survey, 18 out of 20 respondents said that fanfiction gave them an opportunity to fix unsatisfying plots or to create deserving endings.

I further found that fanfiction writers also engage in writing about themselves in a subtle fashion. The most obvious form of this is projecting oneself by writing about similar struggles and feelings. I once saw a writer using two tags in their story on AO3, “author is not at all projecting her own drama onto these characters,” and “where could you possib[ly] get that from.” With this satirical tone, this writer implied that not only was she projecting her personal

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<sup>339</sup> All quotes in this paper have been edited for length and clarity.

life into the story, but this kind of self-projection was prominent in fanfiction writing. The prominence of projecting is further supported by my survey data: 14 out of 20 respondents said they have included situations they have been through in their writing and 16 out of 20 included feelings and emotions in similar scenarios.

While we see that writers included both events and feelings of their offline life in their fanfiction writing, writers sometimes utilized this opportunity to coach themselves. In Gina's example, this was done via creating a parallel self of her, Hannah.

In Gina's story, Hannah kept journaling to process her trauma.

“Words leaking out of her instead of tears. Pain pushing the pencil across the paper, sometimes chapters at a time. Fear and laughter intermingling like old friends, connected by a thin line of graphite. Sometimes she had felt that the thread that she was hanging on by each day was threaded through the end of that writing tool.”

When I asked her why she chose journaling as a hobby for Hannah, Gina said, “[This character] tends to keep things close to the vest, and she would need some kind of outlet”. If we considered this and Gina's interview response together, the parallel becomes evident. Gina said, “I think I incorporate a lot of myself into each story, whether I mean to or not,” and that “Fanfiction is definitely an outlet” for her personally. Inside of the story, Hannah was journaling, and outside of this story, Gina was writing about Hannah's writing process to process her own personal issues. Eventually, Gina remarked in a comment, “This story gave me the closure I was looking for.”

Gina's self-coaching may seem indirect and unconscious. Another writer, Savannah, utilized fanfiction more directly as a form of self-therapy. Before writing for the JAG Universe, Savannah started writing for a fiction fandom involving supernatural forces and controlling natural elements. She stated in an interview that she was able to overcome her childhood fear of fire by deliberately associating fire with a character she liked a lot. “I always view writing as a ‘personal way of therapy.’ I overcame my childhood fear of fire by attributing it to a character I love...In a way, this attribution – something I was once scared of linked with something/someone I really like – helped me to ‘see’ fire as something else. *Not as a destructive and dangerous power, but as warming, comforting, and helpful.*” This type of self-coaching resembles the avatar therapy Snodgrass discussed<sup>340</sup>, but it involves writers' efforts in creating scenarios or avatars for this coaching to happen.

I found working through personal issues in fanfiction writing throughout the study. Lara also observed this behavior over her years in many fandom communities. “People write because they have certain issues in their lives that they want to try and deal with through fictional characters.” In my survey, twelve out of twenty respondents have used fictional characters to express parts of themselves that are difficult to discuss directly. Seven have stated it helped them

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<sup>340</sup> Snodgrass, *The Avatar Faculty*.



work through difficult things in life they do not want to discuss openly. Here I argue that not only was fanfiction used for its therapeutic benefits, but writers also turned to fanfiction because they found it difficult to achieve similar results in offline life.

I also observed that thirteen out of twenty respondents have included feelings and experiences they want to have in life but do not possess. One writer wrote the following in my survey,

“Writing fanfic has helped me process trauma and lessons from therapy. By giving my favorite characters good endings and happy scenarios, *I can see a possible future for myself that is as happy and is, importantly, achievable*. So often, fandoms are centered on drama and loss and trauma for the sake of shock. That can become like real life, which is dangerous. Fanfiction can reclaim narratives and give humanity and reality back to us.”

In this well-summarized statement, the anonymous writer showed us not only was fanfiction utilized to process trauma, but writers also processed it by creating alternative, better possibilities for their beloved fictional characters. Thus, giving desired or deserving endings to characters was not only about criticizing existing social norms but also about rehearsing a possible reality for writers themselves. Oftentimes, writing things down makes them concrete and experienced as real.

## Conclusion and Discussion

Fanfiction writers can be completely absorbed into TV worlds, experience strong emotions towards fictional characters, and at the same time, take on critical lenses and utilize fanfiction to resist restrictive social norms. My findings here are in line with current scholarly works which argued for the emotional relief, opportunities to resist, and achieving escape provided by fanfiction and other virtual participation. I argue that while writing fanfiction, writers express their emotions and explore aspects of their identities. These attempts sometimes lead to processing writers’ difficult and even traumatic pasts. During this process, writers actively or unconsciously use fictional space and characters to discuss and coach themselves. In this real-but-not-real space, writers actively make things real and experience them as real and even lasting. This liminality offers writers a chance to achieve what they often cannot in offline daily settings, and they receive emotional relief and catharsis in this process.

What this study shows is not only the features of fan culture (reactive and transformative) or the function of fanfiction writing (emotional escape, self-coaching). It provides critical insights on affect and ontology, specifically, how we embody affective experience under the influence of others, and what we consider as real or reality. Following Seigworth and Gregg’s notion, “Effect is born in *in-between-ness* and resides as accumulative *beside-ness*,”<sup>341</sup> and

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<sup>341</sup> Melissa Greg and Gregory Seigworth, *The Affect Theory Reader* (Durham: Duke University Press, 2010), 2.

Latour's "...[then] to have a body is to learn to be affected, meaning 'effectuated,' moved, put into motion by other entities, humans, or nonhumans,"<sup>342</sup> we see affect's embodied, intersubjective nature. Here, fanfiction writers' experience tells us this notion extends to virtual worlds and fictional characters; to be "put into motion by other entities" can involve being mesmerized and influenced by fictional characters which are situated in a reality co-created by TV producers and fan writers. We also see that fan writers utilize what they know as virtual/fictional/unreal to create something they experience as real. They exhibit what I consider a fragile grasp of reality. Savannah said, "Putting thoughts on paper turns them into something real, existing, and final. It creates another reality which makes it real in some ways, at least for me." Understanding fanfiction writing thus provides insights on not only what is real, but how reality is made and negotiated during the affective, intersubjective experience.

In her dissertation, Kelley stated that her fanfiction avatar was extensional of herself and I find her words powerful and illuminating. "It [writer's fanfiction handle] was a version of me that got to be incredibly intelligent, smooth, educated, and articulate...She was strong, confident, and powerful...she was an aspect of myself that got to be all mine."<sup>343</sup> I believe a similar experience exists for other fanfiction writers alike.

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<sup>342</sup> Bruno Latour, "How to Talk About the Body? The Normative Dimension of Science Studies", *Body and Society*, 10(2-3): 2004, 205.

<sup>343</sup> Kelley, "To My Betas," 248.

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