

Conflicting Cases:
A Bibliometric Analysis of the Role of Case Studies in Paleopathology

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1.0 Introduction

The discipline of bioarchaeology is the study of human remains from archaeological sites, and focuses on the questions and answers that can be asked of, and learned from human skeletal remains. The term bioarchaeology, as we use it today, was first seen in North American anthropological literature in 1977, where Jane Buikstra refers to it as “A new form of regionally-based, interdisciplinary research in mortuary site archaeology and human osteology... With the active participation of both archaeologists and physical anthropologists in all phases of research design, members of our ‘bio-archaeological’ research group made the initial decision to focus upon the investigation of biocultural change” (as cited in Knusel 2010). Prior to bioarchaeology as an integrative field of archaeology and biological anthropology, with a particular interest in biocultural theory, the study of human remains was approached differently. These early studies focused on the production of descriptive reports, opposed to asking questions around the actual individual, or the population.

Paleopathology is the study of disease, health, and trauma in past populations through the study of skeletonized, or mummified human remains. While, today, paleopathology is considered to be a subfield of bioarchaeology, the discipline began in medicine and developed outside of the discipline of anthropology. Akin to early studies in human skeletal biology, the early days of paleopathology were dependant upon the publication of descriptive reports, disregarding the potential for population level analysis.

Both of these disciplines have been critiqued for their ties to descriptive methodologies (Washburn 1951; Armelagos & Van Gerven 2003; Zuckerman et al. 2012). Accompanying the critiques was a push for these two fields to adopt a more analytical and hypothesis driven

approach. This gave rise to the popularity of bioculturally oriented bioarchaeology, common amongst bioarchaeologists today, and the desire for paleopathology to adopt a similar framework. A biocultural approach refers to the recognition that the human skeleton is a biologically, culturally, and socially shaped entity (Agarwal & Glencross 2011). However, despite the critique of paleopathology's use of descriptive methodologies – which continue today – case studies continue to permeate the journals used by paleopathologists (Mays 2010). Case studies refer to relatively short reports that detail an individual-by-individual account of disease in the past, naturally these reports are inherently descriptive. The continued publication of these case studies in the face of their critique creates a conflict in the field around the use of description. It has been argued that case studies are overly descriptive (Roberts 2006; Armelagos & Van Gerven 2003; Zuckerman et al. 2012), yet they continue to dominate publications in the field (Mays 2010; Hens & Godde 2008). In discussing this descriptive conflict, Armelagos and Van Gerven ask “given the promise of analytical research, has our commitment to description actually given way?” (2003:59).

The aims of this essay are twofold. First, this essay will examine the publication trends of case studies over the last 11 years (2005-2015). Second, it will explore the role of case studies in modern paleopathology. The term role here refers to the manners in which case studies are used by other researchers. Existing literature that discusses case studies in paleopathology lack any information on their role, as just defined; this essay hopes to fill this gap present in case study literature. The research question of this essay are: (1) has there been any significant change, increases or decreases, in the publication of case studies over the last 11 years; (2) are case studies that adopt a biocultural framework more common than purely descriptive case studies; (3) does the national location of author have an effect on the publication of case studies; (4) how

are case studies being used by other researchers, and what is their role within paleopathology? In asking these questions I will also be assessing the current state of biocultural theory within paleopathology. Anthropology as a whole makes claims to the holistic, multi-disciplinary/multi-subdisciplinary nature of its work; with the integration of paleopathology into bioarchaeology, paleopathology more specifically is claiming to be holistic and more inclusive. This research will shed light onto this topic, examining the holism of paleopathology.

These questions will be approached by applying two standard bibliometric techniques: content analysis and citation analysis. Bibliometric techniques are tools to analyze publication trends within scientific disciplines (Mays 2010). They have been used in anthropology in a variety of ways, including the investigation of descriptive and analytical studies. The content analysis presented here uses statistical procedures to investigate a database of 537 articles that I created for this research, while the citation analysis allows me to investigate the use of case studies.

The structure of this essay is as follows: Section 2 will discuss the history and development of human skeletal biology into bioarchaeology as it is known today through a review of the literature, as well as, discussing the current state of the field. Then the development of paleopathology will also be outlined, where the separate developments in Europe and North America can be shown. In Section 3 I will begin by outlining the sample used to conduct this research, and move into the methods for both the content and citation analysis. In section 4, the statistical data will be presented, as well as any other findings that arise. In the final section (Sect. 5) I will discuss the implications of my findings, and what they mean to the field of paleopathology.

2.0 The Development of Biocultural Theory in Bioarchaeology and Paleopathology

2.1 The Development of Bioarchaeology

2.1.1 History

To begin an examination of the history of human skeletal biology, and its transformation into modern bioarchaeology, we must go back to the mid-nineteenth century. In this stage of proto-physical anthropology, skeletal biology was fixated on the categorization of race (Armstrong et al. 1982). This fascination with race is not new to this time period, rather it stems from centuries of attempts to create racial hierarchies (Armstrong & Van Gerven 2003). Human skeletal biology's involvement in the discussion around racial typologies came from the process of analyzing morphological variation, meaning difference in shape, in the crania of different preconceived races (Armstrong et al. 1982). In the earliest days of this period, racial categories were based on the idea of degeneration from God's original creation (Armstrong & Van Gerven 2003:54). Rather than moving past this with the introduction of Darwinian evolution, the basis of races simply moved from degeneration, to stages of evolution. Due to the nature of this material, studies produced in this period were inherently descriptive.

By the beginning of the twentieth century the study of the human skeleton moved into the emerging field of biological anthropology. While this incorporation with anthropology did lessen the field's focus on the racial approach, it did not vanish entirely. In this time period three major figures dominated biological anthropology, each bringing their own approach to the field; they were Franz Boas, Ales Hrdlicka, and Earnest Hooton (Armstrong & Van Gerven 2003:55). In regards to the issues of racial categorization, Boas was critical of their use and was firmly against the creation of hierarchies of race; however, Hrdlicka and Hooton were less critical. Hrdlicka saw race as an important factor shaping cultural processes (Armstrong & Van Gerven 2003).

Throughout this formative period, the approaches of Earnest Hooton were some of the most influential. In his 1930's study, *The Indians of Pecos Pueblo*, Hooton argued that biological histories could be learned through the application of racial typologies to the human skeleton (Armelagos et al. 1982). Hooton's approach persisted for a number of years before it was eventually questioned and slowly dropped. Studies focused around description managed to persevere despite this change. Prior to the 1960's, this early period of biological anthropology can be seen as the field's distinctly descriptive phase, where archaeological context and an understanding of culture are distinctly lacking (Zuckerman & Armelagos 2011). This period will later become an area subject to significant critique by the academic community.

The first real steps skeletal biology took to move away from its obsession with race occurred throughout the 1950's. Potentially due to the Nazi movement of the 1930's and 1940's, which by the 1950's encouraged researchers to move away from such a focus on race (Zuckerman & Armelagos 2011). However, in the early 1950's there were two publications that marked the true beginnings of biocultural thought in skeletal biology. First was the paper *New Physical Anthropology*, written by Sherwood Washburn in 1951. This seminal paper argued that physical anthropology needed to forgo its descriptive and racially focused ways and adopt an approach that focuses on theory driven research and the use of hypothesis testing to learn about evolution and adaptation (Zuckerman & Armelagos 2011).

Shortly after the publication of Washburn's paper, Georg Neumann published an equally influential chapter titled *Archeology and Race in the American Indian* (1952). Within the literature Neumann is considered to be "...among the last physical anthropologists committed to the [racial] typological concept" (Cook 2006:60), or "the last and the best of the typologists" (Hall 1997 as cited in Armelagos & Van Gerven 2003:57). However, Neumann's work has

provided future generations of skeletal biologist and biological anthropologists with methods to recreate cultural histories, marking an important point in the progression of bioarchaeology (Armstrong 2003).

While these two studies by Washburn (1951) and Neumann (1952) both provided novel methods and theories to understand populations through the study of human remains, they were not accepted immediately after their inception. It is not till the 1960's that these papers became more widely accepted. The 1960's saw the introduction of Binford's (1962) processual archaeological paradigm. This paradigm encouraged archaeologists to move beyond description by rigorous hypothesis testing and recognizing culture as a system, allowing for population level understandings of the past (Binford 1962). The collective efforts of these three scholars, along with the help of others, biological anthropology finally began moving towards the adoption of a biocultural approach (Armstrong & Van Gerven 2003). This is not, however, to say that the field had dropped its ties to description. As Armstrong (2003:28) argues "Until the 1980s, skeletal biology remained a descriptive undertaking".

It is within the 1970's that bioculturally oriented bioarchaeology arises in response to this "new physical anthropology" movement. The basis of bioarchaeology is in the four-field, and interdisciplinary approach it takes. It functions by incorporating the methods between biological anthropology, skeletal biology, and archaeology; while relying on social/cultural theory for the questions it seeks to answer (Armstrong & Van Gerven 2003). As part of the rise of bioarchaeology, three tenets to the proper practice of bioarchaeology develop in this period. First is the population perspective, which focuses on the use the individual as a unit of diagnosis, yet the population for analysis. Second, is the recognition that culture is an environmental factor that interacts with biological adaptation (Zuckerman & Armstrong 2011). The final tenet is the

inclusion of methods to test alternative hypothesis examining this engagement between biological and cultural processes in adaption. Armelagos and Van Gerven (2003:58) refer to these three tenets as the ‘three promises’ of bioculturally oriented bioarchaeology.

2.1.2 Current State

What then is the state of bioarchaeology today? As mentioned before bioarchaeology is based on the integration of archaeology and skeletal biology. Today the study of the human skeleton is generally dependant upon an understanding of the archaeological context. Human remains are to be considered part of the archaeological record, and should be studied in relation to the site as a whole (Duday 2005). Depending on one’s particular school of thought, bioarchaeology can be seen as the study of human remains either *from* or *within* an archaeological context (Knusel 2010). The words *from* and *within* are stressed here as they mark a separation in the school of thought a bioarchaeologist takes in their study.¹

The biocultural model to bioarchaeology truly took hold of the discipline as of the late 1990’s, and has continued to rise ever since (Zuckerman and Armelagos 2011). With this movement away from description, bioarchaeology is able to address a series of critiques targeting the basis of the discipline that plagued the field in it’s early years (Wood et al. 1992; Bocquet-Appel & Masset 1982; Petersen 1975; Knudson & Stojanowski 2008). Zuckerman and Armelagos (2011) provide a list of five primary foci in bioarchaeology today. They are the evolution of human diet, violence, gendered violence, studies from the African Diaspora, and finally disease (Zuckerman and Armelagos 2011:26). While this list encapsulates a great deal, novel topics are still arising within this growing field of biocultural bioarchaeology.

¹ See Knusel (2010) Bioarchaeology: A Synthetic Approach for a detailed break down of the different schools of thought within bioarchaeology.

2.2 The Development of Paleopathology

2.2.1 History

Since paleopathology can only recently be considered a sub-field of bioarchaeology, we must discuss its history separate from that of skeletal biology and bioarchaeology. Early scholars interested in the history of paleopathology discuss the field's history in four periods (Ubelaker 1982). First is the 1774 – 1870 period, where there was a focus on the presence of disease in Quaternary period fauna. Next is the 1870 – 1900 period where traumatic lesions and syphilis were studied; then the 1900 – 1930 period which was interested in infectious disease and evidence for medical treatment in prehistory. Finally, the 1930's – present where we are focused on paleoepidemiological studies and incorporating an ecological perspective (Ubelaker 1982). While this model to examining paleopathology's history remains valuable, for the purpose of this paper I will outline a history of paleopathology in reference to biocultural theory, only using this four period model as a basis.

Just as we began the history of bioarchaeology in the nineteenth century, we will do the same for paleopathology. In this early phase of paleopathology, the discipline was far removed from anthropology and archaeology. Rather, it was predominantly physicians that carried out paleopathological work (Buzon 2012). Since such physicians would have lacked anthropological or archaeological training, these studies were conducted outside of the context in which the remains were found. Without context, the results of these early studies were published as case studies – lacking much population level analysis, and focusing on describing each case of disease. Within the medical world, case studies have long been used as the primary means of disseminating new or interesting clinical findings (Mays 2012a). Case studies, being a predominantly medical form of publication, likely achieved such popularity in early

paleopathology because of its ties to the medical world – it appears physicians were publishing as if it were a medical discipline, where case studies are more common.

While some scholars refer to this formative period as ‘the dark ages of paleopathology’ due to the commitment to descriptive research, it was not all so bleak. It is important to acknowledge that the advancement in thought and methodologies we now depend on originate in this era. Since medical practitioners were trained in pathology and anatomy they were able to develop these associations between lesions on bone and disease in life, a concept used as the basis for diagnosis today (Grauer 2012). As well, this period gives rise to individuals such as Frederic W. Jones and Jefferies Wyman, whose early works can be seen as the origins of population level disease analysis in human remains, and the study of the history of disease (Zuckerman et al. 2012).

In the early twentieth century paleopathology began to grow into its own discipline. The work of Mark Ruffer in the early decades (1910-1920) marked the start of this movement. Ubelaker (1982:341) refers to Ruffer’s work as “the dawn of the specialist in paleopathology”. It is with his work that paleopathology “appears to have taken the study of human remains beyond the curiosity stage to attempt to understand paleoepidemiology” (Roberts 2006:419). Ruffer is also, in fact, most commonly credited with coining the term paleopathology itself (Roberts 2006; Ubelaker 1982). This, however, was not enough to transform paleopathology from a descriptive endeavor into one focused on the biocultural.

There is little other development in the field until the 1930’s, where its development is short lived. Just as bioarchaeology took great influence from Hooton’s *The Indians of Pecos Pueblo* (1930), paleopathology did as well. For paleopathology, this seminal work represented an attempt to approach the study of disease through population level analysis. Akin to Ruffer,

Hooton's work has been referred to as 'foreshadowing' the epidemiological approach to ancient disease (Zuckerman et al. 2012:36; Ubelaker 1982). It is also with the work of Hooton that we see the incorporation of archaeology in the study of ancient disease, which is something of great importance to modern paleopathology (Ubelaker 1982; Armelagos & Van Gerven 2003).

While the works of Hooton will later be praised for their contributions to the field, they did not cause an immediate surge of biocultural work in paleopathology. Rather, in one of paleopathology's first reflexive evaluations, conducted by Jarcho in 1966 the time between 1930 and 1960 were seen as "doldrums" (as cited in Zuckerman et al. 2012:36). Just as in the previous century, paleopathology had not seen any movement beyond descriptive based studies. There was little attention paid to this population level analysis, or questions around social theory; as papers still focused on the diagnosis of lesions in human skeletal remains (Zuckerman et al. 2012).

By the 1960's the history of paleopathology begins to split in two separate directions. Generally speaking, these two directions equate to the European and North American schools of paleopathology (Grauer 2012). The following account of paleopathology, from the 1960's through to the present, is the North American history. The 1960's finally marks the slow arrival of biocultural theory into paleopathology, and the beginnings of modern paleopathology. There is no doubt this movement was in part stimulated by the *New Physical Anthropology* and processual approaches that aided bioarchaeology in its progression (Zuckerman et al. 2012). Other than these, a growing interest in epidemiological studies of the past, and the recognition of non-specific stress indicators also helped push paleopathology in the right direction (Buikstra and Cook 1980). In the case of paleopathology non-specific stress indicators are skeletal indicators (e.g. lesions) that signify a material representation of physiological disruption and

disease (Temple and Goodman 2014). Temple and Goodman (2014:188) explain “[A general model for studying stress in the human skeleton] moved bioarchaeological research beyond a descriptive approach and toward one that embraced anthropological themes, including population stress and culture change”. I will revisit this exact quote later, but here it shows how important the study of stress indicators is to the progress of paleopathology. Buikstra and Cook (1980:461) conclude their account of paleopathology in America, through the 1960’s and 1970’s, by saying “The outlook for paleopathology appears much more optimistic than it did at the time of Jarcho’s critique [1966]”. Reflecting on the future of paleopathology, Buikstra and Cook (1980), as well as Ubelaker (1982), acknowledge the difficulties in adopting a biocultural focus. They call for research improving indicators of subsistence, evidence for disease, and finally the adoption of multidisciplinary approaches to the field, incorporating medical scholars, archaeologists, and epidemiologists.

By the time skeletal biology adopts the title of bioarchaeology, paleopathology slowly became a sub-field of this new discipline. The 1970’s and 1980’s were not static, rather, they can be seen as a time for a new concept, brought to light in the 1960’s, to develop. During this period a biocultural approach was increasingly advocated for and becoming gradually more popular (Zuckerman et al. 2012). At this time, while case studies and descriptive research were still common, papers that incorporate Armelagos and Van Gerven’s (2003) three promises of bioarchaeology were gradually increasing.

Paleopathology in Europe, as stated before, has developed differently than in North America. While I will not outline a complete history of paleopathology in Europe, predominantly because of a lack literature on such a topic, I shall explain how the two histories, and in turn

approaches, differ.² The main difference in the two approaches is that North America was much more quick in adopting the bioarchaeological and biocultural model compared to Europe. Roberts (2006:417) explains that “It is noticeable... that Europe as a whole has lagged behind in the development of a biocultural/bioarchaeological”. The reason for this lag in development stems from the fact researchers, until recently, were coming from fields such as medicine, dentistry, and anatomy. They had no training in archaeology or anthropology to later contextualize the biological data they collected (Roberts 2006). Also contributing to this delayed biocultural approach was the lack of appropriate training programs for those wishing to study paleopathology in Europe. It was not until 1980 that the UK developed its first program in explicitly archaeological osteology; programs such as this did not become common until the 1990’s (Mays 2010; Roberts 2006). In Europe it remained common to publish descriptive case studies until more recently due to the backgrounds of researchers being so rooted in medicine (Grauer 2012). Similar to North America, European paleopathology has undergone critique throughout its course, which has led to the eventual adoption of biocultural theory (Roberts 2006; Grauer 2012).

2.2.2 *Current State*

While the current state of paleopathology has benefited from this series of developments in the field, all one has to do is flip through the pages of a current osteological journal to realize case studies are still prevalent. Despite the field's efforts to remove them, case studies have managed to remain dominant within the literature. Due to this, a conflict in the use of descriptive methods has arisen – with case studies locked in its sights. Over the last two decades case studies

² For the most complete history of paleopathology in Europe, which can be broken down further into different countries, see Charlotte Roberts chapter *A View from Afar: Bioarchaeology in Britain* found in Buikstra’s edited volume *Bioarchaeology: The Contextual Analysis of Human Remains*

have been critiqued due to their descriptive nature. Some scholars are more mild in their critique, such as Ortner (2011), who recommends case study publication be closely monitored lest the subject become ‘trivialized’; or Roberts (2006), who is encouraging British scholars to move forward and formulate hypothesis driven research, with a population perspective. Along this same time, Zuckerman and colleagues (2012) explain that case studies need to be compiled in an aggregate fashion in order to be productive. Other researchers have been more critical of case studies, as is with Armelagos and Van Gerven (2003). In their paper they argue case studies prevent progress in paleopathology, and with their publication paleopathologists are resorting back to their roots laden with racial typologies. They write “Alternative biocultural analyses appear to have stalled... As a result, many osteologists have returned to the old questions of racial history” (Armelagos & Van Gerven 2003:60).

On the other side of this argument, some researchers have argued for the potential value case studies hold. These points will become important later as well when assessing the role of case studies within paleopathology. The most prominent and logical argument for why case studies are being published comes from Stojanowski and Buikstra’s (2005) critical evaluation of the *American Journal of Physical Anthropology (AJPA)*. They first propose that case studies are valuable as synthetic tools, necessary for the creation of larger compiled volumes on disease in the past. In their own words, “synthesis cannot occur without the raw data provided by descriptive report [or case studies]” (Stojanowski & Buikstra 2005:108). This view is echoed by Zuckerman and colleagues (2012), Stojanowski and Duncan (2015), and Park and colleagues (2010). The next argument that has been made on behalf of case studies is in their potential for diagnosing rare instances of disease. While not quite as dominant as the argument for synthesis, scholars argue case studies can be used to diagnose instance of disease in past populations, akin

to how the clinical science once used them (Grauer 2012; Mays 2012a; Mays 2012b). These contentious views both create and reinforce the descriptive conflict with paleopathology. Due to this conflict, I argue it is difficult to assess the progress and future of paleopathology without a further understanding on the role of case studies.

3.0 Sample and Methods

3.1 Sample

To conduct an analysis on the status and role of case studies within paleopathology I applied a series of bibliometric techniques to the *International Journal of Osteoarchaeology* (referred to as the *IJO*). Bibliometric methods have aided researchers and journal editors in the past because of their ability to closely, and statistically, examine research trends within a discipline. By applying these techniques to the *IJO*, I am able to track the trends bioarchaeology and paleopathology follow, while focusing on case study publication and examining the role case studies play within their field.

For this study I have analyzed a sample consisting of all articles published in the *IJO* over an 11 year period – between 2005 – 2015 (retrieved November 2015 and February 2016). This resulted in a database of 537 articles. Not included in this sample of articles were those published in self-titled special issues, as the inclusion of entire issues dedicated to a single topic would potentially bias results. As well, articles such as book reviews and obituaries were also omitted for the same reason.

The *IJO* is aimed at an international audience of archaeologists, zooarchaeologists, and bioarchaeologists, with a particularly high frequency of paleopathological articles. As well, compared to journals such as the *American Journal of Physical Anthropology*, the *IJO* has received less attention in the form of analysis. It is also worth recognizing that the *IJO* has been

the primary outlet for paleopathological literature for a number of years, and has faced little competition until recently with the founding of the *International Journal of Paleopathology* in 2011. The 11 year period I address is based on the fact it provides minimal overlap with existing studies of the *IJO* and serves as a recent look into the field of paleopathology, and bioarchaeology as a whole.

3.2 Methods: Content Analysis

To explore the publication trends of case studies, it is important to first define what constitutes a case study. According to Mays (2010:194) a case study is “an article whose prime aim is the study of remains on an individual-by-individual basis. Most often seen in paleopathology, case studies are often devoted to only one skeleton but, equally, several skeletons may be described”. While for the purpose of this study I borrow from Mays’ definition and add upon in two ways. I argue case studies can be seen as either descriptive or biocultural in nature. While the former relies on strictly descriptive methods and pays little attention to the biocultural approach, focusing on the description of lesions or other paleopathological phenomena; the later, however, incorporates the biocultural model that has been discussed at length throughout this paper.

The first step of the content analysis portion of this paper was to sort and categorize all publications in the journal in order to understand the trends. Each article was placed into one of eight categories, as follows:

- (1) Descriptive case studies. Paleopathological case studies that were aimed at describing the expression of a disease or health state, but without contextualizing the case in the larger biocultural or analytical framework.

- (2) Analytical case studies. Paleopathological case studies that considers the broader biocultural implications of the case, in addition to describing the disease or health state of skeletal remains.
- (3) Bioarchaeological studies. Non-paleopathological studies of human remains from archaeological contexts that incorporate a large scale, population based study.
- (4) Faunal studies. Studies that focus on the use and analysis of animal remains.
- (5) Non-paleopathological case studies. Studies that resemble case studies yet make no reference to paleopathology, often pertaining to diet or a description of a particular burial.
- (6) Methodological studies. Studies acting as “innovations in osteological methodology” (Mays 2010:194).
- (7) Other paleopathological studies. Any study that incorporates large scale, population based research to paleopathology; including paleopathology methods papers, and studies in paleoepidemiology.
- (8) Unclassified. Any article that was unable to be sorted into the above categories.

Following the techniques presented by Hens and Godde (2008), and more recently, Mays (2010), to place articles into a category the abstracts were read, exploring the text when necessary, as it often was when differentiating descriptive from biocultural case studies.

To examine the effect of the authors affiliated institution on the publication of case studies, a subsample of case studies was created. For each of the case studies the affiliated institution of the first author was recorded, following the method used by Mays (2010). This does assume the first author of a paper is the main author, which is common of the social and

natural sciences. Rather than recording the exact location for each paper, each author was assigned one of three categories: North American, European, or Other. Using these three categories I am preventing any unnecessary splitting that may influence my results, while still being able to accurately test for this division between European and North American paleopathology.

To analyze all the data collected here, both datasets were imported into a statistical program (IBM SPSS 23). Within this, a series of Chi-squared tests were performed to test for difference in the trends, this follows methods used in past content analyses (Hens & Godde 2008; Mays 2010). Alongside statistic analysis, quantitative observations will be presented and discussed in situations where statistical analysis was not possible.

3.3 Methods: Citation Analysis

To answer the larger question on the role of cases studies within paleopathology, another dataset was created. This dataset is a subsample of my initial data set. I separated all case studies published between 2005 and 2012 (n=115) and choose to analyze 35% of this set, resulting in a dataset of 40 case studies. Of these 40 case studies, the division between descriptive and biocultural was nearly one to one; there were 22 descriptive case studies, and 18 biocultural. The sample's timeframe was shortened to seven years to insure each case study had three years to be cited. For each of these case studies data was collected on the number of times they were each cited, followed by the different contexts they were each cited in.

Compared to literature on content analysis, there has been a relatively low number of studies that utilize these techniques. This make formulating the methods difficult. While a study of this depth has, to my knowledge, never been done I have been able to borrow methods from other sources. Part of this suite of bibliometric techniques is the process of impact assessment.

This is an analysis of the impact of an article, or type of article, based on how many times it has been cited. Stojanowski and Buikstra (2005) provide an example of robust impact assessment in the *AJPA*. While they use Web of Science to collect information on where and how often articles are being cited, I followed DeWitte and Stojanowski (2015) and used Google Scholar. Google Scholar provides a more robust and accurate analysis as their database include publication outside of journal articles, including books, edited volumes, theses, and dissertations. Based on the information provided in Google Scholar, the number of times each case study has been cited was collected.

In order to record the context in which case studies are being cited, each article, book, or thesis that cited the case study was examined and the means in which it cited the case study was recorded. Following trends that arose when looking at how they are being citing, four patterns were found which provided the basis for organizing this data. The four contexts in which an instance of citation could be cited were incidentally, diagnostically, synthetically, and finally with no in text reference made. Incidental citations are those in which the case study does not directly contribute to the study in which it was found. Often these are part of long lists of citations. Diagnostic citations are those that borrow the diagnostic criteria presented in a case study in order to make a diagnosis in their own study. Included in this are studies that borrowed methodological techniques from the case study. An example of such a citation can be seen in a study of Iron Age human remains from Zambia by Gibbon and colleagues; they write “Using the diagnosis criteria by Molnar et al. (2011), osteoarthritis was diagnosed when at least two of the following characteristics” (2014:104), showing a case study by Molnar et al. being cited for its diagnostic criteria. A synthetic citation is one where the case study contributes data to a larger analytical study. Finally, there was a small number of articles that had referenced the case study

in their bibliography, but no in text citation was found. Due to a number of language barriers, and availability of articles or books through my institutions library, I was able to collect the context for 238 of the times cited, out of the total of 356.

Just as was done with data from the content analysis, these data were uploaded into SPSS (IBM, 23) for statistical analysis. Here, following Mays' (2012b) notes on impact assessment, I performed a series of non-parametric tests (Kruskal-Wallis ANOVA and Maan Whitney U-Test). As explained by Mays (2012b), data of this type are generally not normally distributed, thus non-parametric statistics must be used to prevent a bias in the result. Again, statistical analysis will also be accompanied by quantitative observations.

4.0 Results

4.1 Content Analysis

Over the 11 year period that was analyzed, a total of 537 articles from the *International Journal of Osteoarchaeology* were counted. Figure 1 provides the total number of articles published in each category used in this study. The most common publication type was the general bioarchaeological category, with a total of 117 publications, or 21.8 % of all publications. However, if the two categories of case studies are evaluated as a single unit, they total 152 articles, which is 28.3%. This makes case studies the most common category. Nearly half, 49.2%, of all studies in the *IJO* were of a paleopathological nature – this is based on an

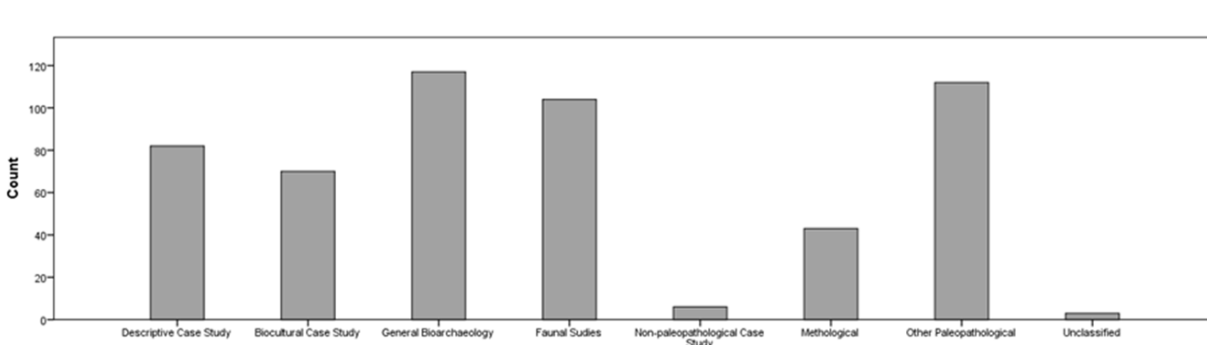


Figure 1: Total counts of all articles published in the *IJO* between 2005 and 2015, broken down by publication type.

aggregation of categories (1), (2), and (7). When comparing the two types of case studies, it was found that descriptive case studies were slightly more common than biocultural case studies. The difference was minimal, however, with descriptive totaling 82 (15%) and biocultural totaling 70 (13%). These result also show that the lest common form of publication were non-paleopathological case studies, where along with any unclassified articles, were nearly non-existent.

To examine the presence of any change over time in the publication of case studies a number of different variables were tested. First, case studies were grouped together and compared with all other publications across the sample’s timeframe using a Pearson’s chi-squared test. The test produced a Pearson Chi-squared value of 25.8 and a *p* value of .111, which means the null hypothesis cannot be rejected, meaning there is no significant change in the general publication of case studies in comparison to all of the journal’s other publications. Table 1 and Figure 2 illustrate the pattern of publication frequencies of paleopathological case studies

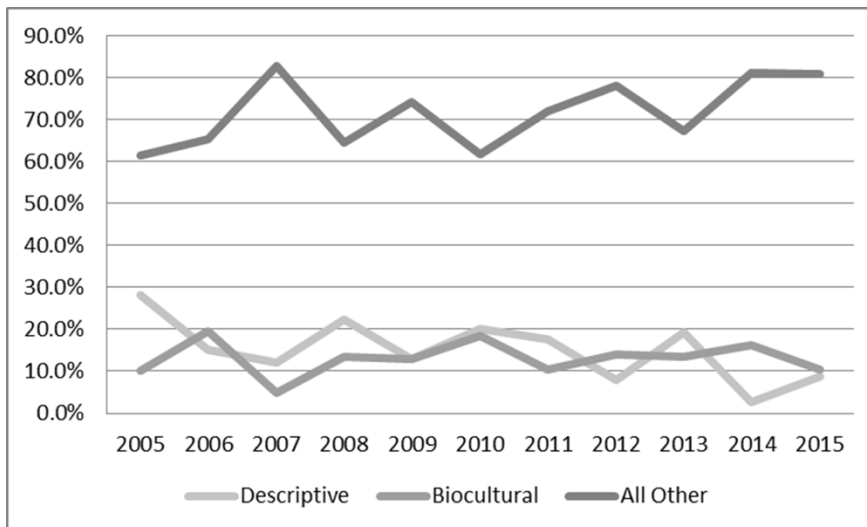


Figure 2: Percentages of descriptive and biocultural case studies over the last 11 years, in comparison to all other publications.

relative to all other article types over the time period. Looking at these data it seems no trends emerge, other than a consistently lower percentage of case studies compared to other forms of publication. A second Chi-squared test

was done to evaluate the difference between case studies, again collectively, and articles with a

distinctly paleopathological focus (category number 7). The results yield a chi-squared value of 25.16 with a p - value of .131. Just as before, this indicates there has been no trends, over the last 11 years, in regards to the publication of case studies within all paleopathological publications in the *IJO*. The progression of case studies, in reference to the wider body of paleopathological literature, can be seen in table 2.

Since this research took a novel approach to looking at case studies by dividing them into descriptive or biocultural, it was also possible to test whether there has been any movement away from a descriptive focus in favor of a biocultural or analytical one within case studies specifically. To do so, a third chi-squared test was conducted to determine whether any changes were significant. Producing a Chi-squared value of 11.28 and a p value of .336, again the null hypothesis could not be rejected, showing there to be no statistically significant difference. This means there is no apparent association between temporal progression and the adoption of a biocultural approach. This unpredictability in the publication of case study types can be seen in figure 2, where no clear patterns arise – other than a generally higher count of descriptive case studies.

Of the 40 case studies examined for author location it was found that Europe held the highest number of case study publications. Twenty-five out of the 40 case studies were published by European authors, equalling 63%. This is compared to the 12 case studies published by North American authors, which equates to 30%. The remaining 3, or 7%, of case studies were published by researchers outside of North America and Europe. Figure 3 shows the total counts for each location. As figure 4 shows, there does not seem to any noticeable difference between descriptive and biocultural case studies in the regard.

Publication Type	Year											Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Descriptive Case Study	11	7	5	10	4	12	12	4	10	1	6	82
	28.2%	15.2%	12.2%	22.2%	12.9%	20.0%	17.6%	8.0%	19.2%	2.7%	8.8%	15%
Analytical Case Study	4	9	2	6	4	11	7	7	7	6	7	70
	10.3%	19.6%	4.9%	13.3%	12.9%	18.3%	10.3%	14.0%	13.5%	16.2%	10.3%	13%
All Other Articles	24	30	34	29	23	37	49	39	35	30	55	385
	61.5%	65.2%	82.9%	64.4%	74.2%	61.7%	72.1%	78.0%	67.3%	81.1%	80.9%	72%
Total	39	46	41	45	31	60	68	50	52	37	68	537
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 1: Case Studies and All Other Publications by Year

Publication Type	Year											Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Descriptive Case Study	11	7	5	10	4	12	12	4	10	1	6	82
	52.4%	28.0%	23.8%	45.5%	22.2%	33.3%	40.0%	17.4%	41.7%	6.3%	21.4%	31.1%
Analytical Case Study	4	9	2	6	4	11	7	7	7	6	7	70
	19.0%	36.0%	9.5%	27.3%	22.2%	30.6%	23.3%	30.4%	29.2%	37.5%	25.0%	26.5%
Other Paleopathological Studies	6	9	14	6	10	13	11	12	7	9	15	112
	28.6%	36.0%	66.7%	27.3%	55.6%	36.1%	36.7%	52.2%	29.2%	56.3%	53.6%	42.4%
Total	21	25	21	22	18	36	30	23	24	16	28	264
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2: Case Studies and Other Paleopathological Studies by Year

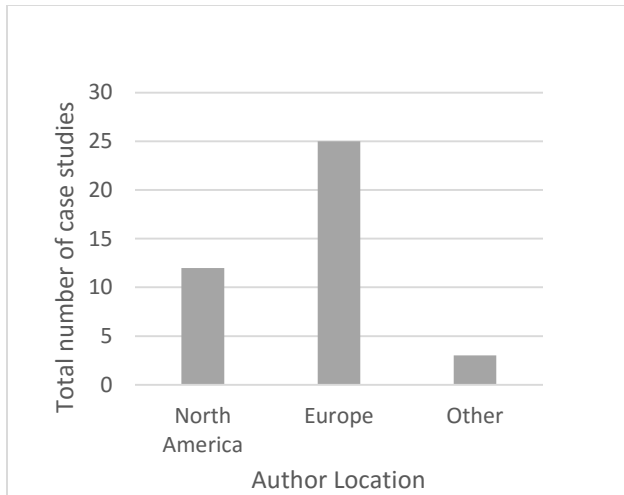


Figure 3: Total counts of case studies sorted by the location of the author.

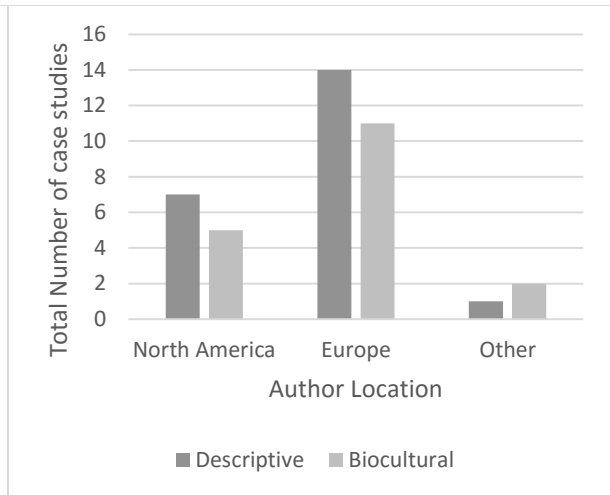


Figure 4: Total counts of case studies sorted by the location of the author, and divided by case study type

4.2 Use Analysis

In the seven year subsample, consisting of 40 case studies, it was found that all case studies together were cited 356 times. Looking at raw citation frequency, biocultural case studies have a higher impact, meaning their average times cited per paper was greater. Biocultural

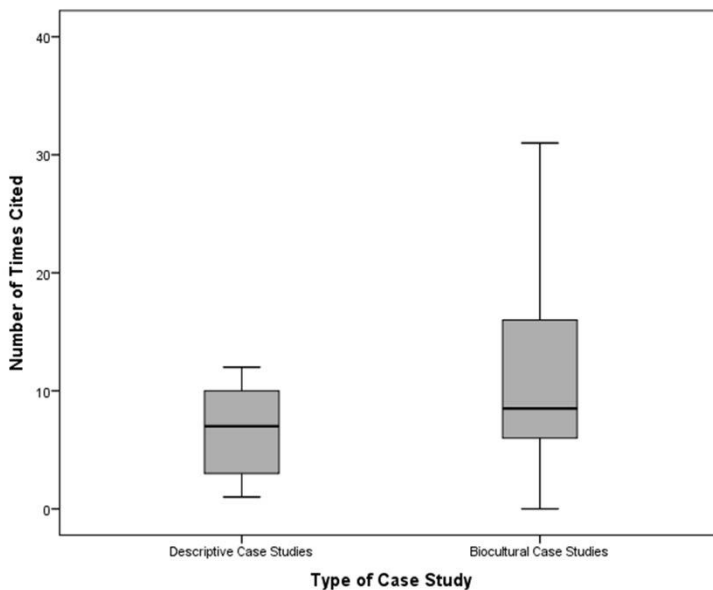


Figure 5: Boxplot representing the number of times cited for both Descriptive Case Studies and Biocultural Case Studies. The bar within the box represents the mean, and the box and tails represent the distribution.

papers were cited on average 10.72 times per paper, compared to the 7.41 of descriptive case studies. Figure 5 shows the range and means times cited for each type of case study.

Since not all materials that referenced the case studies within the subsample were accessible, due to language barriers and library

restrictions, 238 instances of citation were able to be observed. Case studies were most commonly cited in a synthetic manner, totaling 182 out of all observed instances (76%). This is

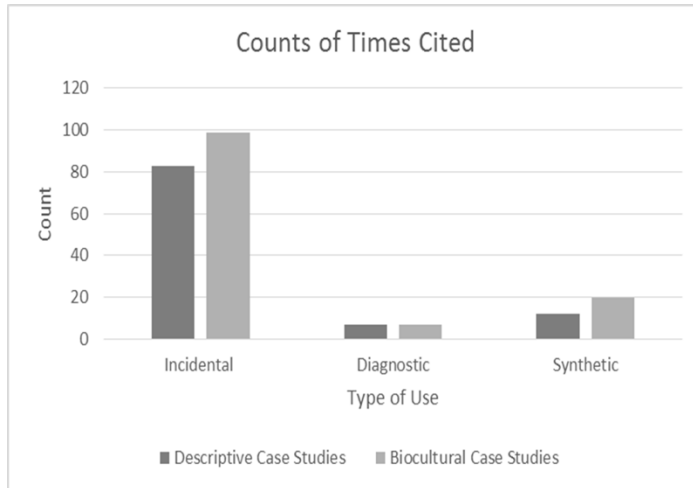


Figure 6: Bars represent the total number of citations in the three main categories, Incidental, Diagnostic, and Synthetic. Separate bars are provided for each of the two forms of case studies.

followed by synthetic uses of case studies, which totaled 32 total instances (13%). Diagnostic uses, and instances without in text reference, were quite low, totaling 14 instances for diagnostic and 11 for those not present in text. This equates to 6% and 5% respectively.

Between the two case study categories there were no significant differences in

how they were cited. Figure 6 shows the number of times case studies, in the two categories, are being cited incidentally, diagnostically, and synthetically; while table 3 shows the means and range for each manner of citation.

	N	Minimum	Maximum	Mean	Std. Deviation
Incidental	37	1.0	21.0	4.919	4.1991
Diagnostic	10	1.0	3.0	1.400	.6992
Synthesis	20	1.0	3.0	1.600	.7539
No-Reference made	8	1.0	3.0	1.375	.7440

Table 3: Mean values and ranges for the number of times case studies are cited in each context

5.0 Discussion

This study has followed its predecessors in bibliometric studies asking questions about the current trends in publication, yet also differs in a number of ways. Rather than examining the overarching themes in bioarchaeological, or paleopathological, publications – as is seen with

Mays (2010), and Hens and Godde (2008) – this paper is concerned with the questions being asked around the use of case studies and descriptive research in the field. As the results above have shown paleopathology studies make up a large portion of the *IJO*'s publications, with case studies claiming over half of this publication niche. This is consistent with Mays' brief analysis of case studies in the UK (*IJO* and *Journal of Archaeological Science*), which found case studies made up 39% of all skeletal biology publications (2010). With the addition of the results showing no significant change over time, it can be hypothesized that the publication of case studies has remains rather static since 2001 (Mays 2010). However, it must be recognized that the methods for categorization differ between the current study and Mays' (2010) study, thus this is merely an observation.

From these results more questions arise, questions that literature in the field has previously ignored. Most notably, the results of these past studies leave behind the question of how case studies are being applied within paleopathology. This is what separates the study at hand from previous studies in the field. Previous publications addressing the topic of case studies are not only nearly non-existent, but also rather superficial. This has created a gap in the literature that this research aims to fulfill. In discussing the results of this study, I will first look at studies showing the decline of descriptive research over time, discussing potential reasons for this movement. Then the results of the content analysis will be discussed, providing a view of paleopathology over the last 11 years. Finally, I will discuss how case studies are used in paleopathology, assessing whether they fill roles that are ascribed to them by current researcher.

5.1 Descriptive and Analytical Knowledge

As has been mentioned previously, biological anthropology has been subjected to a series of content analyses, tracing its publication trends back to 1930. With the addition of this essay,

such an account is continued into the present. Of all journals examined in such a way, the *AJPA* is by far the most popular. The basis for these studies comes from a general movement within physical anthropology away from descriptive research towards analytical research. From the results of these past studies, it is quite clear that over time bioarchaeologists, and paleopathologists specifically, have begun to favor analytical knowledge.

The first study that addresses this movement in the field, from descriptive research to analytical, was Owen Lovejoy and his colleagues in 1982. This seminal chapter explored the publication trends of skeletal biology from 1930 to 1980, through a content analysis of the *AJPA*. Their research noted descriptive studies held 86.5% of all publications between 1930 and 1939 and slowly began to decline after that – reaching a low of 55.9% between 1970 and 1980. This chapter appears to mark the beginnings of the descriptive conflict within skeletal biology, Lovejoy et al. write “the proportion of description documented here seems excessive...” (1982:335).

This same idea is revisited in 2003 by Armelagos and Van Gerven. In an attempt to extend the work of Lovejoy et al. (1982), they conduct a more recent content analysis of the *AJPA*. Results showed descriptive research still dominated between 1980 and 1984, with 59%, and finally peaked between 1996 and 2000 with 71%. Armelagos and Van Gerven (2003) argue this shows a resurgence in descriptive research, and a cessation of analytical research.

Two other content analyses that showcase this movement are worth mentioning. First is Hens and Godde (2008), who provide a full account of skeletal biology in the *AJPA* from 1980 to 2004. Following five year increments, the percentage of descriptive research moved from 80.4% in 1980, to 58% in 2004. Opposed to Armelagos and Van Gerven (2003), however, they believe these data show a decline in description and a dramatic increase in analytical work, which they

viewed as “impressive and promising” (Hens & Godde 2008:237). The second, and most recent content analysis I am looking at is from Park et al. (2010). While the *AJPA* is looked at, this study also incorporates a number of other journals – including the *IJO* – between the years 1997 and 2006. Opposed to tracking change over time, this study aims to better expose the recent trends within paleopathology. Park et al. (2010) sought whether there was a movement towards paleopathology addressing biocultural questions. Their results show there was no change, with 55.3% of papers not discussing a wider context (Park et al. 2010:504).

It appears clear that since the 1930’s there has been a movement, both in practice and in theory, for paleopathologists to forgo the publication of descriptive research in favor of analytical research that speaks to the broader social context. What is unclear, is why? I return to the quote, “This theoretical framework [referring to biocultural theory and the push for more analytical research] moved bioarchaeological research beyond a descriptive approach and toward one that embraced anthropological themes, including population stress and culture change” from Temple and Goodman (2014:188). It seems by moving away from description and into more analytical research – the root of the descriptive conflict – paleopathology is simply trying to become a more anthropological, that is holistic and socially driven, discipline. I argue this is at the root of all scholars arguing for the stronger incorporation of biocultural theory into paleopathology. This is seen in Washburn’s (1951) push for the incorporation of social theory into skeletal biology, as well as in Armelagos and Van Gerven’s (2003) discussion on the integrative and four-field nature of the biocultural approach. With the incorporation of biocultural theory into paleopathology, the field becomes more anthropological in nature. This seems to be at the base of why this movement from description to analysis exists in paleopathology.

On the other hand, we must also ask why case studies are still so prevalent in the literature despite the movement against them. While the current research has not answered this question specifically, I hypothesize that the publish or perish phenomena present in academia today is a contributing factor. Academics are now faced with an increased pressure to publish papers both quickly and continuously (Kilonzo & Magak 2013). Failure to meet these requirements results in an increased risk of failure in academic pursuits. Individuals who face this, risk losing their jobs and become marginalized by colleagues and institutions (Kilonzo & Magak 2013). It is becoming increasingly true that publications are everything to an academic (Clapham 2005). However, this is logical, publications are the predominant means in which new information is shared or theoretical paradigms are proposed. Rather, it becomes a potential issue once an individual is judged based on the quantity of their publications, as the quality of publications are then often overlooked (Rhee 2008). This pressure is only magnified in new academics attempting to begin their careers (Kilonzo & Magak 2013). Due to this, to begin or maintain an academic position it seems one must focus on the quantity of their publications opposed to the quality of the content.

In regards to the descriptive conflict presented in this paper, I argue that this increasing pressure to published in quantity has in part contributed to the presence of case studies in paleopathology today. The publish or perish phenomenon began to grow in the 1970's, and has since become increasingly more present (Edwards 2015). It was during the 1970's and beyond that bioarchaeology arose, and the pressure for paleopathology to move beyond descriptive research developed. It is possible that this increased publication pressure had a counteractive effect on the practical application of biocultural theory in paleopathology. It would seem that descriptive studies, such as case studies, are easier to produce in quantity, opposed to

bioculturally focused, analytical papers, which are more focused on the quality. Case studies, being generally short and focused on description, would be easier to produce in high quantity. This has indirectly been brought up by Zuckerman and colleagues (2012) in their discussion of the issues in adopting a biocultural approach. They mention how the difficulty in applying biocultural analysis to paleopathology has likely been a deterrent in its application. Biocultural reports are generally longer studies that require researchers to engage with biological and social theory, which has been considered “difficult to operationalize” (Zuckerman et al. 2012:48). To conclude this idea, I believe the increased pressure to publish in high volumes has resulted in case studies maintaining a dominant status in paleopathology’s publications.

5.2 Paleopathology over the Last 11 Years

Armelagos and Van Gerven (2003:59) asked whether “given the promise of analytical research, has our commitment to description actually given way?”. Results from this study can begin to answer this question. Over the last 11 years, publications within the *IJO* have not seen any movement away from the publication of case studies. This is true both in regards to the grand scheme of the *IJO* and within paleopathological publications specifically. In both of these contexts as well, case studies are the most common form of publication, holding 28% and 58% respectively. Responding to both my first research question and the question posed by Armelagos and Van Gerven, I argue that paleopathology has not experienced any changes in the publication of case studies over the last 11 years – rather case study publication appears to have remained static. This tells us our commitment to description has likely not gone away. In reference to my second research question I argue similar results. There appears to be no noticeable movement towards the adoption of biocultural case studies over descriptive. Generally, case studies seem to be resilient over time, despite the push for change.

This does not, however, mean the future of paleopathology is destined to fail. These findings can still provide an optimistic outlook. First we can see that biocultural case studies constitute nearly half of all case studies published in the *IJO*. Since case studies have never been looked at from this perspective, they cannot be compared. However, it still shows that researchers are acknowledging the push to adopt a biocultural framework, and applying it when possible. Likewise, the data show that nearly half of all paleopathology's publications are outside the realm of case studies. Scholars today are addressing the areas in which Buikstra and Cook (1980) and Ubelaker (1982) claim need attention. This is seen in the growing integration of stable isotopic research within paleopathology (Katzenberg 2012), which addresses the push for stronger multidisciplinary and subsistence analysis. The work of Klaus et al. (2010) also shows how researchers are currently addressing these concerns. They provide an attempt at new ways to diagnose disease using ancient DNA analysis, which also shows the involvement of multidisciplinary teams within paleopathology. These studies, as well as countless others, show that paleopathology is truly not doomed and is making efforts to go beyond description, regardless of the dominant presence of case studies.

In discussing the last 11 years of paleopathology through the *IJO* it was interesting to see that there was no noticeable drop in the quantity of paleopathological studies in the *IJO* in 2011, the year that marks the introduction of a new journal, The International Journal of Paleopathology (*IJPP*). One might anticipate that with the introduction of a new journal dedicated to the publication of paleopathological studies, there would be a decrease in the *IJO*'s paleopathology publications in the succeeding years. This was however not the case; numbers appear to have remained high throughout the years of this sample. Hens and Godde (2008) came across a similar situation in their analysis. They had speculated the introduction of the *IJO* in

1991 would influence the publication trends of the American Journal of Physical Anthropology. In concluding, they suggested that the two journals had separate emphases, the *AJPA* focusing on statistical analysis and hypothesis testing, and the *IJO* more on descriptive studies (Hens & Godde 2008). The lack of change found in the current study could result from a similar reason, however, with the *IJPP* still in its infancy, time could also be a contributing factor. At this point in time the *IJPP* has only been in production for four years, and while most certainly a reputable journal, it may be too young to drastically change the trends seen in the *IJO*. It is also interesting to see that the *IJPP* discusses the publication of case studies in their submission guidelines, claiming only case studies of a “special significance” are suitable for publication. The *IJO*, however, makes no note of case study publication in their guidelines. This too could be a contributor to the fact there has been no change in publication trends. Further research exploring these two journals could prove useful in thinking about the current state of paleopathology.

5.2.1 Influence of Author Location

Given that paleopathology has developed separately in Europe and in North America, I hypothesized that there would be a difference in case study publication between the two regions. Specifically, I had expected to see a greater number of case studies published by European scholars. This come from the fact paleopathology in Europe has been notoriously tied to its roots in medicine, more so than North Americans have (Roberts 2006; Mays 2010). In his analysis of a number of bioarchaeological journals, Simon Mays (2010) had shown that case studies were published more often by scholars in the United Kingdom in comparison to anywhere else. As well, this study showed that UK based scholars published more case studies than any other form of study; while North American based scholars predominantly published population based reports (Mays 2010).

Through an analysis of case study publication in the *IJO*, I have been able to show this is also true of the last 11 years. While I did not compare the number of case studies published in regards to all other publications based on author location, this study has shown where case study production is most common. Supporting both my hypothesis and the work of Mays (2010), a visual inspection of figures three and four show that case studies are produced predominantly by European scholars. Over half of the case studies published (63%) can be attributed to researchers at European institutions.

5.3 The Role of Case Studies

In unison with previously conducted analyses, this research shows case studies are undoubtedly a very common form of publication for paleopathologists. Since case studies are so prominent in the field, we must consider how they are being used by other researchers. In doing so we can then assess what the role of the case study is within paleopathology. The results of this study allow for the examination of how case studies are being used. We can begin by looking at the impact of case studies. I have defined impact earlier, but, at general level, impact is the amount an article, or type of article, is cited (Stojanowski & Buikstra 2005; Mays 2012b). Since impact assessment was not a primary aim of this research, data to compare the impact of case studies to other form publication was not collected. Despite this, impact differences between descriptive and biocultural case studies can be examined. The results show that biocultural case studies were cited on average more than descriptive, thus have a greater impact rating (figure 5). Due to methodological difference the data presented here are also incomparable with the data presented by Mays (2012b).

To look at the role of case studies, it was first necessary to examine how case studies have been defended in regards to this descriptive conflict. This is discussed at some length earlier

in this paper (see section 2.2.2 *Current State*), where it was argued that scholars believe case studies act as useful tools in paleopathology due to two features. First, their ability to be used in the creation of larger synthesized works (Stojanowski & Buikstra 2005); and second their usefulness in diagnosing rare instances of disease (Mays 2012a; Mays 2012b). To refer back to my fourth research question, the results of this study must be compared to these ideas. As we have seen earlier, case studies were most commonly cited in an incidental manner – totaling 76% of publications. Already it can be seen case studies are seldom used in the ways they are believed to be. Case studies were shown to be used in a synthetic fashion 13% of the time, and at under half that, diagnostically at 6%. This acts to further reinforce the descriptive conflict in paleopathology; while it is argued that case studies are valuable tools in paleopathology, this study shows they are rarely used in ways deemed as valuable.

5.4 Limitations

It is important to discuss the limitation that are present within this analysis of the *IJO*. Methodologically, there are a number of things to considered. First, this study only provides a partial outlook on the field of osteoarchaeology due to fact only a single journal is examined. I have detailed the reasoning behind the use of the *IJO* previously in this paper. As well, in previous content/citation analyses it has been discussed that observing a single journal helps to control for variables that may effect analysis, such as editorial policies or subscription costs (Mays 2012b). A second limitation is the fact this research has not followed the exact form of content analyses as has been done previously, this means the data presented here are not able to be directly compared to previous finding. This was done because of the novel nature of this research. I aimed not to replicate previous studies but to go beyond what has already been done. A third limitation is the fact there is a level of inherent subjectivity in classifying articles into

categories, or citations into specific contexts. This is a limitation found in any form of content or citation analysis, and has been lamented by a number of other researchers (Hens & Godde 2008; Stojanowski & Buikstra 2005; Park et al 2010). Future studies applying these techniques could mitigate the level of subjectivity through an assessment of the level of inter-observer error in categorization, by having multiple researchers attempt the categorization of articles. Finally, it is worth noting that this research represents a novel means of analyzing case study publication. While other studies have aided in the creation of the methods applied here, citation analysis at the level presented here has never, to my knowledge, been conducted. This means these particular methods have yet to be tested in the field of bibliometrics.

6.0 Conclusions

Paleopathology, as with any scientific field, has experienced a series of critiques that have allowed the field develop. Arising from the work of Victoria physicians, paleopathology owes its roots to work grounded in descriptive study. It was during this period that the case study became the keystone publication type for paleopathologists, and its appears this has not changed. Beginning in the mid-twentieth century we see an increasing pressure in the field of bioarchaeology and paleopathology to forgo descriptive research, which includes case studies, in favor of a more analytical, interpretive, and hypothesis driven approach. However, despite this push, case studies still comprise a grand amount of the fields publications. This research has shown that there have been no statistically significant changes in the publication of case studies within the *IJO* over the last 11 years. Rather, it has revealed that case studies make up over half of paleopathology's publications in this particular outlet. Referring back to the question Armelagos and Van Gerven (2003) asked, regarding whether we have dropped out commitment to description, I would argue no, descriptive research still remains an integral part of

paleopathology. However, within case studies a distinction is made between descriptive case studies and biocultural case studies. While this study has shown there to be no change over time in the publication of the two case study types, it has shown that close to half of all case studies are biocultural in nature. This shows that paleopathologists are aware of the pressure to adopt a biocultural approach, showing that biocultural theory certainly has its place within paleopathology today.

While this study has borrowed methodological ideas from previously conducted content analyses, it presents new ideas to the study of case studies. This is the first study of its kind to analyze the context in which a case studies are cited. Citation analyses in the past have only gone as far as assessing the impact of case studies through gross citation frequencies. Mays (2012b:82) has brought to light this issue in the past, explaining “citation frequency takes no account of the context in which the article was cited...”. In doing so, this study was able to show that case studies are used predominantly incidentally by other researchers. This goes against the arguments that have been made claiming case studies remain productive tools in paleopathology due to their ability to be synthesized and to diagnose. Respectively, there were used in these contexts 13% and 6% of the time.

While I have shown that case studies are not being used in the ways researchers have previously thought them to be, it is not my goal here to argue case studies have no place in paleopathology. Paleopathology, undoubtedly necessitates a case-by-case approach at times due to the nature of bioarchaeological assemblages. When studying human remains, samples are often highly fragmented, and when studying disease specifically, prevalence rates are often quite low. It is not uncommon to only have a single skeleton in an assemblage that is affected by a given disease. This can make population level, analytical research difficult due to a small or non-

existent sample size. Likewise, arguments previously made by Stojanowski and Buikstra (2005) about the synthetic value of case studies are indeed valid. Without case studies, creating synthesized volumes on health and disease in the past would be incredibly difficult. Along similar lines, case studies allow comparative research to be conducted, both through these synthesized volumes and on their own. Opposed to discrediting case studies as a valid form of publication within paleopathology, this research aims to fill a gap within the literature on the fields publications. Previously, studies have been superficial, looking for change or impact opposed the actual role of case studies. By highlighting the ways in which case studies are being used by other researchers, I hope this research can better inform scholars, researchers, reviewers, and journal editors who responsible for the production and publication of cases studies.

While the current research has discussed potential reasons for the prevalence of case studies in paleopathological journals, this is a topic in need of further study. Future researchers could benefit from going beyond bibliometric techniques to assess case studies, and consider borrowing from other anthropological subfields to answer this question. Discussions with those practicing paleopathology and editing journals could help build our understanding of why case studies prevail. Succeeding content analyses can also learn from the shortcomings of this research. Researchers should take care to account for the potential for inter-observer error in article and citation classification. As well, the new techniques applied here could prove valuable in a cross journal analysis of case study publication. For paleopathology to continue to grow as its own discipline it must keep the past in mind, as learning from previous shortcomings will allow the discipline to progress. To best understand how paleopathology is reacting to its own past we must continue to explore the descriptive conflict presented here.

References

Agarwal, S., and Glencross, B.

2011 Building a Social Bioarchaeology. In *Social Bioarchaeology*, S. Argawal and B. Glencross eds. Chichester, West Sussex: Wiley-Blackwell.

Armelagos, G., Carlson, D., and Van Gerven, D.

1982 The Theoretical Foundations and Development of Skeletal Biology. *In A American History of American Physical Anthropology: 1920-1980*, F. Spencer *ed.* New York, NY: Academic Press.

Armelagos, G.

2003 Bioarchaeology as Anthropology. *Archaeological Papers of the American Anthropological Association* 13(1):27-40.

Armelagos, G. and Van Gerven, D.

2003 A Century of Skeletal Biology and Paleopathology: Contrasts, Contradictions, and Conflicts. *American Anthropologist* 105(1):53-64

Binford, L.

1962 Archaeology as Anthropology. *American Antiquity* 28(2):217-225.

Bocquet-Appel, J, and Masset C.

1982 Farewell to paleodemography. *Journal of Human Evolution* 11(4): 321-333.

Buikstra, J., and Cook, D.

1980 Paleopathology: An American Account. *Annual Review of Anthropology* 9:433-470

Buzon, M.

2012 The Bioarchaeological Approach to Paleopathology. *In A Companion to Paleopathology*, A. Grauer *ed.* Chichester, West Sussex: Wiley-Blackwell.

Clapham, P.

2005 Publish or Perish. *BioScience* 55(5):390-391

Cook, D.

2006 The Old Physical Anthropology and the New World: A Look at the Accomplishments of an Antiquated Paradigm. *In Bioarchaeology : The Contextual Analysis of Human Remains*, J. Buikstra & L. Beck *eds.* San Diego, CA: Elsevier Inc.

DeWitte, S., and Stojanowski C.

2015 The Osteological Paradox 20 Years Later: Past Perspectives, Future Directions. *Journal of Archaeological Research* 23(4):397-450.

Duday, H.

2005 L'archeothanatologie ou L'archeologie de la Mort. *In Objets et méthodes en paléanthropologie*, Paris: Comité des Travaux Historiques et Scientifiques.153-207

Edwards, J.

2015 Don't Do as I Do; Do as I Say. *In A Guide to Publishing for Academia: Inside the Publish or Perish Phenomenon*. J. Liebowitz *ed.* Boca Raton, FL:CRC Press

Grauer, A.

2012 Introduction: The Scope of Paleopathology. *In A Companion to Paleopathology*, A. Grauer *ed.* Chichester, West Sussex: Wiley-Blackwell.

Gibbon, V., Gallagher, A., and Huffman T.

2014 Bioarchaeological Analysis of Iron Age Human Skeletons from Zambia.

International Journal of Osteoarchaeology 2:100-110.

Hens, S., and Godde, K.

2008 Brief Communication: Skeletal Biology Past and Present: Are We Moving in the

Right Direction? American Journal of Physical Anthropology 137:234-239.

Hooton, E.

1930 The Indians of Pecos Pueblo: A Study of Their Skeletal Remains. New Haven CT:

Yale University Press

Katzenburg, A.

2012 Understanding Past Diet: The Relationship Between Diet and Disease. In A

Companion to Paleopathology, A. Grauer ed. Chichester, West Sussex: Wiley-Blackwell.

Kilonzo, S., and Magak, K.

2013 Publish or Perish. International Journal of Sociology 43(1):27-42

Klaus, H., Wilbur, A., Temple, D., Buikstra, J., Stone, A., Fernandez, M., Wester, C., and Tam,

M.

2010 Tuberculosis on the north coast of Peru: skeletal and molecular paleopathology of

late pre-Hispanic and postcontact mycobacterial disease. Journal of Archaeological

Science 37:2587-2597

Knudson, K., and Stojanowski, C.

2008 New Directions in Bioarchaeology: Recent Contributions to the Study of Human

Social Identity. Journal of Archaeological Research 16: 397-432.

Knusel, C.

2010 Bioarchaeology: A Synthetic Approach. *Bulletins et mémoires de la Société d'anthropologie de Paris* 22(1-2):62-73

Lovejoy, O., Mensforth, R., and Armelagos, G.

1982 Five Decades of Skeletal Biology as Reflected in the *American Journal of Physical Anthropology*. In *A American History of American Physical Anthropology: 1920-1980*, F. Spencer *ed.* New York, NY: Academic Press.

Mays, S.

2010 Human Osteoarchaeology in the UK 2001–2007: A Bibliometric Perspective. *International Journal of Osteoarchaeology* 20:192-204.

Mays, S.

2012a The Relationship Between Paleopathology and Clinical Sciences. In *A Companion to Paleopathology*, A. Grauer *ed.* Chichester, West Sussex: Wiley-Blackwell.

Mays, S.

2012b The Impact of Case Reports Relative to Other Types of Publication in Palaeopathology. *International Journal of Osteoarchaeology* 22:81-85.

Neumann, G.

1952 Archeology and Race in the American Indian. In *Archeology of Eastern United States*. J. B. Griffin *ed.* Chicago: University of Chicago Press

Park, V., Roberts, C., and Jakob T.

2010 Palaeopathology in Britain: A Critical Analysis of Publications with the Aim of Exploring Recent Trends (1997–2006). *International Journal of Osteoarchaeology* 20(6):467-507

Peterson W.

1975 A Demographer's View of Prehistoric Demography. *Current Anthropology* 16(2):227-245

Rhee, J.

2008 Publications and Academia: Quantity does not equate to quality. *Otolaryngology – Head and Neck Surgery* 138:257-258

Roberts, C.

2006 A View From Afar: Bioarchaeology in Britain. *In Bioarchaeology : The Contextual Analysis of Human Remains*, J. Buikstra & L. Beck *eds.* San Diego, CA: Elsevier Inc.

Stodder, A., Johnson, K., Chan, A., Handwerk, E., and Rudolph, K.

2006 Publishing Patterns in Paleopathology: Findings of the Publications Explorations Committee. *Paleopathology Newsletter* 134

Stojanowski, C. and Buikstra, J.

2005 Research Trends in Human Osteology: A Content Analysis of Papers Published in the *American Journal of Physical Anthropology*. *American Journal of Physical Anthropology* 128:98-109

Stojanowski, C., and Duncan, W.

2015 Engaging Bodies in the Public Imagination: Bioarchaeology as Social Science, Science, and Humanities. *American Journal of Human Biology* 27:51-60.

Temple, D., and Goodman, A.

2014 Bioarcheology Has a “Health” Problem: Conceptualizing “Stress” and “Health” in Bioarcheological Research. *American Journal of Physical Anthropology* 155:186-191.

Ubelaker, D.

1982 The Development of American Paleopathology. *In A American History of American Physical Anthropology: 1920-1980*, F. Spencer *ed.* New York, NY: Academic Press.

Washburn, S.

1951 The New Physical Anthropology. *Transactions of the New York Academy of Science, Series II* 13(7):298-304

Wood J., Milner G., Harpending H., and Weiss K.

1992 The Osteological Paradox: Problems of Inferring Prehistoric Health from Skeletal Samples. *Current Anthropology* 33(4):343-370

Zuckerman, M., and Amerlagos, G.

2011 The Origins of Biocultural Demensions in Bioarchaeology. *In Social Bioarchaeology*, S. Argawal and B. Glencross *eds.* Chichester, West Sussex: Wiley-Blackwell.

Zuckerman, M., Turner, B., and Armelagos, G.

2012 Evolutionary Thought in Paleopathology. *In* A Companion to Paleopathology, A.

Grauer *ed.* Chichester, West Sussex: Wiley-Blackwell.