Identified skeletal collections: the testing ground of anthropology?

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Archaeopress Publishing Ltd
Summertown Pavilion
18-24 Middle Way
Summertown
Oxford OX2 7LG

www.archaeopress.com

ISBN 978 1 78491 805 7
ISBN 978 1 78491 806 4 (e-Pdf)

Printed in England by Oxuniprint, Oxford

This book is available direct from Archaeopress or from our website www.archaeopress.com

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Chapter 3

The Grant Human Skeletal Collection and Other Contributions of J. C. B. Grant to Anatomy, Osteology, and Forensic Anthropology

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Introduction

Dr. John Charles Boileau Grant is best known for his contributions to the instruction of anatomy. Grant was well known for his enthusiastic visual lectures on human anatomy, his strict discipline for staff and students, which fostered an atmosphere that challenged students to excel, and his encyclopedic knowledge of human anatomy (Breslin 1956; MacKenzie n.d.; Robinson 1988; Tobias 1992). Grant taught anatomy to thousands of medical students at the University of Manitoba, the University of Toronto and at the University of California at Los Angeles. Grant has also had a huge influence on the instruction of anatomy outside his own classroom: he was Chair of Anatomy first at the University of Manitoba and later at the University of Toronto; and the museum of anatomy that expanded under his direction beginning in 1930 is still an educational resource for medical students at the University of Toronto. He also authored three texts that were published in multiple editions: *A Method of Anatomy, Descriptive and Deductive* (1937); *Handbook for Dissectors* (with H. A. Cates, 1940); and *An Atlas of Anatomy* (1943). The *Handbook for Dissectors* now known as *Grant's Dissector* is in its 16th edition (Detton 2016) and *Grant's Atlas of Anatomy* has been translated into various languages including Italian, Japanese and Spanish, and is in its 14th edition (Agur and Dalley et al 2016).

Before World War II, almost all physical anthropologists were trained as anatomists, and Grant's anatomical teaching and research was very much intertwined with his anthropological interests. Grant's influence on osteology and forensic anthropology are less known. This chapter will provide a review of his contributions to these areas, describe the human skeletal reference collection that is named after him in order to illustrate its research potential, and provide some important historical context for interpreting the pattern of human variation that is sampled in the collection. While the focus in this chapter is on Grant's contributions to anthropology with a particular emphasis on osteology and forensic anthropology, it is impossible to separate the anatomy from the anthropology in the first half of the 20th century (Albanese 2003a, 2006; Hunt and Albanese 2005; Blakey 1987; Armelagos et al 1982).

The University of Edinburgh and the University of Durham: 1909–1919

Grant received his medical training at the University of Edinburgh and was exposed to the influence of several notable textbook authors, teachers and researchers. The University of Edinburgh has a long and distinguished tradition of anatomical and medical instruction, and also had an influence on the emerging field of physical anthropology (Tobias 1985). Grant studied anatomy under Daniel John Cunningham and likely used the first edition (published in 1902) or the second edition (published in 1905) of Cunningham's *Textbook of Anatomy*. As a student, Grant received several awards for his knowledge of anatomy and his skill at dissection, and upon graduating, was invited to work as a demonstrator for Cunningham from 1909 to 1911 (Tobias 1992). Grant's interest in physical anthropology may have originated during his time at Edinburgh where he had contact with Sir William Turner. Turner had collected a large number of identified skeletons at Edinburgh and had been an important influence on Robert J. Terry, who established the Terry Collection after his return to the United States (Hunt and Albanese 2005; Tobias 1985; Trotter 1981). Once he had the opportunity at the University of Manitoba and later at the University of Toronto, Grant also followed in the tradition of Turner in combining anatomy and anthropology (Tobias 1992).

From 1911 to 1913, Grant was a demonstrator of anatomy at what was then known as the University of Durham at Newcastle upon Tyne (now Newcastle University) under Professor R. Howden, who was the editor of *Gray's Anatomy* at the time. Grant is credited for assisting in the revision of the text and the preparation of several dissections for the illustrations in the 18th and 20th editions. During this time at Durham University, Grant also came in contact with one of his heroes and major influences, Sir Grafton Elliot Smith (Basmajian 1974). Smith also had an important influence on two other prominent anatomist-anthropologists: Raymond A. Dart and T. Wingate Todd (Hunt and Albanese 2005). Raymond A. Dart, who was later appointed Chair of Anatomy and established the Dart Collection at the University of Witwatersrand, was a senior demonstrator under Smith (Tobias 1985; Dart 1973). T. Wingate Todd, who was later appointed Chair of Anatomy and greatly expanded the Hamann-Todd Collection, was a lecturer under Smith and was responsible for processing and cataloguing the skeletons that Smith had acquired as part of the Nubian Archaeological Survey (Shapiro 1939).

On August 5, 1914, the day after Great Britain declared war on Germany, Grant wrote to the War Office to apply for a commission in the Royal Army Medical Corps, and he served as a medical officer from November 1914 to April 1919. After the war, Grant returned to his position as the demonstrator of anatomy at the University of Durham. Later that year, he was invited to apply for the Professorship and Chair of Anatomy at the University of Manitoba.

The University of Manitoba: 1919–1930

Grant arrived in Winnipeg to take up the Professorship and Chair of Anatomy at the University of Manitoba in October 1919, and held the position until 1930. Soon after his arrival, Grant began pursuing research in physical anthropology, which he described as

his 'hobby' in an interview he gave decades later (Breslin 1956). In 1920, Grant served as the medical officer to an 'Indian Treaty Party' that traveled to York Factory and Churchill on Hudson Bay[1]. Fifty years later, he described how this trip affected him:

> '*On finding out that almost no work had been done on the Anthropometry (Physical Anthropology) of the North American Indians of Canada, it seems obvious that without further delay, data on the Indians should be collected before further intermixture with other races took place.*' (Grant 1970).

With the guidance of Diamond Jenness, an early pioneer in anthropological research in Canada, Grant made several trips to various settlements in Manitoba and the Northwest Territories in Canada, to collect anthropometric data over three field seasons in 1927, 1928 and 1929. He published three volumes (Grant 1929, 1930, 1936) based on his data and data collected by Jenness in 1923. Grant modeled his research and writing after Louis R. Sullivan's (1920) paper 'Anthropometry of the Siouan Tribes' and Grant's publications followed an approach that was common for the period. As the quote above indicates, variation was considered within a racial paradigm and Grant collected a suite of standard measurements (stature, sitting height, etc.) and indices (cephalic, crural, etc.) and ABO blood group data. He published descriptive summary statistics and raw data for each individual in the sample. Grant also provided contextual information for his research sample and included brief sections on language affiliations, marriage practices and post-contact history (Grant 1929, 1930). Grant returned to the Northwest Territories in the summer of 1934 to collect additional anthropometric data but this research was never published (Anonymous 1934).

Soon after arriving in Winnipeg, Grant (1922) published his first paper on osteology, and was called upon to assist in forensic investigations where human skeletal remains were discovered. His work in this area could be considered the beginning of forensic anthropology in Canada. The earliest record of a request for assistance is dated to September 1921, and he continued to assist with these cases until the late 1950s (Breslin 1956). Unfortunately, details about specific cases are scarce because most of Grant's personal and research papers are missing. The author conducted an extensive search of the archival documents at the Anatomy Division (formerly Anatomy Department), the central archive, and the Department of Anthropology at the University of Toronto, as well as the medical archives at the University of Manitoba, and was able to locate only a few documents to piece together this history. It is likely that many of Grant's papers went missing when the Medical School at the University of Toronto moved to a new building about 10 years after Grant's retirement.

[1] The 'Numbered Treaties' were negotiated between various First Nations and the Government of Canada between 1871 and 1921. Treaty No. 5 (1875) was extended in 1910 to include this area of Manitoba on the shore of Hudson Bay. By the 1920s a treaty party would have included a government representative known as an 'Indian agent', officers of the Royal Canadian Mounted Police and a doctor. The political, social and economic implications of these treaties on First Nations were far reaching and persist today, but are beyond the scope of this chapter. Interested readers are referred to Beardy and Coutts' (1996) collection of oral histories of Cree Elders from York Factory; Coates and Morrison (1986) for a detailed report about Treaty No. 5; and Poelzer and Coates (2015) for more about treaties within a greater political and social context in Canada.

Grant began collecting individual bones or skeletal elements in an *ad hoc* fashion in the 1920s (for example, Basset 2015). He kept several of the archaeological crania that were sent to him and he also actively exchanged skeletal elements with M. R. Dreman at the Department of Anatomy, University of Cape Town. In the first half of the 20th century, it was a common practice by anatomists with an interest in skeletal variation to exchange skeletons with colleagues from around the world (Hunt and Albanese 2005). This typological approach to collecting skeletons, where only one or a few individuals of a specific group was considered a sufficient sample of variation, was common at the time (for the historical context of this problematic typological approach see Blakey 1987 and Armelagos et al 1982; and for the lasting impact of this approach on forensic anthropology see Albanese and Saunders 2006). The skeletal collection that Grant began almost a decade later was somewhat a departure from this typological approach.

The University of Toronto and the University of California at Los Angeles: 1930–1973

In 1930, Grant accepted an invitation to be the Chair of Anatomy at the University of Toronto, which he held until his retirement in 1956. Grant's first objective when he arrived in Toronto was to create:

> '*a teaching museum of anatomical material that would be* ***used****... It was designed that the specimens were placed in four-sided jars, set on revolving bases, hence each specimen had four surfaces to present, each was specially illustrated and labelled... the student, seated and with textbook or notes beside him, could study in comfort*' (Grant 1970, emphasis added).

This approach marks a major shift in how anatomy was taught, and over 75 years later, many of the original preparations on turntables are on display and are still used by students to study anatomy (Stewart n.d.).

Upon arriving in Toronto, Grant also began planning for what he referred to as the 'Anthropological Collection'. Like other anatomists at the time who were interested in physical anthropology, Grant set up a protocol whereby cadavers were processed for their skeletons after medical students had completed the dissections. Other notable anatomist-anthropologists whose collections are still readily available for research include Robert Terry at Washington University, St. Louis (the collection is now at the Smithsonian Institution, National Museum of Natural History); T. Wingate Todd at Western Reserve University in Cleveland (now Case Western Reserve; the collection is now at the Cleveland Museum of Natural History); George S. Huntington (Muller et al. 2017) at the College of Physicians and Surgeons in New York (now part of Columbia University; the collection is now at the Smithsonian Institution's National Museum of Natural History); and Raymond Dart at University of the Witwatersrand, Johannesburg, South Africa (Dayal *et al*. 2009; Hunt and Albanese 2005).

There are some important similarities that Grant shared with Todd and Terry. All three were charter members of the American Association of Physical Anthropologists (AAPA). Grant (1930) presented a paper at the first full meeting of the AAPA in April

1930, at the invitation of Aleš Hrdlička, the first physical anthropologist appointed at the Smithsonian Institution (Brown and Cartmill 2005; Blakey 1987). Also, like Todd, Grant was interested in comparative skeletal anatomy and also collected the skeletons of animals, though only a mounted skeleton of a male gorilla still hangs in Grant's Anatomy Museum. And like Terry, Grant went to great lengths to cross-check the documentary information for individuals in the collection. Both Terry and Grant operated under the assumption that information on death certificates (age at death and cause of death) that arrived with each cadaver in the anatomy department morgue should be considered suspect until the information was independently confirmed. The common practice for confirmation was to review the hospital records of the deceased or through correspondence with acquaintances of the deceased. However, each of these collectors had different research priorities and resources, and as a result, the respective collections vary considerably in size; in terms of what documentary data were collected, cross-checked and curated; and the condition of the skeletal remains.

Throughout the 1930s, both Todd and Terry retained the skeletons of almost all the cadavers that were dissected in their respective anatomy departments. Some of the skeletons were included in the collection while others were used for research and teaching. Todd personally collected a suite of anthropometric data from the first 2500 individuals in his collection; conducted groundbreaking research on age changes in the skeleton (for example, Todd 1920, 1921; Todd and Lyon 1924, 1925a, 1925b,1925c); published extensively on various osteological, anatomical and forensically relevant topics (see Krogman 1939 for a list of over 175 of Todd's publications grouped by subject area); and collected over 900 primate skeletons for comparative study (Hunt and Albanese 2005; Krogman 1939). Terry published only a few papers on osteology and anatomy (for example, Terry 1932). Instead, he focused on developing an ingenious method for collecting 'living' stature from cadavers (see Terry 1940); documenting the ante-maceration appearance of the cadavers (documents, plaster death masks, hair samples and scale photographs); and on cross-referencing and confirming the accuracy of documentary data for each individual in the collection, which he continued to work on after his retirement (Hunt and Albanese 2005). Collecting ceased or was considerably reduced when Terry and Todd vacated their respective Chairs of Anatomy. Todd died unexpectedly in 1938, and Terry retired in 1941. Mildred Trotter continued to add skeletons more selectively to the Terry Collection until 1965. She published extensively on anthropological and forensic topics including, but not surprisingly, landmark research on stature estimation from skeletal remains (for example, Trotter 1930, 1938, 1943; Trotter and Duggins 1948, 1950; Totter and Gleser 1951, 1952; see also Hunt and Albanese 2005; Conroy *et al* 1992). Interested readers should see Chapters 4 and 5 for more information on how these collections can still be used effectively for forensic and bioarchaeological research.

Grant's priorities were different than those of Todd and Terry, and as a result, there are some important differences in the Grant Collection. Grant only published one paper in the area of osteology (Grant 1922). However, with the assistance of Charlie Storton, Grant was able to divide his time and resources between the skeletal collection, the anatomy museum and his anatomy textbooks (Hall 2007). The skeletal collection and research in

osteology were less of a priority for Grant as compared to Terry or Todd, and the Grant Collection, consisting of 202 skeletons, is significantly smaller than Terry's collection of over 1700 skeletons or Todd's collection of approximately 3300 skeletons. In addition, about half of the crania in the Terry Collection are intact and the rest typically have only one section, which was made to gain access to the brain for instruction in brain anatomy. In contrast, almost all the crania in the Grant Collection have both transverse and sagittal sections, which left each cranium in three or four parts. Only a few crania (approximately 5 individuals) are still intact because these cadavers were not suitably preserved for the anatomy courses and were never dissected.

The outbreak of World War II had a huge influence on Grant's work. At the age of 53, Grant tried to enlist in the armed forces but was rejected on medical grounds. He sought surgical treatment and again tried to enlist but was rejected because his contribution to the war effort in training doctors was considered more important than his service as a medical officer (Basmajian 1974; Robinson 1988). Before World War II, Germany was a major exporter of anatomy textbooks, and in the lead-up to the war, these textbooks became increasingly difficult to purchase outside of Germany. This lack of suitable textbooks was one of Grant's greatest motivations for beginning work on his textbooks (Storton, as quoted in Hall 2007). Grant served during the war to the best of his abilities by focusing his attention on his teaching, the anatomy museum and the publication of his anatomy texts.

During the war, little time and few resources were available for the skeletal collection. The retention of entire skeletons and specific skeletal elements was more selective and split among competing purposes from 1942 to 1945. Some skeletal elements with pathological conditions and 'ideal specimens' are not curated with their respective skeletons because these elements were used in anatomy demonstrations, to illustrate pathological conditions, and/or were prepared for display in the anatomy museum and to serve as models for the illustrations that appeared in Grant's publications. In a few cases, the skeletal elements were later returned to the skeletal collection to the respective individuals. In other cases, important elements of some individuals, usually with an interesting variation, are missing. For example, individual GR0394 is described as having 'left leg short and deformed' but the bones of the left leg are not in the collection. After 1945 and until the 1950s when collecting ceased, additions to the collection varied considerably from as high as 35 skeletons in 1946–47 to a low of just one in 1953–54 when the last skeleton was added to the collection.

Over 150 skeletons that were initially included in the collection were removed either because their ages could not be independently verified (approximately 100 individuals) or because those ages were overrepresented in the collection (approximately 50 individuals). Despite this correction, some ages are still overrepresented in the collection (see Figure 1), a common problem with skeletal collections derived from anatomical sources in the first half of the 20th century (Hunt and Albanese 2005). The documents associated with the individuals that were removed are still curated with the collection and have been a valuable source of information for understanding the current size

and composition of the collection (see Watkins and Muller 2015 who describe a similar process for the Cobb Collection). It is not clear why two females with verified ages and three females whose ages were not verified were removed even though other females whose ages were not verified were kept in the collection.

After his retirement in 1956, Grant was appointed professor emeritus and curator of the Anatomy Museum. In 1961, he was invited to be a visiting professor of anatomy at the University of California at Los Angeles where he spent half of every year teaching anatomy until 1970. He was working on the 7th edition of his *Atlas of Anatomy* when he died in August 1973.

Grant's Legacy: James E. Anderson and Physical Anthropology in Canada

Although Grant's publications in the area of physical anthropology are limited, he made a significant contribution to the discipline through the training and supervision of James E. Anderson as an anatomist, medical doctor and physical anthropologist (Melbye 1995). Anderson graduated as an M.D. in 1953, and in 1956 was appointed as a lecturer in the Department of Anatomy at the University of Toronto, where he taught anatomy and a course in human osteology to pre-medical and anthropology students. In 1958, he was appointed as an assistant professor to the Department of Anthropology and worked closely with Lawrence Oschinsky to develop a series of graduate level courses in physical anthropology (for additional information on Oschinsky's contributions to physical anthropology in Canada, see Ossenberg 2001). In 1963, Anderson was appointed associate professor of physical anthropology at the State University of New York at Buffalo but returned to the University of Toronto in 1966, and brought several of his graduate students with him. In 1967, he was appointed chair of anatomy at the then recently established medical school at McMaster University in Hamilton, Ontario, where he also participated in the Burlington Growth Study in the nearby city of Burlington, Ontario. Although the Burlington Growth Study continues to be used primarily for craniofacial growth studies in dentistry and medical research (see Kulshrestha *et al* 2016; American Association of Orthodontists Foundation 2016), data from the Burlington Growth Study are still being used in various anthropological research projects, including several fairly recent doctoral dissertations by Clare McVeigh (1999) and Todd Garlie (2001) from McMaster University, and Sherry Fukuzawa (2002) from the University of Toronto. Anderson completed the 7th edition of *Grant's Atlas of Anatomy* after Grant's death, and then edited the 8th and 9th editions.

In addition to creating the first English-speaking graduate program in physical anthropology in Canada, Anderson's and Oschinsky's research also marked the beginning of a transformation in osteology from descriptive research to analytical research (Meiklejohn 1997; Melbye and Meiklejohn 1992). Oschinsky's influence was tragically limited by his unexpected death at the age of 45 in 1966. Anderson supervised the first two doctorates that were granted in physical anthropology in English-speaking Canada, which were awarded in 1969 to Michael Pietrusewsky and Jerry Melbye. Anderson continued to act as a supervisor to both students at the University of Toronto after he left for McMaster University (Melbye, in 2003, personal communication).

Anderson also directly supervised or influenced through his graduate courses an entire generation of osteologists in Canada and the United States, including Nancy Ossenberg, Queen's University, Kingston; Jerry Cybulski, Canadian Museum of History, Ottawa; Christopher Meiklejohn, University of Winnipeg; Michael Spence, Western University; Sonja Jerkic, Memorial University of Newfoundland; Jim MacDonald, Northeastern Illinois University; Joyce Siranni, SUNY-Buffalo; and Robert Sundick, Michigan State University, Kalamazoo (Jerkic 2001).

In turn, Jerry Melbye has had a huge influence on osteology and forensic anthropology in Canada and the United States through his casework and educational initiatives. Melbye was appointed to the Department of Anthropology at the University of Toronto after completing his doctorate and went on to a long career in research and education in skeletal biology and later in forensic anthropology. Between 2004 and 2009, Melbye was at the Texas State University at San Marcos where he helped to develop a new Ph.D. program in forensic anthropology. In Canada, he was instrumental in the establishment of Canada's first forensic science program at the University of Toronto, and he acted as a consultant when the forensic science program was established at the University of Windsor, where the author was appointed in 2004. He also taught thousands of undergraduate students, and supervised 30 doctoral and 54 master's students, who have distinguished themselves in their research and the training of another generation of skeletal biologists and forensic anthropologists. These include Susan Pfeiffer (1976), Shelley Saunders (1977), M. Anne Katzenberg (1983) and Christine White (1990), to name a few. Most professors of physical anthropology with interests in osteology in Canada were or are Anderson's students, Melbye's students, Melbye's students' students, or some combination of the preceding. The author of this chapter is a typical example: two of the author's biggest influences in osteology while an undergraduate at Western University (formerly the University of Western Ontario) were Christine White, who completed her Ph.D. with Melbye, and Michael Spence, who completed his master's degree with Anderson; Melbye supervised the author's master's degree at the University of Toronto, which included research involving the Grant Collection; Melbye's student, Shelley Saunders, was the author's doctoral supervisor at McMaster University (Hamilton, Canada); and the author was a Social Science and Humanities Research Council of Canada (SSHRC) postdoctoral fellow and worked with Susan Pfeiffer at the University of Toronto, conducting research that led to this publication.

Anderson's direct influence on physical anthropology continued well after he left the University of Toronto. For example, Katzenberg and Saunders co-edited several influential volumes, including *Biological Anthropology of the Human Skeleton* (the second edition of which was published in 2008). These thorough and comprehensive volumes were directly inspired by Anderson's publications. In a conversation with the author in 1998, Saunders explained how the goal for the first edition was to provide a more current volume to replace Anderson's guide for investigating past populations, *The Human Skeleton: A Manual for Archaeologists* (1962). See Jerkic (2001) for more information about Anderson's contributions to physical anthropology in Canada.

The Grant Human Skeletal Collection

Identified skeletal collections have been used extensively for medical and anthropological research for over 100 years (Hunt and Albanese 2006). The research value of anatomical and anthropological research of an identified skeletal collection is directly related to the quality of the documentary data associated with each individual and the collection as a whole (Hunt and Albanese 2006; Albanese 2003a; see also Chapters 4 and 5, this volume). Data quality and accuracy can only be assessed through a review of the protocol for collecting and the historical context of the collection period. This section will provide some additional context for the Grant Collection.

Every cadaver that arrived in the Anatomy Department at the University of Toronto was logged into the Anatomy Register and assigned a cadaver number in accordance with the Anatomy Act of Ontario (various dates; see Discussion section). This cadaver number is the same number associated with each skeleton currently in the collection. Until the late 1920s, cadaver numbers were assigned from one to 200. After the cadaver number 200 was reached, the numbering system started again at one. The cadaver number in conjunction with the year of death was used for identification purposes since there were never more than 200 cadavers processed in a given year. In the Anatomy Register that is still on file in the Division of Anatomy, there were five series of cadaver numbers (one to 200) before Grant arrived at the University of Toronto. In 1928, the sixth series of cadaver numbers was started. All of the individuals that are currently in the skeletal collection have Series Six cadaver numbers, with one exception (see below). After Grant arrived in Toronto and began making plans for the skeletal collection, cadaver numbers were not reset after the cadaver number 200 was assigned, but instead were sequentially assigned up to 1000. Series Seven numbers (beginning with number one again) were assigned to cadavers that arrived in the Anatomy Department starting in December 1954, but were not dissected until 1957, the year after Grant retired and several years after the last skeleton was added to the collection. The first skeletons were processed for the collection after the 1930–31 academic year. The last skeleton was added to the collection after the 1953 dissection course. From about 1931 to 1941, between 12 and 22 skeletons were added to the collection each year, which amounts to under 60% of the cadavers that were used for anatomical instruction.

The Grant Skeletal Collection, consisting of 202 skeletons in various degrees of completeness, and most of the documents associated with the collection were transferred to the Department of Anthropology at the University of Toronto in the mid-1980s. Partial cranial elements from an additional 80 individuals were also transferred at that time. These partial crania are numbered but do not have documents associated with them. Some of these skeletal elements pre-date Grant's arrival at the University of Toronto and were never part of the skeletal collection. Although the partial crania are curated with the full skeletons, they should be considered a separate collection. Using new data collected from documents located in the Department of Anatomy at the University of Toronto in 2003, the author has identified 41 of these individuals. However, age at death of these 41 individuals should be considered approximate. For the 39 unidentified partial crania with

cadaver numbers below 200, the challenge is in determining whether they have a Series Five cadaver number or Series Six cadaver number.

Despite the fact that most of Grant's papers are not available in any archive, a series of original documents is still available for the skeletal collection. The documents that are curated with each skeleton varied in format over the 25 years of collecting but fall into two major types, which are referred to here as 'data forms' and 'assessment forms.' Data forms are full-page documents that are available for every individual (excluding the partial crania). The data forms varied over the decades of collecting, but they consistently include the following fields of data: name, age, age verified, sex, serial number (cadaver number), received from (source of the cadaver), date (of death), cause of death, date the dissection was begun, table number (where dissection took place) and a checklist of bones. Additional comments are either in the margin or in a designated notes/comments section on the form. Most of the data (age, age verified, sex, etc.) were consistently recorded on the forms, while other fields, such as the date of death, were often left blank.

Assessment forms are half page forms that are available for 33 of the 202 individuals in the collection and for over 150 individuals that are no longer in the collection with cadaver numbers from GR0437 to GR0837. Assessment forms have the following fields: cadaver number, name, date of death, place of death, patient number (if the person died in a hospital), cause of death, age at death and space to list the criteria to assess whether the age at death and cause of death should be considered correct. The assessment forms are invaluable for reconstructing the process by which cause of death and age at death data were verified, and why some individuals were kept in the collection while others were removed.

Besides sex (based on soft tissue), age at death and cause of death data should be considered accurate with very few exceptions. The author has reviewed all the documents available for the collection in the Department of Anthropology and the Division of Anatomy, including the documents associated with those individuals who were eventually removed from the collection. It is evident from these documents that Grant had a thorough and systematic procedure, similar to Terry's, to assess the accuracy of these two important fields of data. As noted above, death certificate information was not accepted as accurate without independent confirmation. The assessment forms illustrate the confirmation process, which followed a logical pattern where hospital records were reviewed, and individuals who knew the deceased were consulted. There is no evidence of bias in the confirmation of cause of death, and cause of death did not seem to be a criterion for inclusion or retention of an individual in the collection.

Although the assessment forms are available for only 33 of the individuals in the collection, there is evidence that the same process was followed for all the individuals who were included in the collection. In 35 cases (cadaver numbers less than GR0437) with no assessment form, the age at death listed in the Anatomy Register (described above) does not match the age at death that is designated as 'verified' on the data form. At first glance, this discrepancy suggests that the age data for these individuals may be

suspect. In fact, the opposite is true. The age that was recorded in the Anatomy Register was listed on the death certificate and other documents that accompanied the cadaver to the anatomy department morgue. The Anatomy Register had to be kept in compliance with regulations in the Anatomy Act of Ontario and had to remain synchronized with the death certificate. The Anatomy Register should not be considered the definitive source for the correct age because it was never amended even after the correct age at death was determined through independent verification. These 35 'discrepancies' clearly illustrate that the systematic review process for cross-checking age at death data was applied to all the individuals (except the partial crania), and the age of death data were carefully verified even in those cases with no assessment forms.

The situation is different for the cause of death data. The cause of death information on data forms can be considered accurate but not always precise, regardless of whether an assessment form is available or not. For example, the cause of death for GR0640 is listed as 'bronchopneumonia' but on the Anatomy Register it is listed as 'left bronchopneumonia.' The greater detail available in the Anatomy Register is reliable, particularly when considered in conjunction with the source of the cadaver. Many of the individuals in the collection were transferred from hospitals or long term care facilities (i.e. sanatoriums) in the Greater Toronto Area, and thus, the cause of death would have been based on information collected over weeks or months of care and treatment immediately before death. It is not clear why there are small but potentially significant differences from the Anatomy Registry. However, pathological investigations involving individuals from the Grant Collection may be problematic if the information in the Anatomy Register is not reviewed. When considering all of the documents available in conjunction with the source of the cadaver, the cause of death data for the Grant Collection are more precise and accurate than death certificate data for this time period. However, it is important to note that the same caveats apply to the Grant Collection that would apply to any other cause of death data from the 1930s and 1940s. For example, 'senility' is described as the sole or contributing cause of death for two individuals. Because of regulations stemming from the Anatomy Act of Ontario, the Anatomy Register must be stored in fire-proof safe at the Division of Anatomy at the University of Toronto and it is not curated with the skeletal collection.

The protocol in place for the collection process was designed to avoid commingling of skeletal elements from different individuals. Among other things, the data form is a checklist of bones that followed the cadaver, starting with the dissection. There are also clear notes documenting if skeletal elements were removed (for example, 'humerus taken for museum'). Additionally, there are five documented cases where skeletal elements were mixed from several individuals at one time or another. In some cases, the mixing occurred when the cadavers were dissected. In other cases, the mixing occurred later in the collection process, but these elements were later removed. One example is presented to illustrate the thorough record keeping that was followed throughout the collection process, which has ensured the integrity of each individual skeleton in the collection. A comment in the remarks section of the data form for GR0345 states: 'on Feb 11, 1938 the right lower limb was found rotted with fracture of femur and poor injection and was replaced by left lower limb of subject no 170.' This intentional commingling

was carefully documented so that it could be undone. When examining the skeleton of GR0345, it is clear that there is no evidence of mixing: the fractured right femur is present and is consistent in size and robusticity to the left femur, and there is no GR0170 in the collection. The limb from GR0170 was used only at the time of dissection for anatomical instruction and the correct leg was returned when the individual was added to the collection.

In a few other cases, there is evidence of accidental mixing of skeletal remains. These problems seem to be limited to a few ribs that are easily identified when the entire set of ribs is examined for these individuals. Significant problems with commingling occur in only one case: GR0185. The skeletal elements and the documentary data from two individuals are mixed. The problems stem from confusion over two individuals with the same cadaver number. One individual has a Series Five cadaver number and one individual has a Series Six cadaver number. This error occurred very early in the collection process because both the skeletal elements and the documentary information are a mix of Series Five-GR0185 and Series Six-GR0185. Series Five-GR0185 is a nearly complete skeleton of a 79-year-old female who died of arteriosclerosis in 1927. Series Six-GR0185 is represented by a partial cranium of a 60-year-old male that died of calculus pyonephrosis. The skeletal material from both of these individuals is easily separated. The information curated with the skeleton is a mix of data from both individuals: 60-year-old female with age verified with 'calculus pyonephrosis' as the cause of death. The male's age can be considered verified, but the female's age should be considered unverified because there is no evidence that the information for any the Series 5 individuals was rigorously verified.

One major difference that becomes obvious when comparing the Grant Collection to collections from the United States is the nature of the documentary data. Despite the racial view of human variation that was prevalent in physical anthropology in the first half of the 20th century (see Blakey 1987; Armelagos et al 1982), and evident in Grant's early anthropometric research, the documents associated with Grant's skeletal collection are remarkably lacking in racial designations. This lack of racialization is in very sharp contrast to other major research collections, such as the Hamann-Todd Collection and Terry Collection, and is more in line with the earlier Huntington Collection (now at the Smithsonian Institution) where the country of origin of recent immigrants was documented. These differences in documentation likely stem from the location where the collecting took place. In some cases, country of origin (for immigrants) and state of origin are documented for individuals in the Terry Collection. However, racial categories, particularly 'White' and 'Negro' (terms used in the original documents from the 1930s and 1940s), were used to designate individuals in the Terry and Haman-Todd collections to reflect the common popular views in St. Louis and Cleveland, two cities with significant African-American communities. Individuals in the collection were classified after death just as they were in life under the Jim Crow laws, decades before the equal rights movement in the United States. For example, standardized forms were used by Terry in St. Louis for documentary data for each individual in the collection. The form contains similar data as the Grant Collection data form described above with one significant difference. The first line of the form has

spaces for series or year, cadaver number, name and skeleton number. These data had to be kept under the Anatomy Act in Missouri (various dates, see Discussion section). On line two, race was the first non-required datum that was recorded. In contrast, New York (Huntington Collection) and Toronto (Grant Collection) were, and still are, multiethnic and multicultural communities that served as major entry and settlement points for immigrants from various parts of the world (see also Pearlstein 2015). If and when they were categorized, individuals tended to be placed in arbitrary categories based on country of origin, rather than arbitrary categories based on perceived racial difference (see Blakey 1987 for more details).

Following the transfer of the Grant Collection to the Department of Anthropology, the collection was sent to the Cleveland Museum of Natural History (CMNH) for processing and cataloguing in late 1987, and was returned to the University of Toronto in 1988. At the time, the CMNH had recently completed processing the Hamann-Todd Collection and was one of the few institutions with the necessary expertise and facilities to treat skeletons in this condition. An electronic database of demographic data and skeleton inventory was created at the CMNH and is now curated with the skeletal material at the University of Toronto. The figures for this paper were generated using the CMNH database supplemented with data from the Anatomy Register, as well as information collected from the data forms and assessment forms that were not included in the CMNH database.

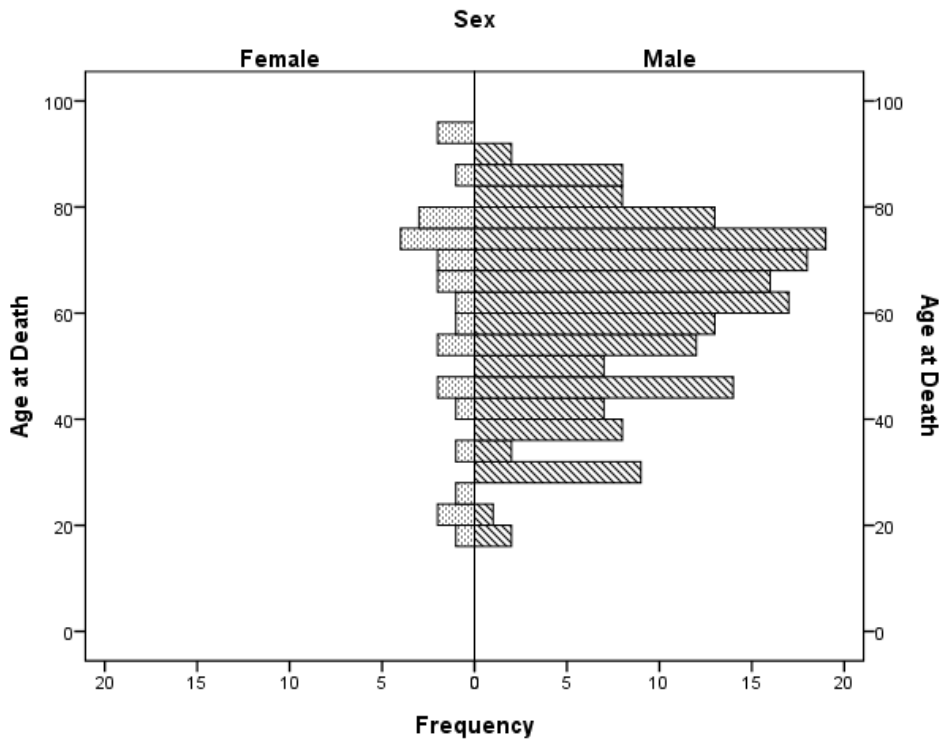

Figure 1. Demographic composition of the Grant Collection (n = 26 females; n = 176 males).

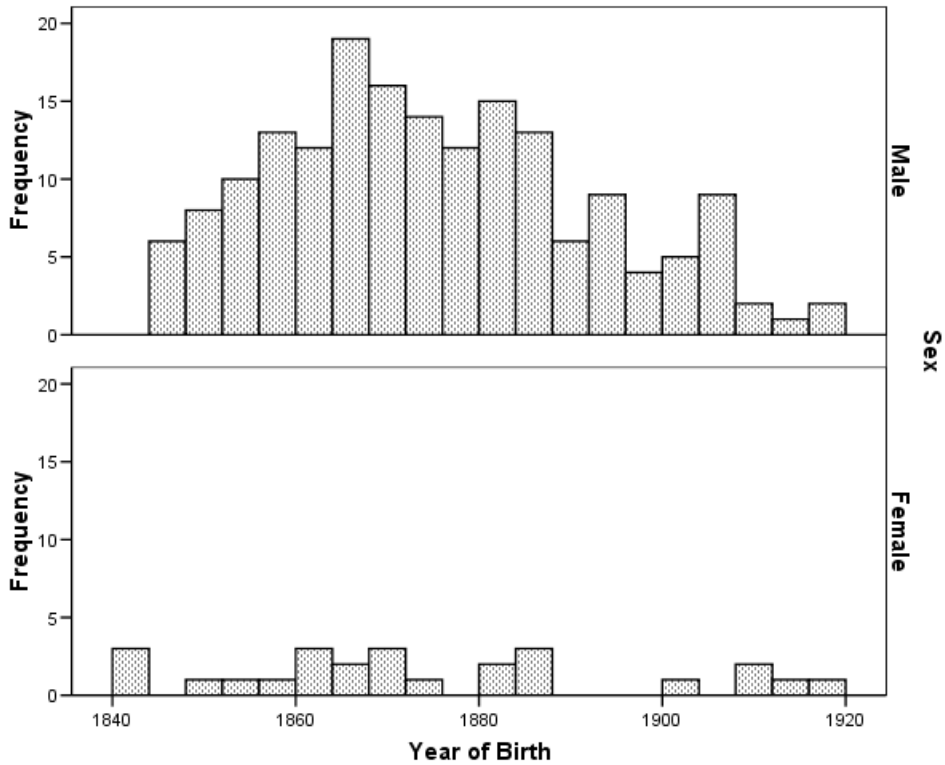

FIGURE 2. BIRTH COHORTS OF MALES AND FEMALES FROM THE GRANT COLLECTION. YEAR OF BIRTH WAS CALCULATED BY SUBTRACTING AGE FROM YEAR OF DEATH. BIRTH YEARS ARE GROUPED INTO 5 YEAR COHORTS (N = 26 FEMALES; N = 176 MALES).

Of the 202 individuals in the collection, 26 are female and 176 are male (Figure 1). Ages at death range from 17 to 93 years with the majority between 45 and 80 years (Figure 1). Ages at death were verified for all the males, and for 17 of the 26 females. However, considering the error described above for GR0185, age at death should be considered verified for only 16 females. Years of birth range from 1841 to 1918 with the majority falling between 1860 and 1890 (Figure 2). Year of birth was estimated by subtracting age at death from year of death. As previously mentioned, there are very few intact crania in the collection. Most crania have a transverse section that allowed for the removal of the calotte and a sagittal section of the cranium that divided the face into left and right halves. The sacrum and the mandible were typically sectioned sagittally, and in some cases, vertebral bodies have also been sectioned. Damage to other bones and the pattern of other missing elements in the rest of the skeleton is more sporadic. Despite the removal of some 'interesting' cases, there are many excellent examples of various pathological conditions, including perimortem fractures, poorly set but healed premortem fractures, and various lesions resulting from infectious diseases in a pre- and peri-antibiotic period. The most common causes of death are (in descending order) various types of cardiovascular disease (arteriosclerosis, myocarditis, etc), tuberculosis (all forms), various types of cancers, and bronchopneumonia (Table 3).

Cause of Death*	Frequency†	Percentage Frequency
Cardiovascular disease	72	36
Cancer	27	13
Tuberculosis	27	13
Bronchopneumonia	23	11

*Only those causes of death that are list more than 5 times are presented.
†This figure is the total number of times that a cause of death is listed as the sole cause of death or in conjunction with another cause of death.

Table 1. Most common causes of death listed in the Grant Collection.

Discussion and Conclusion

The Grant Collection has been underutilized for a number of reasons. The size of the collection, the incompleteness of some skeletons, the very low number of females, and the condition of most of the crania have placed some limits on the collection's research potential. A second major impediment to research has been accessibility. Unlike the Terry Collection, which has been continually available for research, first at Washington University and now at the Smithsonian Institution, the Grant Collection followed a fate similar to the Hamann-Todd Collection. Both collections were not readily available for research for decades. In fact, both collections were nearly lost when there was no interest in their respective anatomy departments to maintain the collections. It was not until the 1980s that both collections were available for research after they were transferred to anthropology departments, processed, re-catalogued and stored in modern, easily accessible storage units.

Data from the Grant Skeletal Collection have been used in several master's and doctoral dissertations (for example, Sharman 2014; Sitchon 2003; Albanese 1997a), conference presentations (for example, Sharman 2004; Albanese 1997b, 1997c, 1997d, 1997e; Fairgrieve and Kaye 1995), and publications (for example, Albanese 2013; Albanese *et al.* 2008; Sitchon and Hoppa 2005; Usher 2002; Rogers 1999; Fairgrieve 1995; Bedford *et al.* 1993; Gruspier and Mullen 1991; Stuart-Macadam 1989; Lang 1987; Lovejoy *et al.* 1985). Much of the research has involved testing and developing forensic methods, particularly age and sex determination methods, and to a lesser extent, the collection has been used in paleopathological and paleoanthropological research. In general, despite some problems with all of the identified collections from this period (Komar and Grivas 2008; Ericksen 1982), research clearly shows that these collections in general are still invaluable for developing and testing modern forensic methods because of the quality of the documentary data (Albanese 2013; Albanese *et al.* 2008; Sharman 2014; see also Chapters 4 -7, this volume). The only limiting factor with the Grant Collection is the size of the collection, and it is best used in conjunction with other identified collections.

Skeletal collections such as the Terry, Todd, and Grant collections owe their existence to a unique set of conditions in the first half of the 20th century in the United States and Canada when most physical anthropologists were anatomists. Key individuals with

research interests in physical anthropology were heads of their respective anatomy departments and could channel departmental resources to amassing and curating skeletal collections. Furthermore, they had legal access to cadavers for anatomical instruction (Terry 1940) through the anatomy acts in their respective jurisdictions at the state level in the Unites States and provincial level in Canada. The anatomy acts in many states and provinces were originally passed in the middle to late 19th century, and are directly derived from the Anatomy Act passed in England in 1832. The focus of that act was to allow the legal transfer of unclaimed cadavers to medical schools for the instruction of anatomy (Blake 1955). Thus, individuals who would have been buried 'at tax-payer expense' where transferred to qualified institutions. Richardson (2001) provides a comprehensive assessment of the social, political and economic context, as well as the ethical issues associated with anatomical instruction in England leading up to the passing of the act in 1832 (see Wilf 1989 for a similar discussion focused on New York).

The origins of the respective acts (Richardson 2001, Wilf 1989) and their application when the skeletal collections were amassed (Muller et al 2017) do raise some ethical concerns regarding anatomical instruction, skeletal collections and power relations within a society (as discussed in Chapter 9). However, the greater socio-economic and political context has continuously changed in the last 200 years in different jurisdictions, and a context-specific nuanced approach to ethical issues has some value and is essential to understand the patterns of variation in various collections (see Chapters 4 and 5, this volume). Although the acts have changed very little since the middle of the 19th century, in the Province of Ontario (Grant Collection), the State of Missouri (Terry Collection) and other jurisdictions, the source of cadavers gradually changed from exclusively unclaimed bodies at the beginning of the 20th century to almost exclusively donated bodies by the beginning of the 21st century. Yet, the differences between the skeletons of unclaimed individuals and donated bodies in the Terry Collection do not seem to be measureable (Ericksen 1982). Also, Charlie Storton, Grant's assistant for many years, noted in an interview in 2007, that while almost all of the individuals currently in the Grant Collection were unclaimed, the pathway for individuals was rather unique (as described in Hall 2007, see also Chapters 4 and 5, this volume).

There is little doubt that the greater power relations in society between dominant groups and marginalized groups are reflected in the demographic composition of the Terry Collection. It is not a coincidence or an accident that Black males make up the largest group and White females make up the smallest group in the Terry Collection (Hunt and Albanese 2005). These biases in the construction of collections have resulted in the use of the Terry and other collections to reinforce and perpetuate scientific and popular misconceptions of human variation (Albanese and Saunders 2006; see Chapter 4, this volume). However, the collections have been and continue to be invaluable for effectively critiquing racial and typological approaches to research and for providing alternatives to a racialized view of human variation that existed when the collections were amassed and that still persist. After Jesse Owens won multiple gold medals at the 1936 Olympics in Berlin, Cobb (1936) collected anthropometric data from Owens and

other athletes and compared it to the detailed anthropometric data collected by Todd from cadavers that were to be included in the Hamann-Todd Collection. Cobb clearly demonstrated the non-concordance of so-called racial traits, and that it was training and not 'race' that resulted in multiple gold medals (see also Rankin-Hill and Blakey 1994; Chapter 9, this volume). More recently, in a series of papers the author and various colleagues have demonstrated using data collected from the Terry, Coimbra, Lisbon and Grant Collections that a racial approach is an impediment to developing effective methods that are applicable in forensic cases, and avoiding a racialized approach results in methods that are more accurate and easier to apply (Albanese *et al.* 2016a; Albanese *et al*. 2016b; Albanese 2013; Albanese *et al.* 2012; Albanese *et al.* 2008; Albanese and Saunders 2006; Albanese *et al.* 2005; Albanese 2003b).

Both physical anthropology and anatomy were very much shaped by the people, research paradigms and greater society in the first half of the 20th century. The development, during this critical period, of both disciplines has had lasting effects that are still seen today. The history of the modern emergence of physical anthropology and the development of the modern curriculum in anatomy were developed during this period. The skeletal collections are a material artifact of these distinct disciplines. While there are similarities between all of the skeletal collections from this period, there are also significant differences in the collections that reflect the research interests of the collector as discussed above, the state of the discipline, popular views of human variation in the greater society (in particular, 'race') and the interactions of these personal, discipline and societal biases (See Chapter 4, this volume). Only with historical context is it possible to understand how the collections were amassed in different parts of the world, which leads to a better understanding of human variation, and a better understanding of the history and current status of two major disciplines. Grant was an early pioneer in a much more hands-on approach to teaching anatomy, and the skeletal collection was an extension of that pedagogy. Grant's contributions to the instruction of anatomy, through his teaching, textbooks and anatomy museum, are enormous. Although his contributions to physical anthropology, osteology, forensic anthropology and bioarchaeology are less well known, they are still very significant. The Grant Collection is available for research to qualified individuals. Interested researchers should contact the Department of Anthropology at the University of Toronto for more information on how to gain access to the collection.

Acknowledgements

Thanks to Dr. Cynthia Kwok, Joan MacKenzie, Dr. Patricia Stewart and Dr. Jennifer Sharman. A special thanks to Pat Reed for facilitating access to the collection and documents in the Department of Anthropology and for a complete list of references involving data from the Grant Collection. This research was funded through a postdoctoral fellowship from the Social Science and Humanities Research Council of Canada. This paper is dedicated to Shelley Saunders, whose contributions to anthropological research cannot be expressed in words.

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