



Forensic Anthropology Population Data

A newly assembled human skeletal reference collection of modern and identified Filipinos



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ABSTRACT

A collection of 75 modern skeletons from the Philippines has recently been created, and is being housed at the Archaeological Studies Program of the University of the Philippines, Diliman, Philippines. All individuals lived during the 20th century, and almost all died within the 21st century. These individuals were accessioned from exhumed and abandoned tombs at the Manila North Cemetery, and most have documented age and sex from tombstone inscriptions. This paper describes the first season of recovery and the collection's current demographic composition, with the future addition of more individuals to the collection expected to follow. The Philippines has an immediate need for forensic resources given its large vulnerable population, widespread diaspora, and exposure to natural disasters. Having a collection of modern Filipinos available for study is critical to the advancement of forensic anthropology and skeletal biology, especially for this heavily understudied population and region of the world.

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1. Introduction

Reference collections are essential resources for research in biological anthropology, especially in developing methods for estimating the biological profile of unidentified skeletal remains. Notable reference collections such as the Hamman–Todd and Terry Collections have served extensively as the basis for standard estimation methods, but such collections do not adequately represent the wide degree of global human skeletal variation. Additionally, many of these more established collections were amassed during the 19th century, and so cannot address secular changes that have occurred since then. Rates of senescence, degrees of sexual dimorphism, manifestations of ancestral traits, and formulae for stature may vary across populations. Therefore, standard methods, while still in wide use in forensics and bioarchaeology, cannot be reliably and appropriately applied to all human groups. Many practitioners now recognize the need for diversity among reference collections [1,2], and the establishment of a Filipino reference collection greatly enhances scientific

capacity for this understudied yet important population and region.

A few dispersed osteological collections can be found in teaching hospitals and universities around the Philippines, but these are most often used as anatomical training tools and therefore rarely have antemortem data or elements still associated with a single individual. Only one previous study has used documented Filipino skeletons [3], which were derived from defleshed cadaveric long bones, but this collection was destroyed shortly after data were collected. The present collection is the first anthropological research collection in the Philippines of modern individuals with antemortem data. The collection was amassed from exhumed and subsequently abandoned skeletons from a large modern cemetery in Manila, Philippines. Several other collections around the world have served as precedent for cemetery-sourced protocols such as ones at the University of Athens [4] and the Crete Collection [5] in Greece, the Bocage Museum [6] and the University of Coimbra [7] in Portugal, the Spitalfields Collection in the UK [8], the National University of La Plata in Argentina [9], the University of Granada [10] and the Universitat Autònoma de Barcelona [11] in Spain, the University of Bologna in Italy [12], and the Autonomous University of Yucatan in Mexico [13] to name a few. Skeletal collections at Khon Kaen University [14–16] and Chiang Mai

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University [17,18] in Thailand were the only openly available resources for anthropological research in Southeast Asia prior to the present collection, although these were amassed through cadaver donations. This newly assembled collection of modern Filipinos adds island Southeast Asia to the growing population diversity of skeletal collections around the world.

2. Materials

It is common funerary practice in the Philippines to reuse graves after a predetermined lease period. This temporary interment is an expedient option for those with low to no income living in densely populated metropolises. Manila North Cemetery is one prime example where such funerary practices are observed and is the current source site for this collection. The site spans 54 hectares and is one of the oldest, largest, and most active in the country. The cheapest burial option is stacked niches, locally termed pauper's graves or apartments, that are leased for five years (Fig. 1). While there is an option for family members to renew the lease for an additional five years, many can no longer be contacted by cemetery administration or opt out of renewal, and these remains become wards of the administration. Remains with expired leases are then exhumed and are placed in rice sacks with their associated tombstone and are stored within the cemetery's grounds for one year prior to being reinterred in a mass grave. The one-year period is for instances when the family do return for remains, although it is rare for families to do so. While one year is the suggested "limbo" period the cemetery administration prescribes before mass burial, the overwhelming rate of disinterment and the lack of personnel and resources result in many neglected and abandoned remains that do not end up in mass graves. Furthermore, the combination of growing poverty and shrinking space has forced many families to take residence within the cemetery among the dead. In turn, many have found sources of income as flower vendors, epitaph carvers, and most relevantly hired grave caretakers. We work in close consultation with these



Fig. 1. Stacked niche burial tombs, locally termed apartments or paupers' graves, at Manila North Cemetery.

caretakers to know which remains no longer have visiting relatives and are the most appropriate for accession.

3. Methods

3.1. Permissions

A permit for the recovery of these remains was issued by the Manila Health Department, which oversees Manila North Cemetery, that stated remains are to be stored and available for non-destructive research at the University of the Philippines on an indefinite basis (in accordance with [19]: Section 97, 100.e). Two major considerations that were brought up by city health officials were (1) ordinances requiring the mass reburial of exhumed remains for sanitary concerns, and (2) actions to be taken if some family members did come forward looking to retrieve their relative's skeleton. In consultation with legal officials at the University of the Philippines, proper sanitation and storage of the remains during the study satisfied the mass burial ordinance (Danilo Concepcion and Rose Beatrix Cruz-Angeles, personal communications, 2016; see [20]). The cemetery administrative office also has a running list of individuals accessioned, and remains will be immediately returned to requesting family members. Because the majority of these skeletons come from destitute contexts, it is nearly impossible to contact living next-of-kin and inform them that research efforts are taking place. However, cemetery staff are now informing the families of remains that are due for exhumation of the option to include their relatives in the collection after the lease period. The project serves as a mutually beneficial agreement between city administrators, cemetery residents, and university scholars to organize and respectfully house unclaimed, unburied remains and allow research and teaching.

3.2. Recovery and recording

All individuals were recovered from Manila North Cemetery between June and August of 2016. While both documented and undocumented individuals were recovered, those with associated tombstones compose the majority of the collection. Each individual was assigned an accession number, and details from the associated tombstone (i.e., name and birth and death dates) were recorded. Gendered names provide documented sex, which was secondarily verified by associated clothing that was also packed with the remains in addition to unanimous visual assessment of the pelvis by at least four observers [21]. Documented age in decimal years was calculated from subtracting the decimal date of birth from the decimal date of death [22–24]. For example, an individual born on December 23, 1993 who died on December 25, 2015 would have an age of 22 years and two days, or 22.005 years. A Minimum Number of Individuals count of one was also verified. Remains were then transported from the cemetery to facilities at the Archaeological Studies Program, University of the Philippines Diliman for processing and curation.

3.3. Processing and curation

A majority of the individuals were fully skeletonized at recovery. However, given the very recent death and disinterment of remains, thorough sanitation was necessary. Cleaning involved dry brushing followed by an initial bath in soapy water in order to loosen any remaining soft tissue adhered to the bone if present. Additional soft tissue and dirt were then scrubbed off. Plastic mesh bags were used to keep sided foot bones associated, as feet were often found segregated in socks. To extract and remove grease and fat, remains were then submerged again in soapy water for a

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